FOOD WHEN THE SHOPS STOP

The Self-Sufficiency Growing Guide

18 practical guides on land, soil, seeds, calories, storage and animals.

foodwhentheshopsstop.com

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The Self-Sufficiency Growing Guide
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PART 1

Getting Started

Is it possible, how long it takes, how much land it needs, and what to grow first.

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GUIDE 1

Can I Really Grow Enough Food to Survive on My Own Land?

Short answer: yes, genuinely, but it takes more than most people expect. With enough land, the right crop mix, and realistic planning that accounts for losses and storage, a household can grow a meaningful share or even all of its food. The households that actually manage it aren't the ones with the most enthusiasm; they're the ones who work out real numbers before they start, rather than discovering the true scale of the task halfway through a growing season.

> **KEY POINTS**
>
> - **Yes, It's Genuinely Possible.** People have fed households from their own land for as long as agriculture has existed: it's not a fantasy, but it does require real land, real labour and real planning.
> - **Scale Is the Usual Surprise.** Most people's mental image of "a productive garden" is far smaller than what full self-sufficiency actually requires, often by several multiples of land, seed and labour.
> - **The First Year Is the Hardest.** Soil, skill and systems all improve with experience: a realistic plan expects the first season to underperform and builds in margin for that.
> - **Numbers Beat Optimism.** The households that succeed plan from real calorie, land and seed figures, not from a general sense that "growing food" will roughly work out.

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What "Enough" Actually Requires

The honest answer to this question is yes, but "enough" is doing a lot of work in that sentence. Growing a meaningful amount of food for fresh eating through a season is genuinely achievable in a modest garden. Growing *all* the calories a household needs for a full year is an entirely different scale of undertaking, requiring real land (often measured in hundreds of square metres per person, not a few raised beds), a crop mix weighted toward calorie staples rather than salad vegetables, and storage systems to carry a harvest through the months nothing is growing.

The households that actually manage full self-sufficiency, or come close, share a few things in common: they plan from real numbers rather than optimism, they build in a buffer for losses (not every seed germinates, not every crop survives to harvest), and they don't rely on crops alone: most combine

growing with stored food, some livestock, or foraging, so a single bad harvest doesn't leave them short.

Three Levels of "Enough"

People use "growing enough food" to mean very different things. Being clear about which one you are aiming at is the first step, because each needs a different amount of land and effort.

LEVEL	WHAT IT MEANS	ROUGH LAND PER PERSON	REALISTIC FOR
1. Fresh supplement	Vegetables, salad and herbs for much of the year. Staples and winter food still come from the shops.	A few raised beds up to a few dozen square metres	Almost any household with a garden or allotment
2. Serious share	A large part of your calories from potatoes, beans, squash and stored crops, with the shops filling the gaps.	Roughly a third to half of the full-self-sufficiency figure	A household with a generous plot and time to work it
3. Full self-sufficiency	Nearly all of your food for the year from your own land, with no shop top-up.	Roughly 750 to 1,800 square metres, depending on zone and skill	Households with real land, good soil, water and years of practice

THE NUMBERS

The Calorie Target

Food security comes down to energy. An adult typically needs somewhere around 2,000 to 2,500 calories a day, depending on size, age and how physically active they are. That is roughly 730,000 to 900,000 calories a year, per person, and every extra person in the household adds the same again.

Now compare that with what vegetables give. A pound or half a kilo of tomatoes or lettuce supplies only a small fraction of a day's energy, while potatoes, beans, grain and squash supply far more per kilo and per square metre. That is why plans for real self-sufficiency are built around staples, not salad. Our what vegetables to grow guide sets out the order of priority, and how much potato, wheat and rice per person puts figures on it.

What You Actually Need

Land is only one of the ingredients. A plan that ignores the others tends to fall over:

- **Land.** Enough of it, in sun for most of the day and not on a steep, waterlogged or heavily shaded site. How much land do I need?
- **Soil.** Healthy soil is what turns land into yield. Poor or compacted soil takes years to improve. See building healthy soil without fertiliser and making compost without buying anything.
- **Water.** A reliable supply for the dry spells, ideally stored from rainfall. Dry climates need extra planning: growing in a drought-prone climate.

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- **Time and labour.** Feeding a household is closer to a part-time job than a hobby, with the heaviest work at planting and harvest. Be honest about how many hours you and your family can realistically give, especially during illness or a busy season.
- **Skill.** Gardening knowledge builds with experience, and every mistake teaches you something. Start growing now so that learning happens while you still have a safety net.
- **Seed.** Enough seed for the plot, and a way to keep it going year after year. See how many seeds for a family of four and how to save seeds.
- **Storage.** Somewhere to keep the harvest and a way to preserve it. See storing food without a fridge.

How Long Does It Take?

Almost nobody gets there in one season. A realistic path looks something like this:

- **Year one.** You learn your site, your soil and your climate. Expect failures, losses and surprises. A good first year might give you a modest share of your food and a lot of lessons.
- **Years two and three.** Soil improves, you stop repeating early mistakes, and you can scale up the crops that work. A sizeable share of your food becomes realistic.
- **Year four onwards.** With stored seed, working systems for storage and a plot that has been built up, a household can come close to full self-sufficiency, if it has the land and the time.

These are rough, and plenty of people take longer. Our guide to how long it takes to become self-sufficient goes into more detail.

PLAN FOR THE BAD YEAR

What Can Go Wrong, and How to Build a Buffer

The harvest you plan for and the harvest you get are rarely the same. The usual culprits are:

- **Weather.** Late frosts, a wet summer, drought or a cold spring can cut a crop by a large margin.
- **Pests and disease.** Slugs, birds, caterpillars, blight and rot can take a heavy toll, particularly on a single-crop plot.
- **Germination and seedling losses.** Not every seed comes up and not every seedling survives.
- **Storage losses.** Rot, mould, mice and damp can quietly eat into a harvest after you have done the hard part.
- **Illness or injury.** If the person doing most of the work is out of action in peak season, crops go unharvested.

Ways to build a buffer:

- Plan to grow somewhat more than you need, so a poor year still leaves enough. Many people aim for a margin of around a fifth or more.
- Grow several staples, not one, so a single failure does not wipe you out.
- Keep a store of food that carries over from one year to the next.

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- Save your own seed so you are not dependent on the next order.
- Share the work among the household, and keep the plan simple enough that someone else could follow it.

See the short growing season guide if your summers are brief.

Beyond the Vegetable Plot

Most successful self-sufficient households do not rely on vegetables alone. They combine several sources:

- **Stored and preserved food.** A pantry of dried beans, grain and preserved produce is the simplest safety net. See the vegetables that store longest.
- **Livestock.** Chickens give eggs and meat from small spaces, but they need feed, shelter and care. See are chickens worth it? and land for a homestead with animals.
- **Foraging.** Wild greens, nuts, berries and fungi add variety, but only if you can identify them with certainty. Never eat anything you cannot identify.
- **Fruit and perennials.** Fruit trees, bushes, asparagus and similar plants take years to establish but then give a harvest for decades with little effort.

None of this makes the garden less important. It simply means the garden does not have to carry the whole load, which makes the plan much more forgiving.

What a Garden Will Not Give You

Even a very productive plot leaves some gaps, and it is better to know them now:

- **Fat and oil.** Hard to grow in a temperate garden without livestock, nuts or oil seeds.
- **Salt.** Not something a garden can supply, and needed both for health and for preserving food.
- **Some vitamins.** A plant-only diet needs a source of vitamin B12, and diets short of animal products or varied crops can run short of other nutrients too. Our guide to surviving on vegetables alone covers this.
- **Medicine and fuel.** A garden helps with neither, though firewood and some herbs can be grown or gathered.

None of these are reasons not to grow food. They are reasons to plan beyond the vegetable plot, and to keep a modest stock of the things you cannot grow.

Where to Start Right Now

1. **Grow something this season,** even if it is only potatoes and beans. Practical experience is worth more than any amount of reading.
2. **Build your soil.** Start a compost heap and mulch your beds.

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3. **Learn to store.** Practise drying beans, curing onions and storing roots, so you are ready when the harvest grows.
4. **Save seed from easy crops.** Beans, peas, lettuce and tomatoes are a good start. See our Seed-Saving Helper.
5. **Scale up gradually.** Add land, crops and systems year by year, not all at once.

Start with what vegetables to grow, then work out how much land you need.

Frequently Asked Questions

Can I really grow enough food to survive on my own land?

Yes, it's genuinely possible with enough land, the right crops and realistic planning, but it takes considerably more space, labour and time than most people expect: the households that succeed are the ones who work out real numbers in advance rather than assuming a garden will naturally scale up to full self-sufficiency.

What's the biggest reason people fail to grow enough food?

Underestimating scale: most people plant a garden sized for fresh eating through the season and assume it's roughly self-sufficient, when in reality the land, seed and labour needed to cover a household's full calorie needs for a year is far larger than a typical hobby garden, often by several multiples.

Does growing enough food mean giving up other food sources entirely?

Not necessarily: a realistic self-sufficiency plan usually combines grown crops with other sources like stored food, livestock, or foraging, since relying on crops alone, especially in the first year or two, leaves little margin if a harvest underperforms.

How much land do I need to feed one person?

As a rough guide, full self-sufficiency takes somewhere between about 750 and 1,800 square metres per person, depending on your climate zone and how experienced you are. A smaller area can supply a large share of your food, but covering every calorie for a year takes real land.

How many calories does a person need each year?

An adult typically needs around 2,000 to 2,500 calories a day, which is roughly 730,000 to 900,000 calories a year. The exact figure varies with age, size and activity level.

Can I be self-sufficient on an allotment?

An allotment is usually much smaller than the land needed for full self-sufficiency, but it can supply a large share of your vegetables and some of your staples, especially potatoes, beans and squash. Treat it as a way to reduce your reliance on the shops, rather than replace them entirely.

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How long does it take to become self-sufficient?

Most people need several years. The first season is mainly about learning your site and soil, and many households take three to five years or more to reach a dependable, large share of their food. See our guide for more detail.

What is the hardest part of growing all your own food?

Usually the sheer scale and the need for dependable calories over the winter. Growing fresh vegetables for the summer is much easier than producing, storing and preserving enough staples to last twelve months.

Do I need livestock to be self-sufficient?

Not strictly, but animals help. Chickens provide eggs and meat, and livestock supply fat and manure. A plant-only plan is possible, but needs careful attention to protein, fat and vitamin B12.

What if my first harvest fails?

It is common for a first harvest to fall short. This is why it is wise to keep your normal food supply going while you learn, grow more than you need, and spread the risk across several crops rather than depending on one.

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GUIDE 2

How Long Does It Take to Become Self-Sufficient in Food?

Short answer: several years, not one season. Year one is mostly about learning your soil, climate and pests, and rarely hits full calorie targets even with a good plan. Years two and three usually see real improvement as fertility, skill and systems mature. Genuine year-round reliability, where a bad week doesn't threaten the whole plan, typically takes three to five years to build. Anyone promising full self-sufficiency in a single season is skipping the part where you actually learn your land.

> **KEY POINTS**
>
> - **Year One: Learning, Not Mastery.** Soil, microclimate, pests and your own skill are all unknowns: expect underperformance against targets even with a solid plan.
> - **Years Two & Three: Real Progress.** Soil fertility builds, systems (rotation, seed-saving, storage) start working properly, and yields typically improve substantially.
> - **Years Three to Five: Reliability.** This is roughly when perennial crops like fruit trees start yielding meaningfully, and a plan stops depending on everything going right at once.
> - **Numbers Shorten the Learning Curve.** Knowing your real seed and land requirements from the start avoids one of the biggest first-year mistakes: planning from guesswork instead of your actual numbers.

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Why the Timeline Is Measured in Years

Two things drive how long real self-sufficiency takes to build, and neither of them is fixable by working harder in a single season: soil fertility and experience. Soil that's been fed compost and managed well for three years produces noticeably better harvests than the same ground in its first season under cultivation: there's no shortcut to that, only time and consistent inputs.

Experience works the same way. The first time you grow a crop in your specific soil and microclimate, you're learning in real time, when it actually needs water, what pests show up and when, how your particular growing season really runs versus the seed packet's generic guidance. That knowledge compounds every year, which is why second and third seasons routinely outperform the first even without changing much else.

Year by Year: What to Expect

Every site is different, but most people follow a similar path. Treat the shares below as rough guides, not promises.

WHEN	TYPICAL SHARE OF YOUR FOOD	WHAT YOU ARE DOING	WHAT YOU LEARN
Year 1	A modest share, mostly summer vegetables and some staples	Preparing beds, sowing easy crops, starting a compost heap	How your soil, weather, slugs and birds actually behave
Year 2	A noticeably bigger share	Fixing year-one problems, adding staples and storage crops, extending the plot	Which crops thrive for you, and how to keep them going through winter
Year 3	A large share of your vegetables and some of your calories	Rotating crops, saving seed from easy crops, planting perennials	How to store and preserve enough to bridge the hungry gap
Years 4 and 5	A dependable large share, close to self-sufficient for some households	Fine-tuning, harvesting from the first perennials, building a food reserve	How to handle a bad year without panic
Year 5 onwards	Full self-sufficiency is possible for households with enough land and time	Maintaining soil, seed stock and stores	Which parts of the system need most attention

Some households move faster, particularly those that already garden, and many take longer. The point is that progress compounds. Each year you start from a better position than the last.

What Speeds It Up, and What Slows It Down

Things that speed it up

- Existing gardening experience, or a neighbour who can mentor you.
- Good, well-drained soil, or a site where beds have been cultivated before.
- A reliable water supply and a sunny, sheltered plot.
- Several people helping, so the work is shared.
- Starting with real numbers and a plan, so you grow the right things in the right amounts.

Things that slow it down

- Starting on compacted, stony, waterlogged or very poor soil.
- Heavy shade, strong wind or frost pockets.
- A short growing season or a difficult climate. See short growing season.
- Little time to spare, or being unable to garden through illness or travel.
- Trying to do everything in the first year, then giving up when it overwhelms you.

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How Long Perennials Take

Perennial crops are a long-term investment. They need patience at the start, but once established they give a harvest year after year for little work. Typical waiting times are:

PLANT	ROUGHLY HOW LONG UNTIL A WORTHWHILE HARVEST	NOTES
Strawberries	About a year	Plants crop well for a few years, then need replacing from runners.
Raspberries and blackberries	One to two years	Fast and productive, and easy to propagate.
Currants and gooseberries	Two to three years	Long-lived and reliable.
Rhubarb	About a year before light picking	Leave it to build strength first.
Asparagus	Two to three years	Worth the wait: a bed can last for 20 years or more.
Apples and pears	Often three to five years or longer	Dwarfing rootstocks fruit sooner than full-size trees.
Nut trees	Many years	A long-term gift, not a quick food source.

THE FOUNDATION

Building Soil Takes Seasons

Soil changes slowly. Compost, mulch, green manures and careful digging all help, but the improvement builds over several seasons, not overnight. Typical stages are:

- **First season.** Remove perennial weeds, loosen compacted ground and add as much compost or manure as you can get. Expect uneven results.
- **Second season.** Organic matter starts to build up, soil structure improves and beds become easier to work.
- **Third season onwards.** Earthworms and soil life are established, beds hold water better, and yields climb noticeably.

Feeding your soil from your own resources is a big part of resilience. See building healthy soil without fertiliser and making compost without buying anything.

Skills to Build, in Order

You do not have to learn everything at once. A sensible order is:

1. **Growing easy crops well.** Potatoes, beans, squash, onions and leafy greens. See what vegetables to grow.

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2. **Making compost and managing soil.** It underpins everything else.
3. **Watering and pest control.** Learning to spot problems early and respond sensibly.
4. **Storing and preserving.** Drying, curing, clamping and storing. See vegetables that store longest.
5. **Crop rotation and planning.** Keeps soil healthy and pests down, and makes yields predictable.
6. **Saving seed.** Start with easy crops. See how to save seeds.
7. **Scaling up and adding livestock or fruit.** Once the foundations are solid.

LEARN FASTER

Keep Records from Day One

The single easiest way to shorten the learning curve is to write things down. A simple notebook or spreadsheet is enough. Note:

- When you sowed, planted out and harvested each crop.
- How much each crop actually yielded, ideally weighed.
- Which varieties did well and which failed.
- Weather events, pest outbreaks and what you did about them.
- Losses in storage, and why.

Phase Out the Shops Gradually

The safest approach is to treat your garden as a growing share of your food, not an all-or-nothing leap. Keep your normal food supply going while you learn, and reduce your reliance on it only as the garden proves itself.

- Build up a store of dried and tinned food as a safety net while you learn.
- Set modest targets each year, such as covering all of your potatoes and onions, then adding beans and squash.
- Measure what you actually harvested before increasing the target.
- Never stake your food supply on a single untested crop.

For the bigger picture, see can I grow enough food to survive? and how much land do I need?.

If You Need Food Quickly

If you are starting in a hurry, some crops give food much sooner than others. These are rough times from sowing to a first harvest, in a suitable season:

CROP	ROUGHLY HOW LONG TO FIRST HARVEST	NOTES
Radish	About 3 to 5 weeks	Quick and easy, but little food energy.

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Salad leaves and spinach	About 4 to 8 weeks	Cut-and-come-again for repeat harvests.
Peas and bush beans	About 8 to 12 weeks	Dried, they become a storable staple.
Early potatoes	About 10 to 14 weeks	The fastest staple for calories.
Maincrop potatoes and squash	About 16 to 20 weeks or more	Higher yields, and they store well.

Fast crops fill the gap while slower staples grow, but there is no way to compress a full growing season. A realistic emergency plan starts as early as possible and expects the first real harvest months away. See short growing season if your summers are brief.

Frequently Asked Questions

How long does it take to become self-sufficient in food?

Realistically, several years rather than a single season: the first year is mostly about learning your soil and climate and rarely hits full calorie targets, the second and third years usually see yields improve substantially as soil fertility, skill and systems like perennial crops and seed-saving mature, and genuine year-round reliability typically takes three to five years to establish.

Why doesn't the first growing season usually work as planned?

Because the first year is when soil fertility, pest and disease pressure, watering needs, and the grower's own experience are all unknowns at once: even a well-planned first season tends to underperform its targets simply because so much is being learned for the first time under real conditions rather than on paper.

What takes the longest to establish?

Perennial crops and soil fertility both take multiple years to reach their full potential: fruit trees and bushes often take three to five years before meaningful yields, and soil built up with years of compost and good management produces noticeably better harvests than soil in its first season of cultivation.

Can I become self-sufficient in one year?

Very unlikely. Even an experienced gardener usually needs a few seasons to build soil, learn a new site and create dependable storage. A beginner should expect the first year to give only a modest share of their food.

How long until I can grow all my own vegetables?

Many households can cover most of their vegetables within two or three years, especially if they already garden. Growing all your calories, including staples and winter food, takes longer.

How long do fruit trees take to produce?

Typically three to five years for apples and pears, sometimes longer, depending on the rootstock and variety. Soft fruit like raspberries and currants is faster, often producing in one to three years.

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What if I have poor soil?

It will slow you down, but is not a reason to give up. Add compost and mulch, grow green manures, and consider raised beds so you can build good soil in a smaller area first.

What are the fastest crops to grow for food?

Radishes, salad leaves and spinach are ready in weeks, followed by peas, bush beans and early potatoes in around two to three months. Only potatoes and beans give significant calories.

Should I keep buying food while I learn?

Yes. Keep your normal food supply and build a store of staples while the garden develops. Reduce your reliance on shop-bought food only as your harvests become dependable.

How do I know when I am self-sufficient?

When you have been through at least one bad year without running short, and your harvest, stores and seed cover the whole twelve months. Keeping records helps you see it clearly.

Does having more land make it faster?

Not directly. More land needs more work, and a large plot you cannot manage will slow you down. It is usually better to start with a plot you can look after well and expand year by year.

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GUIDE 3

How Much Land Do I Need to Grow My Own Food?

KEY POINTS

- **Climate Zone Changes Everything.** A Mediterranean or Subtropical zone can yield two to three times more food per square metre than a Boreal or Alpine one: the same crop plan needs very different amounts of land depending on where you are.
- **Staples Need More Room Than Vegetables.** Grain and potatoes supply the bulk of daily calories but take far more land per calorie than most vegetables: a diet leaning on calorie staples needs noticeably more space than one leaning on vegetables alone (which in turn won't fully feed you either).
- **Livestock Multiplies the Land Needed.** An animal has to be fed from land too, so a plan that includes meat, eggs or dairy needs considerably more space per calorie delivered than a crops-only plan.
- **Real Numbers Beat Rules of Thumb.** Every "how much land" rule of thumb is an average across assumptions that may not match your household: the only reliable number is one calculated from your actual group size, zone and crop selection.

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Why "It Depends" Is the Honest Answer

Most "how much land do you need" answers online quote a single number as if it applies everywhere. It doesn't. Three things move the real figure enormously:

- **Your climate zone.** The same crop planted in a Mediterranean zone with a long, warm growing season will out-yield the same crop in a Cool/Boreal zone with a short one, sometimes by two or three times. A land estimate that doesn't specify a zone is really just a guess.
- **What you're growing.** Calorie staples like potatoes, wheat and maize are what actually keep a household fed through a year, but they need real land: a lot more per calorie than fast, space-efficient vegetables like lettuce or radish, which fill a plate but not a pantry.
- **How intensively you grow.** Wide-spaced traditional row cropping uses more land than tightly-spaced, heavily-composted intensive beds: both are legitimate approaches, but they lead to very different area figures for the same harvest.

SCALING UP

Land by Household Size

Using a range of 750 to 1,800 square metres per person for a full calorie diet built on staples, the totals for a household look like this:

PEOPLE	AREA (SQUARE METRES)	ROUGHLY IN ACRES
1	750 to 1,800	0.2 to 0.45
2	1,500 to 3,600	0.4 to 0.9
4	3,000 to 7,200	0.75 to 1.8
6	4,500 to 10,800	1.1 to 2.7

Why the Range Is So Wide

- **Climate.** Warm zones with long seasons and good rainfall produce more per square metre than cold, dry or high-altitude ones. See short growing seasons and drought-prone climates.
- **Crop choice.** Potatoes, sweet potatoes and squash give a lot of calories per square metre, grain and dried beans give fewer. See highest-calorie crops per square metre.
- **Soil.** Fertile, well-fed soil can double yields compared with poor ground. See building healthy soil.
- **Skill.** First-year yields are usually well below what an experienced grower gets from the same ground.

Paths, Rotation and Fallow

A figure for growing area is not the same as the land you need to own. Allow extra for:

- **Paths and edges.** Beds take up only part of a plot, often a half to three-quarters of it.
- **Rotation and fallow.** Crops are moved around, and some ground may rest, so more land is in use over the years than in any one season.
- **Compost and fertility crops.** Some ground may be given to green manures or compost materials. See making compost.
- **Buildings, water and storage.** Sheds, tanks and a storage space take room too.
- **Animals.** Livestock add a great deal. See land for a homestead with animals.

Growing Part of Your Food

Almost nobody starts by growing every calorie. Roughly, the land needed scales with the share you grow, though vegetables and fruit give you more in nutrition and variety for each square metre than staples do:

GOAL	WHAT IT MEANS	LAND PER PERSON (APPROX.)

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Fresh vegetables and herbs	Most of your vegetables in season, few calories	Tens of square metres up to about 100
Vegetables plus potatoes	Vegetables year-round and a large part of your potatoes	A few hundred square metres
Most calories	Staples, beans and vegetables covering most of the year	The lower part of the full range or more
Everything	Full self-sufficiency in calories	750 to 1,800 square metres

These are rough guides and the middle rows vary widely with climate and crop choice.

Where to Start

1. Start with the area you can look after well, and add to it each year as skill and soil improve. See how long it takes to become self-sufficient.
2. Grow the staples first, then add vegetables, fruit and animals as space allows. See what vegetables to grow.

Common Mistakes

1. **Using a single figure for every climate.** The same household needs very different land in different zones.
2. **Counting only bed area.** Paths, rotation and storage use land as well.
3. **Assuming small-plot claims apply to calories.** Very small figures usually mean vegetables or part of the diet.
4. **Planning for a perfect year.** Leave a margin for crop failure.
5. **Taking on too much at once.** A smaller plot done well beats a large one done badly.

Frequently Asked Questions

Why does land requirement vary so much between sources?

Because the figures depend on three things that vary enormously: how many calories come from land-hungry staples like grain and potatoes versus space-efficient vegetables, how favourable your climate zone is for growing (a Mediterranean zone yields far more per square metre than a Boreal one), and how intensively the ground is managed, from wide-spaced row cropping to tight biointensive beds.

Does keeping livestock change how much land I need?

Yes, substantially: livestock generally need far more land per calorie produced than crops do, since the animal is itself fed from land you could otherwise grow food on directly, so a self-sufficiency plan built around meat and dairy needs considerably more space than one built around crops alone.

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How much land do I need for a family of 4?

Using the same range as above, roughly 3,000 to 7,200 square metres (0.75 to 1.8 acres) to grow every calorie on a diet built around staples. Growing part of your food needs much less.

Can I grow enough food on a small plot?

You can grow a large share of your vegetables on a small plot, but all of your calories take much more land, because staples such as grain, potatoes and beans need space.

Does land need to be level and sunny?

Sun matters most. Most food crops want at least six hours of direct sun a day, and a gentle slope is easier to work and drain than steep ground or a hollow where frost collects.

How much extra land should I allow for paths?

A common allowance is to expect beds to cover roughly half to three-quarters of the plot, so plan the overall area accordingly.

Where should I start if I have no experience?

Start with a small area, grow potatoes, beans and a few vegetables you like, and expand as you learn. See the guide to becoming self-sufficient.

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GUIDE 4

What Vegetables Should I Grow If the Shops Stop?

Short answer: start with calorie staples, not salad. Potatoes, grains and dried beans should come first because they carry most of a household's daily energy. Storage crops like onions, squash and cabbage come next, since they keep for months without refrigeration. Fast-growing fresh vegetables (lettuce, spinach, radish) round things out with nutrition and variety, but shouldn't be where the plan starts. The single most common mistake is growing a garden full of quick salad crops and running desperately short on actual calories.

KEY POINTS

- **Calorie Staples First.** Potatoes, wheat, maize, dried beans and peas: these crops carry the bulk of daily energy needs and should take up the largest share of growing space.
- **Storage Crops Second.** Onions, winter squash, cabbage, carrots and other crops that keep for months without a fridge: these bridge the gap between harvests through winter.
- **Fresh Vegetables Third.** Lettuce, spinach, radish and other fast, high-turnover crops: valuable for vitamins and variety, but not where the calorie plan should rest.
- **Zone Changes the List.** A crop that thrives in a Mediterranean zone may struggle in a Boreal one: the right list always starts from what genuinely grows well where you are.

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The Order Matters More Than the List

Most "what to grow" advice online is really a list of easy, popular vegetables: tomatoes, lettuce, courgettes, peppers. All genuinely useful crops, but none of them will feed a household through a winter on their own, because none of them supply much in the way of calories. A tomato plant gives you flavour and vitamin C, not the energy a body actually runs on.

The crops that actually matter for real food security are the unglamorous ones: potatoes, grains, dried beans. These are what carry a household's calorie needs, and they take real growing space to matter, not a few plants in a corner, but a genuine share of the plot. After that, storage crops matter because they extend a harvest through the months when nothing fresh is growing. Fresh vegetables come last in priority, not because they're unimportant, but because they're the easiest part to get right and the least likely to leave a household short.

Which specific crops make sense depends entirely on your climate zone: this site's full crop guide section covers cultivation, yield and storage for over 100 crops across all 8 zones.

PRIORITY ONE

Calorie Staples: The Foundation

A staple is a crop that gives you a large amount of food energy from a given area and keeps well enough to eat all year. These are the crops that decide whether a plot can actually feed people:

CROP	WHY IT EARNS ITS SPACE	GUIDE
Potatoes	High yield from a small area, easy to grow in most climates, and a good keeper in a cool, dark store.	Potato
Sweet potatoes	A warm-climate equivalent to potatoes. Heavy yields where summers are long and hot enough.	Sweet potato
Dried beans and peas	Calories plus protein, and the harvest dries and stores for years in a jar. Also feed the soil.	Dried peas, French bean, Runner bean
Grains	Wheat, maize, oats and barley give the most storable calories, but need the most space and the most processing.	Wheat, Maize
Winter squash	Large, calorie-rich fruit that cures and stores for months in a cool room.	Squash
Hardy roots	Parsnips, swedes and Jerusalem artichokes crop heavily, tolerate cold, and can wait in the ground until needed.	Parsnip, Swede, Jerusalem artichoke

Which of these suits you depends on your climate and how much work you want to take on. Potatoes and beans are the easiest places to start; grains are rewarding but are best added once the rest of the plan is working. For the figures behind these choices, see our guide to the highest-calorie crops per square metre and the calorie rankings for every crop in your zone.

Storage Crops: Food for the Lean Months

Storage crops do not necessarily give the most calories, but they carry your harvest across the gap between one season and the next. Without them, even a good summer leaves you short in late winter and early spring, the hungry gap.

- **Onions and garlic.** Cure them in the sun, hang them in a cool, airy place, and they can last many months. They also flavour almost everything else you grow.
- **Winter cabbage.** Hardy heads can stand in the garden through the cold months or be kept in a cool store.
- **Carrots, beetroot and parsnips.** Store in boxes of damp sand, or leave them in the ground under a mulch in milder climates.
- **Winter squash and pumpkins.** Cure after harvest and keep somewhere cool and frost-free.

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- **Dried beans, grain and seed.** Properly dried, these keep for a year or more with no power at all.

How you store matters as much as what you grow. See our guides to the vegetables that store longest, storing food without a fridge and root cellar alternatives.

Fresh Vegetables: Small Space, Big Benefit

Fresh crops come third in the plan, but they should not be skipped. They supply vitamins, minerals and fibre that staples lack, and they make a diet of potatoes and beans bearable for months on end. Many of them need very little ground.

- **Fast, repeat-sown greens.** Lettuce, spinach and radish can be sown every few weeks and fill gaps between bigger crops.
- **Cut-and-come-again crops.** Kale, chard and perpetual spinach keep producing for months from a single sowing, and kale will stand through winter in many climates.
- **Perennial vegetables.** Asparagus, rhubarb, sea kale and walking onions come back every year with almost no effort once planted. See our perennial vegetables.
- **Tomatoes, peppers and cucumbers.** Wonderful where the summer is long enough, but a bonus, not a foundation.

A useful rule: give fresh vegetables a modest part of the plot, and choose the ones you will actually eat.

How to Split Your Plot

There is no single correct split, because it depends on your climate, your household and how much you rely on the garden. As a rough starting point for a plot that is meant to carry real food security:

GROUP	ROUGH SHARE OF GROWING SPACE	WHAT IT DOES
Calorie staples	About half or a little more	Provides most of the food energy.
Storage crops	About a quarter to a third	Carries the harvest through winter and the hungry gap.
Fresh vegetables	The remainder, often a tenth to an eighth	Adds nutrition, flavour and variety.

Treat these as a starting point to adjust, not a rule. A household with a large plot and a short season will lean harder on potatoes and hardy roots; one in a long, warm season can add grains and sweet potatoes. A plot that is a supplement to the shops can safely take more fresh vegetables.

Beyond Calories: Protein and Nutrition

Calories are the first priority, but they are not the whole picture. A plan built only on potatoes would soon run into trouble.

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- **Protein.** Beans, peas and lentils are the main plant source. Aim to grow enough dried beans that they are a regular part of the diet, not an occasional extra. Grains and beans together make a more complete protein than either alone.
- **Vitamin C.** Potatoes, kale, cabbage and peppers all help. A winter without any fresh green or vitamin C source is a real health risk.
- **Vitamin A and minerals.** Carrots, squash, sweet potatoes and dark leafy greens such as kale and spinach are the key sources.
- **Fat.** This is the hardest nutrient to grow in a temperate garden. Sunflower seeds, squash seeds and nuts help a little, which is one reason many people also keep chickens.

Our guide to whether you can survive on vegetables alone looks at the gaps in detail, and are chickens worth it? covers the eggs and fat side.

WHERE YOU GARDEN

What Changes by Climate Zone

The order (staples, storage, fresh) holds everywhere. The crops that fill each group do not. Here is a rough guide to what tends to lead in each zone, with a link to the full crop list for it.

CLIMATE	WHAT TENDS TO LEAD	FULL LIST
Cold (boreal)	Potatoes, swede, turnip, parsnip, kale and other hardy brassicas. Fast crops and short-season varieties matter.	Cold climate
Alpine	Potatoes, hardy roots and kale. Frost can come in any month, so protect early sowings.	Alpine climate
Continental	Potatoes, squash, beans, maize and cabbage. Hot summers suit warm-season crops; winters demand good storage.	Continental climate
Maritime	Potatoes, kale, leeks, broad beans and roots. Mild and damp, which suits brassicas but makes ripening grain and warm crops harder.	Maritime climate
Mediterranean	Beans, squash, onions, tomatoes and peppers, with cool-season crops grown through the winter. Summer drought is the main limit.	Mediterranean climate
Dry (arid)	Drought-tolerant crops such as tepary beans, millet, squash and sweet potatoes. Water, not heat, decides what works.	Dry climate
Subtropical	Sweet potatoes, beans, squash, peppers and pigeon pea. Long seasons allow more than one crop a year.	Subtropical climate
Tropical	Sweet potatoes, pigeon pea and perennial greens such as moringa and Malabar spinach. Heat and heavy rain suit different crops from temperate gardens.	Tropical climate

If you are not sure which zone you are in, the zone finder will tell you. These summaries are a general guide; local conditions, soil and altitude all matter.

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A First-Year Crop List

If you are starting from scratch, do not try to grow everything. A sensible first year concentrates on a short list of reliable crops, one or two from each group:

1. **Potatoes.** Your calorie workhorse, easy and forgiving. Grow both early and maincrop if you have room.
2. **Dried beans or peas.** Choose a variety suited to your climate and let the pods dry on the plant.
3. **Winter squash.** One or two plants give a surprising amount of storable food.
4. **Onions.** Easy to grow, easy to store, and used in almost every meal.
5. **Carrots or parsnips.** For a storable root crop that stays fresh in the ground or in sand.
6. **Kale or winter cabbage.** Fresh greens through the cold months.
7. **Lettuce, spinach or radish.** Quick, cheerful crops that reward a beginner early.
8. **One crop you love to eat.** A tomato plant or a row of peas keeps the whole project enjoyable.

Choose open-pollinated varieties if you plan to save seed (see open-pollinated vs F1 hybrid), and read how many seeds you will need before you order.

LEARN FROM OTHERS

Common Mistakes to Avoid

1. **Growing a salad garden.** Lots of lettuce and tomatoes, and not enough potatoes, beans and squash to feed anyone through winter.
2. **Relying on a single staple.** If potato blight or a poor summer wipes out one crop, you want others to fall back on. Grow two or three staples.
3. **Planting too much of a difficult crop.** Start with a few plants of a new crop and scale up once you know it works for you.
4. **Forgetting storage and processing.** A harvest you cannot store, dry or process is a harvest you will lose. Plan for it alongside the growing.
5. **Starting with grain.** Wheat and other grains need room, and threshing and milling. They are worthwhile, but not the best crop to begin with.
6. **Ignoring protein.** Skipping beans leaves a gap that potatoes cannot fill.
7. **Growing food you will not eat.** The best crop list is the one you will actually cook, so grow what suits your family's tastes.

Related Guides

- Can I grow enough food to survive?
- How much potato, wheat and rice per person?
- Growing food in a short season

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- Growing food in a drought-prone climate
- How long does it take to become self-sufficient?

Frequently Asked Questions

What vegetables should I grow if the shops stop?

Start with calorie staples (potatoes, grains and dried beans) since these carry most of a household's daily energy, then add storage crops like onions, squash and cabbage that keep for months without refrigeration, and only after that round things out with fast-growing fresh vegetables for nutrition and variety. Growing only quick salad crops and skipping the staples is the single most common mistake people make.

Are leafy greens like lettuce and spinach worth growing?

Yes, but not as a primary calorie source: they're valuable for vitamins, minerals and variety, and they grow fast enough to fill gaps between other harvests, but a diet built mainly on leafy greens will leave a household seriously short of calories no matter how much is grown.

Should the crops I grow depend on my climate zone?

Yes, significantly: the same crop can be a reliable staple in one zone and barely viable in another, so the right crop list starts from what genuinely grows well where you are, not a generic list copied from somewhere with a different climate.

What are the easiest crops for a beginner who wants food security?

Potatoes, dried or runner beans, winter squash, onions and kale are among the most forgiving. They need little equipment, most of them store well, and between them they cover calories, protein and winter greens.

Do I need to grow grain?

Not in your first year. Grains such as wheat or maize give very storable calories but need a lot of space, plus threshing and milling. Potatoes, beans and squash give more food per square metre with less work, so most gardeners add grain later.

How many different crops should I grow?

Fewer than you think at first. A dozen well-chosen crops, covering a staple or two, some storage vegetables, beans and a few fresh greens, is plenty to start with. Add new crops one or two at a time as you gain experience.

Which vegetables store the longest without a fridge?

Dried beans and grain keep longest, often a year or more. Winter squash, onions, garlic, potatoes, carrots and winter cabbage can last several months in a cool, dry, frost-free place. See our guide to the vegetables that store longest for details.

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Can I grow enough protein from the garden?

Largely, yes, through dried beans, peas and lentils, especially when eaten with grains or potatoes. Eggs from chickens fill in much of the rest. It takes dedicated growing space for beans, not just a few plants.

What should I grow if I only have a small garden?

Focus on the crops that give the most food from the least space, mainly potatoes, squash grown upwards, and beans on supports, and add compact fresh greens. A small plot cannot feed a household on its own, but it can still make a real difference.

Should I grow what I like to eat or what is most efficient?

A mix. Efficiency decides the foundation, but a plot full of food nobody wants to eat will not last. Choose staples your household enjoys cooking, then use the leftover space for favourites.

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PART 2

Climate and Soil

Working with a short season, dry weather, and ground that feeds your crops.

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GUIDE 5

What Can I Grow in a Short Growing Season?

Short answer: match the crop and variety to the days you actually have, not the days a generic seed packet assumes. Fast-maturing varieties of familiar crops, naturally hardy staples like potato and barley, and leafy greens grown for repeated cut-and-come-again harvests all genuinely suit a compressed season. A short growing season isn't unique to the coldest zones, either: a late spring, an early frost, altitude, or just a bad year can compress the window almost anywhere.

KEY POINTS

- **Choose Fast Varieties First.** Within almost any crop, some varieties mature notably faster than others: an early potato instead of a maincrop, a quick radish instead of a slow one.
- **Start Seedlings Indoors.** Starting plants under cover before the last frost effectively extends the usable season by weeks.
- **Succession & Cut-and-Come-Again.** Fast leafy greens grown for repeated small harvests, sown little and often, suit a short window better than one big slow crop.
- **Not Just a Boreal Problem.** Altitude, a late spring, or an unusually bad year can compress a season in almost any zone: these strategies apply more widely than just the coldest climates.

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Planning Around Days, Not Assumptions

Every crop variety has a "days to maturity" figure, even if it's not always advertised prominently, and within a single crop, that figure can vary enormously. A maincrop potato might need well over 100 days; an early variety can be ready in 70. A slow-maturing lettuce might take twice as long as a quick cut-and-come-again type. The single most effective thing a short-season grower can do is actively seek out and choose the fast end of that range, rather than defaulting to whatever variety happens to be most commonly sold.

Starting seeds indoors or under cover, then transplanting once the risk of frost has passed, effectively adds those indoor weeks onto the front of the growing season: a genuinely reliable way to fit a longer-maturing crop into a shorter outdoor window than it would otherwise need. Succession sowing (small,

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repeated sowings rather than one large one) and cut-and-come-again harvesting of leafy crops both suit a compressed season too, since they deliver a harvest in weeks rather than requiring the crop to reach full, slow maturity before anything can be picked.

This isn't only relevant to the coldest zones. A gardener in an otherwise milder zone can face a short season from a late, cold spring, an early autumn frost, growing at some elevation within a broader zone, or simply one bad year: the same fast-variety, succession-sowing strategies apply regardless of why the season is short. For the specific crops that suit a genuinely short-season climate as a rule rather than an exception, see the Cool/Boreal zone crop guide.

Work Out Your Real Season

Before choosing crops, find out how long your growing season actually is. Two dates matter:

- **Your average last spring frost.** After this date, tender crops can go outside with much lower risk.
- **Your average first autumn frost.** After this date, tender crops will be killed or stopped.

The gap between the two is your frost-free season. Count the days. Local weather records, a gardening neighbour or an allotment society can usually tell you the typical dates for your area, and keeping your own notes soon makes them more accurate than any chart.

Two cautions. First, these are averages, so any given year can be weeks earlier or later, which is why it pays to leave a margin. Second, the frost-free season is not the whole story. Hardy crops such as peas, kale, spinach and onions can be sown before the last frost and harvested after the first, so your usable season for them is longer.

Our zone finder shows the climate zone you are in and the crops that suit it.

Days to Maturity: Know the Numbers

Every seed packet or catalogue entry gives days to maturity, which is how long the crop takes to reach harvest. The figures below are approximate, from sowing or transplanting, and vary a lot with variety, weather and soil. Use them to see what fits the season you counted above.

CROP	ROUGHLY HOW MANY DAYS	NOTES
Radish	25 to 35	One of the fastest crops there is.
Salad leaves and baby kale	30 to 45	Cut-and-come-again for repeat harvests.
Spinach	40 to 55	Prefers cool weather and bolts in heat.
Turnip	45 to 60	Quick for a root crop.
Bush beans	50 to 65	Dry the pods for storable beans if the weather allows.
Beetroot	55 to 70	Tolerates cool conditions well.

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Peas	60 to 80	Sow early; they like cool weather.
Early potatoes	70 to 90	The fastest staple crop.
Carrots	70 to 100	Choose short, quick varieties such as Nantes or Chantenay types.
Maincrop potatoes	100 to 130	Higher yield, but need a longer season.
Swede	90 to 120	Very hardy and stores well.
Winter squash	90 to 120	Needs warmth; choose early varieties and start under cover.

If your frost-free season is shorter than a crop needs, either choose a faster variety, start the crop under cover so it has a head start, or grow something else. A fast variety is usually the easiest solution.

CHOOSE WELL

Best Crops for a Short Season

The most reliable short-season gardens lean on crops that are quick, hardy, or both:

- **Staples that cope with cool weather.** Potatoes (choose early and second-early varieties), swede, barley and broad beans all tolerate short, cool summers.
- **Quick roots.** Radish, turnip, beetroot and carrots can be ready in two to three months.
- **Hardy leafy crops.** Kale, spinach, claytonia and lamb's lettuce keep growing in cool weather and often through frost.
- **Peas.** Peas like cool conditions and can go in early.
- **Onions and leeks.** Onions from sets and leeks are very hardy, though they need an early start.

Be cautious with: tomatoes, peppers, sweet corn, aubergines, melons and winter squash. They need warmth and a long season, so grow them only if you start them early, protect them, and choose early or short-season varieties.

For a full crop list matched to a short, cool season, see the cold climate guide and the alpine climate guide.

Season Extension: Buying Weeks

A few simple tools can add weeks at both ends of the season. None needs expensive equipment.

- **Start seedlings indoors.** A sunny windowsill, a cool greenhouse or a cold frame lets tender crops such as tomatoes, squash and brassicas get going six to eight weeks before they could survive outside. Harden them off before planting out.
- **Cloches and fleece.** Cover young plants with cloches, jars or horticultural fleece to protect against frost and warm the soil. They also help in autumn.

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- **Cold frames.** A simple box with a clear lid protects seedlings and extends the harvest of salad crops into winter.
- **Polytunnels and greenhouses.** The most effective option for warm-season crops, and they let you grow leafy crops through much of the winter.
- **Raised beds and dark mulch.** Soil in raised beds warms faster in spring. Black plastic or dark mulch warms the soil further before planting.
- **Shelter.** Windbreaks such as hedges or fences soften cold winds, and a south-facing wall (north-facing in the southern hemisphere) stores heat and gives a warmer pocket.
- **Heat stores.** Water butts or dark containers placed near plants absorb heat during the day and release it at night.

A modest amount of protection can make the difference between a crop ripening and a crop being lost to the first frost.

USE EVERY WEEK

Stretching Both Ends of the Season

Early in the year. Hardy crops can go in before the last frost. Sow peas, broad beans, spinach and radish as soon as the soil can be worked, plant onion sets and chit seed potatoes indoors before planting them out. Protect early sowings with fleece or cloches.

Late in the year. Sow quick crops in late summer for an autumn harvest, such as spinach, kale, salad leaves and turnips. Hardy greens can keep cropping under cover well into winter.

Count back from the first frost. To find your last sowing date for a crop, take the first expected autumn frost, count back the days to maturity, and add a couple of weeks, because growth slows as the days shorten and the weather cools. If the answer is already past, it is too late for that crop and you should choose a faster one.

Succession sowing. Sow small amounts every two to three weeks, not all at once, so you get a steady harvest and one frost or bolt does not take everything.

Short Seasons Make Storage More Important

When the growing window is short, the harvest often arrives all at once, and you have to carry it through a long winter. Storage is not an extra; it is part of the plan.

- Favour crops that store well: potatoes, swede, carrots, onions, cabbage and dried beans.
- Harvest before the hardest frosts, and cure and dry crops properly before storing.
- Plan a cold, frost-free, dark place to keep roots and squash.

See the vegetables that store longest, storing food without a fridge and root cellar alternatives.

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Common Short-Season Mistakes

1. **Planting out too early.** Tender plants set out before the last frost get killed. Wait, or protect them.
2. **Choosing long-season varieties.** A variety that needs 120 days is no use in a season of 90.
3. **Relying on tender crops.** A plot built around tomatoes and sweet corn is a gamble. Build around hardy crops, and treat tender ones as a bonus.
4. **Sowing too late.** Count back from the first frost, and sow with a margin.
5. **Ignoring the microclimate.** A sheltered, sunny corner can be several weeks ahead of an exposed one. Put your tender crops in the warmest spot.
6. **Forgetting to harden off.** Seedlings moved straight from indoors to outside often suffer a check or die.

A Starter Plan for a Short Season

1. **Find your dates.** Look up your last spring and first autumn frost, and count the days between.
2. **Build around hardy staples.** Early potatoes, swede, broad beans, kale and onions.
3. **Add quick crops.** Radish, salad leaves, spinach and turnips in succession.
4. **Protect early and late.** Fleece, cloches or a cold frame add weeks at both ends.
5. **Treat tender crops as a bonus.** Start them indoors, grow early varieties and place them in the warmest spot.
6. **Plan storage.** Make sure the harvest has somewhere to go.

See also what vegetables to grow, how long it takes to become self-sufficient and growing in a drought-prone climate.

Frequently Asked Questions

What can I grow in a short growing season?

Fast-maturing varieties of otherwise normal crops (an early potato rather than a maincrop, a quick radish rather than a long-season root), naturally hardy staples like potato, swede and barley, and leafy greens grown for cut-and-come-again harvests all suit a short season: the goal is matching crop choice and variety to the days you actually have, not the days a generic seed packet assumes.

Can a short growing season happen outside a Boreal or Alpine zone?

Yes: a short season isn't only a feature of the coldest zones, it can also come from a late spring, an early autumn frost, growing at altitude within an otherwise milder zone, or simply an unusually bad year, so the same fast-crop strategies that suit a genuinely short-season zone are worth knowing even for gardeners in milder climates who occasionally face a compressed window.

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Does starting seeds indoors help with a short season?

Yes, significantly: starting seedlings indoors or under cover several weeks before the last frost effectively extends the usable season by giving plants a head start before they go outside, which is one of the most reliable ways to fit a longer-maturing crop into a season that wouldn't otherwise support it.

How do I find my first and last frost dates?

Ask local gardeners or allotment societies, check regional weather-service averages, or search online for a frost-date chart for your area. Treat the dates as averages and keep your own notes each year.

What vegetables mature fastest?

Radishes (about a month), salad leaves, baby kale and spinach (four to six weeks), followed by turnips, bush beans, beetroot and early potatoes in roughly two to three months.

Can I grow potatoes in a short season?

Yes. Potatoes are one of the best crops for short, cool seasons. Choose early or second-early varieties, which mature in around 70 to 90 days, and chit the seed potatoes before planting.

Can I grow tomatoes in a short season?

Often, with care. Choose early, short-season varieties, start them indoors six to eight weeks before the last frost, and give them the warmest, most sheltered spot, ideally under cover. Cherry types usually ripen fastest.

Do I need a greenhouse or polytunnel?

Not to start. Cloches, fleece, cold frames and a sunny windowsill give a lot of benefit for little cost. A greenhouse or polytunnel is worth adding later if you want tender crops or winter salads.

What is hardening off?

Gradually introducing indoor-grown seedlings to outdoor conditions over a week or two, by putting them outside for longer each day, so they are not shocked when planted out.

Can I grow grain in a short season?

Some, yes. Barley and oats are among the most reliable grains for cool, short seasons, and spring-sown varieties can mature in around three to four months. Wheat is more demanding.

Does altitude shorten the growing season?

Yes. Temperatures fall with height, so frosts come earlier in autumn and later in spring. A garden high on a hill can have a noticeably shorter season than one in the valley, even in the same region.

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GUIDE 6

Growing Food in a Drought-Prone Climate

Short answer: combine drought-tolerant crop choices with genuine water-saving technique. Legumes like tepary or moth bean, grains like pearl millet, and deep-rooted crops like chickpea cope with limited water far better than thirstier alternatives. Alongside that, thick mulch, deep-but-infrequent watering, and grouping thirsty crops together so limited water reaches where it matters most all make a real, measurable difference. This applies well beyond classic desert zones. Mediterranean, Subtropical and Continental gardens face real drought stretches too.

KEY POINTS

- **Choose Genuinely Drought-Tolerant Crops.** Tepary bean, moth bean, pearl millet, amaranth and chickpea all cope with limited water far better than conventional alternatives.
- **Mulch Heavily.** A thick layer of straw, leaves or compost dramatically cuts evaporation, keeps roots cooler and suppresses water-competing weeds.
- **Water Deep, Not Often.** Infrequent, deep watering encourages roots to grow down toward moisture, rather than staying shallow and dependent on frequent top-ups.
- **Group Thirsty Crops Together.** Concentrating limited water where it's actually needed beats spreading it thin evenly across a whole plot regardless of each crop's real demand.

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Working With Limited Water, Not Against It

The single biggest lever in a drought-prone garden is crop choice. Some crops have been shaped by generations of selection specifically for low-water conditions: tepary and moth bean are genuinely desert-region legumes, pearl millet is a classic drought-tolerant grain, and chickpea's deep root system lets it access moisture that shallower-rooted crops simply can't reach. Choosing these over thirstier conventional alternatives is worth more than almost any watering technique layered on top.

Technique still matters, though. Mulching (a thick layer of straw, leaves, compost, or similar organic material spread over the soil surface) is one of the most effective, lowest-cost interventions available, since it dramatically slows evaporation, moderates soil temperature, and suppresses weeds that would

otherwise compete for the same limited water. Watering deeply but infrequently, rather than little and often, encourages roots to grow downward in search of moisture, building a plant that's more resilient between waterings than one trained by frequent shallow watering to stay shallow-rooted itself.

One more practical point: drought isn't exclusive to classic arid or desert zones. Mediterranean summers are famously dry for months at a stretch, Subtropical zones can have real dry seasons, and even Temperate Continental climates can face genuine dry spells during their hot summer months. These crop and technique choices are worth knowing for any gardener facing an unreliable or limited water supply, not only those in a zone formally classified as arid. For the full set of crops best suited to a genuinely arid climate as the norm, see the Arid / Semi-Arid zone crop guide.

Start With Your Water Budget

Before you plan crops, work out how much water you realistically have. A rough rule of thumb is that vegetables in a dry summer want about 25 millimetres of water a week, which is 25 litres per square metre. A 100 square metre plot that is fully irrigated at that rate would therefore need around 2,500 litres a week at the peak.

That is a lot, which is the point. Few households have unlimited water, and in a real emergency the supply may be limited or cut off. So ask:

- **What are your sources?** Rainfall, mains water, a well or borehole, a stream or pond, stored rainwater.
- **Which of them would still work if the power or mains failed?** A hand pump, a gravity-fed tank or a rain-fed barrel keeps working when mains pressure does not.
- **How much can you store?** Stored water is what carries you through a dry spell.
- **How big a plot can that water support?** It is better to water a smaller plot well than a large one badly.

Choosing drought-tolerant crops and using water-saving techniques both reduce the amount you need, often by a large margin, which is why the rest of this page matters.

Harvesting Rainwater

Rainwater is free, soft and good for plants, and a roof collects far more than most people expect. As a simple calculation, 1 millimetre of rain falling on 1 square metre of roof gives 1 litre of water. So a 50 square metre roof in a place with 600 millimetres of rain a year collects about 30,000 litres, before losses.

- **Start small.** One or two water butts on a shed or house downpipe is a good beginning, and more can be added later.
- **Scale up.** Larger tanks and linked butts store far more, which matters in places where rain comes in a short wet season.
- **Keep it clean.** Cover tanks to keep out light, insects and debris, and use a filter or leaf guard on the gutter.

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- **Use gravity.** A raised tank gives pressure for hoses and drip lines with no pump at all.
- **Collect from sheds, greenhouses and outbuildings too,** not just the house.

Where rules apply to water storage or abstraction, check them locally. Kitchen and bath water (greywater) can also be used on ornamental and some food plants, but only with care, never on leaves or roots you will eat raw, and with soap-free or garden-friendly products.

CHOOSE WELL

Crops by Thirst

Crops differ hugely in how much water they need. A rough grouping, with the caveat that variety, soil and climate all change the picture:

THIRST LEVEL	CROPS	NOTES
Very drought-tolerant	Tepary bean, moth bean, cowpea, pigeon pea, chickpea, pearl millet, amaranth, purslane, moringa	Bred or adapted for dry regions. The strongest choices for an unreliable water supply.
Reasonably tolerant once established	Sweet potato, globe artichoke, onions, garlic, kale, beetroot, chard, squash	Need water to get started, then cope with dry spells, especially if mulched.
Moderate to thirsty	Potatoes, carrots, tomatoes, peppers, French beans, peas	Do fine with steady water, and suffer quickly if it stops at the wrong stage.
Thirsty	Lettuce, celery, cucumber, cauliflower, spinach, sweet corn	Shallow-rooted or fast-growing, and quick to bolt, toughen or fail if dry. Grow only where water is secure.

Our calorie rankings let you sort crops for your zone by water efficiency as well as calories, which makes it easy to see which crops give the most food for the least water.

For the crops best suited to arid conditions as the norm, see the dry climate crop guide, and for a general plan, what vegetables to grow.

Water-Saving Techniques That Work

- **Mulch thickly.** A layer of straw, leaves, grass clippings or compost about 5 to 10 centimetres deep cuts evaporation, keeps roots cooler and suppresses weeds. Keep it a little away from stems.
- **Water deeply and less often.** A good soaking encourages deep roots, while frequent light watering keeps them near the surface.
- **Water at the base, not the leaves,** and in the early morning or evening, when less is lost to evaporation and wind.
- **Use drip lines, soaker hoses or ollas.** Drip irrigation delivers water slowly to the roots. An olla is a buried unglazed clay pot, filled with water, that seeps out gradually, and is a low-tech way to water a bed with very little waste.

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- **Sink beds and make basins.** In dry climates, planting in slight hollows or ringed basins holds rain and irrigation around the roots instead of letting it run away. On slopes, a shallow trench along the contour (a swale) slows runoff and lets it soak in.
- **Space plants a little wider.** Fewer plants share the water in the soil, and each does better in a dry spell.
- **Weed ruthlessly.** Weeds drink as much as crops.
- **Give shade and shelter.** Shade cloth over lettuce, spinach and seedlings, and windbreaks around the plot, reduce water loss from both soil and leaves.
- **Group plants by water need.** Put thirsty crops together in one small, easily watered area, and drought-tolerant crops elsewhere.

Timing and Critical Stages

You do not have to water every crop equally all the time. Many crops have short periods when water matters most, and can tolerate dryness at other times.

CROP	WHEN WATER MATTERS MOST
Beans and peas	At flowering and while the pods fill
Potatoes	When the tubers are forming, after flowering begins
Sweet corn	When the silks appear and the cobs fill
Tomatoes, peppers and squash	At flowering and while fruit swells
Leafy crops and roots	All the way through, but especially at the start
All crops	When seeds are germinating and when seedlings are first planted out

Concentrating water on these stages is sometimes called deficit irrigation, and it can save a lot of water with little loss of crop. Beyond that, time your sowing to suit the climate: plant drought-tolerant crops so they establish with the first rains, grow cool-season crops through the wetter, cooler months where summers are dry, and transplant seedlings in the evening or on a cloudy day so they are not shocked by the sun.

Short on season as well as water? See short growing season.

THE FOUNDATION

Soil That Holds Water

Soil rich in organic matter acts like a sponge, holding water that plants can use between rains. Poor, thin or compacted soil lets it drain away or run off. Building soil is therefore one of the most effective long-term drought defences.

- Add compost and well-rotted manure generously every year.

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- Keep the soil covered with mulch or a growing crop, never bare.
- Dig as little as you can, so the soil structure and soil life stay intact.
- Grow green manures in resting beds to add organic matter.

See building healthy soil without fertiliser and making compost without buying anything.

If the Drought Bites: Triage

If water becomes short in the middle of a season, you may have to choose what to save. Decide in advance, rather than in a panic:

1. **Protect the staples first.** Potatoes, beans, squash and grain feed you, and they are the crops to keep alive.
2. **Keep seedlings and newly transplanted plants watered,** because they have the least reserves.
3. **Let the thirsty crops go.** Lettuce, cucumbers and the like can be sacrificed if water has to be rationed.
4. **Mulch everything you can.** It is the quickest way to cut water loss.
5. **Harvest early where you must.** A smaller crop picked early is better than none.

Common Drought Mistakes

1. **Sprinkling lightly every day.** It wets only the surface and encourages shallow roots.
2. **Watering in the heat of the day.** Much of it evaporates before it reaches the roots.
3. **Leaving soil bare.** Bare soil dries, bakes and loses water fast.
4. **Planting a thirsty crop because it is familiar.** Choose crops that suit the water you have.
5. **Planting too much.** A big plot you cannot water is worse than a small one you can.
6. **Ignoring rainwater.** Free water falling on your roof is easy to capture.

Frequently Asked Questions

How do I grow food successfully in a drought-prone climate?

Combine genuinely drought-tolerant crop choices (legumes like tepary or moth bean, grains like pearl millet, deep-rooted crops like chickpea) with water-saving techniques: thick mulch to reduce evaporation, watering deeply but infrequently to encourage deep roots rather than little and often, and grouping thirstier crops together so limited water goes where it matters most rather than being spread thin across the whole plot.

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Does mulching really make a meaningful difference to water use?

Yes, substantially: a thick layer of mulch (straw, leaves, compost, or similar organic material) over soil dramatically reduces evaporation from the surface, keeps roots cooler, and suppresses competing weeds that would otherwise use water the main crop needs, making it one of the single most effective, low-cost interventions for a drought-prone garden.

Is drought only a problem in classic arid or desert zones?

No: drought-like conditions and unreliable rainfall can affect Mediterranean, Subtropical and Temperate Continental zones too, particularly during their driest months, so drought-tolerant crop choices and water-saving techniques are worth knowing even for gardeners whose zone isn't classified as arid overall.

How much water does a vegetable garden need?

As a rough guide, about 25 millimetres a week in dry weather, which equals 25 litres per square metre. Mulched, well-managed beds with drought-tolerant crops can manage with considerably less.

What are the most drought-tolerant vegetables and grains?

Tepary bean, moth bean, cowpea, pigeon pea, chickpea, pearl millet, amaranth, purslane and moringa are among the toughest. Sweet potatoes, onions, kale, beetroot and squash also cope well once established.

What is the best time of day to water?

Early morning is best, because less is lost to evaporation and the plants have water through the heat of the day. Evening is the next best. Avoid watering in the middle of the day.

What is an olla?

An olla is an unglazed clay pot buried in the soil with its neck above ground. You fill it with water, and the water seeps slowly through the clay to the surrounding roots, which wastes very little.

How much rainwater can I collect from my roof?

One millimetre of rain on one square metre of roof gives one litre. Multiply your roof area by your annual rainfall in millimetres for a rough yearly total, then allow for some losses.

Should I water every day in a drought?

Usually not. Deep, less frequent watering builds deeper roots and makes plants more resilient. Daily light watering mostly wets the surface and loses a lot to evaporation.

Can I use greywater on my vegetables?

With care. It is generally best on ornamental plants, trees and the soil around fruiting crops, not on leaves or roots you will eat raw, and only with garden-friendly, soap-free products. Check local rules.

Does mulch really help in a drought?

Yes. A thick layer of straw, leaves or compost sharply reduces evaporation, keeps the soil cooler and suppresses weeds that compete for water. It is one of the best things you can do.

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GUIDE 7

Building Healthy Soil Without Bought Fertiliser

Short answer: compost, green manures, crop rotation and minimal disturbance: no bag required. Compost returns nutrients from kitchen and garden waste back to the soil. Green manures, crops grown specifically to be dug in rather than harvested, add organic matter, and legume green manures fix nitrogen straight from the air for free. Rotating crop families around the plot stops the same nutrients being stripped from the same ground year after year. None of it costs anything beyond time and a bit of planning.

KEY POINTS

- **Compost: The Foundation.** Kitchen scraps, garden waste and household byproducts become the nutrients that grew them in the first place: the single most important free input.
- **Green Manures Fix Nitrogen Free.** Legume cover crops like clover or vetch pull nitrogen from the air and leave it in the soil when dug in: a genuinely free source of fertility.
- **Rotation Spreads the Demand.** Different crop families draw different nutrients: rotating them prevents any one nutrient being stripped from the same spot every year.
- **Disturb Less, Build More.** Minimal digging (a no-dig approach) preserves soil structure and the biology living in it, which does much of the fertility-building work on its own.

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Fertility Is Built, Not Bought

Bought fertiliser solves a symptom: it adds specific nutrients back into soil that's been depleted. Compost, green manures and rotation address the underlying cause, building soil that holds and cycles its own nutrients rather than needing them topped up externally every season. The difference matters most over years, not any single season: fertiliser feeds this year's crop and nothing more, while genuinely built soil fertility compounds, producing better harvests with less external input as years go by.

Compost is the obvious starting point: it's the only source of fertility that costs nothing and never runs out, since it's made entirely from what a household and garden already produce. Green manures are the less obvious but equally powerful tool: sowing a cover crop specifically to be dug in rather than harvested might feel like "wasting" a growing season on nothing, but a legume green manure like clover

or vetch pulls nitrogen directly from the air (via bacteria living on its roots) and leaves that nitrogen in the soil when it's cut down: genuinely free fertility that a bag of fertiliser would otherwise supply at a cost.

Crop rotation rounds this out by preventing the same demands being placed on the same ground every year. Different plant families draw on different nutrients and are vulnerable to different soil-borne pests and diseases: growing the same family repeatedly in one spot both depletes specific nutrients and lets problems build up. A rotation that moves plant families around the plot over a multi-year cycle spreads that demand out and interrupts the cycle for many pests and diseases. This site's dedicated compost section covers all of this (compost, green manures, rotation and the no-dig approach) in full detail for each of the 8 climate zones.

Know Your Soil First

Healthy soil is a mix of mineral particles (sand, silt and clay), organic matter, air, water and a huge community of living things, from earthworms to fungi and bacteria. Before you decide what to add, find out what you have. Three simple checks cost nothing:

- **The jar test.** Put a couple of handfuls of soil in a tall jar, fill it with water, add a spoonful of dish soap, shake well and leave it for a day or two. Sand settles first, then silt, then clay. The relative thickness of each layer tells you roughly what type of soil you have.
- **The squeeze test.** Squeeze a handful of moist soil. If it falls apart, it is sandy. If it forms a sticky ball that holds a shape and polishes under your thumb, it is clay. If it holds together but crumbles when poked, it is a balanced loam, the best of the three.
- **The worm test.** Dig a spadeful in spring and count the earthworms. A healthy plot has plenty, and few worms suggest the soil is short of organic matter or very compacted.

A cheap pH test kit is worth buying as well. Most vegetables prefer soil that is slightly acidic to neutral, roughly pH 6 to 7. Very acid or very alkaline soil locks up nutrients even when they are present.

What to Feed Your Soil

Feeding soil mostly means feeding the life in it, and the best foods are organic materials you can make or collect for free.

MATERIAL	WHAT IT DOES	NOTES
Compost	Adds organic matter, nutrients and soil life	The core input. Spread 5 to 10 cm on the surface each year. See making compost without buying anything.
Leaf mould	Improves structure and water holding	Slow to make, but free. Pile up autumn leaves in a wire cage and wait one to two years.
Animal manure	Rich in nitrogen and organic matter	Let it rot for at least six months before using, and never put fresh manure on crops. See are chickens worth it?.
Comfrey and nettle	Cheap source of potassium and nitrogen	Cut the leaves for the compost heap, use as mulch, or steep them in water to make a liquid feed.

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Seaweed	Trace elements and organic matter	Where it is available, rinse and use as mulch or in the compost heap.
Straw, grass clippings, wood chip	Mulch that feeds soil life as it rots	Use straw and grass as mulch around crops. Wood chip suits paths and around trees and bushes.
Wood ash	A source of potassium	Use sparingly, a thin dusting only, since it raises pH. Avoid it where soil is already alkaline.

FREE FERTILITY

Green Manures: Crops Grown to Be Dug In

A green manure is a crop grown to improve the soil, not to eat. It covers bare ground, suppresses weeds, protects soil from rain and wind, and then adds organic matter when it is cut down. Legume green manures also add nitrogen, because bacteria on their roots capture it from the air.

GREEN MANURE	TYPE	WHEN TO SOW	GOOD FOR
Clover (crimson or white)	Legume	Spring to late summer	Adds nitrogen. Crimson clover is quick; white clover makes a living mulch.
Winter tares (vetch)	Legume	Late summer to autumn	Adds nitrogen over winter. Dig in or cut in spring.
Field beans or broad beans	Legume	Autumn	Suits heavy soil, and the roots break it up. Can crop as well.
Grazing rye	Grass	Autumn	Very hardy winter cover with deep roots. Good at suppressing weeds and holding nutrients.
Phacelia	Flowering	Spring to late summer	Fast and easy, and bees love it.
Buckwheat	Flowering	Late spring to summer	Very quick summer cover that smothers weeds. Cut before it sets seed.
Mustard	Brassica	Late summer to early autumn	Fast cover, but do not use it where brassica crops are grown, as it can carry clubroot.

Sow a green manure wherever a bed would otherwise sit empty, such as after an early crop is lifted or through the winter. Cut it down before it flowers and sets seed, then either dig it in lightly or, in a no-dig plot, chop it off at the base, leave it on the surface as a mulch and plant through it. Leave the roots in the ground.

Choose varieties suited to your climate and time of year. Seed catalogues usually say when each type should be sown.

LESS WORK, BETTER SOIL

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The No-Dig Method

Digging breaks up soil structure, damages fungal networks and brings weed seeds to the surface. In a no-dig system you leave the soil alone and feed it from the top, the way a woodland floor is fed by falling leaves. Worms and soil life do the mixing for you.

1. **Clear or smother the weeds.** Cut tall growth down, then cover the ground with overlapping cardboard (remove tape and staples) or a thick layer of mulch to exclude light. Perennial weeds need a few months.
2. **Add a layer of compost or well-rotted manure,** 5 to 10 centimetres deep, on top of the cardboard.
3. **Plant or sow straight into it.** Make a hole through the compost for transplants, and sow seed into the surface.
4. **Top up each year** with a few centimetres of fresh compost or mulch, and leave the rest alone.

No-dig also saves a great deal of labour, which matters when you are growing a lot of food, and it keeps moisture in the soil, which helps in dry spells. It does need a good supply of compost or mulch, so plan your supply before you start. Very compacted ground or a plot full of persistent perennial weeds may need a first-time loosening with a fork.

See also growing in a drought-prone climate, where mulch and soil organic matter make a big difference.

SPREAD THE DEMAND

Crop Rotation: A Simple Four-Bed Plan

Moving crop families around the plot each year keeps nutrients in balance and stops soil-borne pests and diseases from building up. A classic four-year plan divides the vegetable area into four beds, and each group moves on one bed every year:

BED	CROPS	WHAT THEY DO FOR THE SOIL
A. Legumes and peas	Broad beans, peas, French and runner beans	Add nitrogen for the crops that follow.
B. Brassicas	Cabbage, kale, broccoli, Brussels sprouts, swede, turnip	Heavy feeders that benefit from the nitrogen the legumes left behind.
C. Roots and alliums	Carrots, parsnips, beetroot, onions, leeks, garlic	Lighter feeders, and they dislike fresh manure.
D. Potatoes, squash and others	Potatoes, squash, sweetcorn, tomatoes	Heavy feeders that suit freshly manured or composted ground.

Each year, move every group to the next bed: A to B, B to C, C to D and D to A. After four years the cycle repeats, so each family returns to the same ground only once in four years.

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Small plots can still rotate, even if only in two or three groups. Where space is very tight, rotate where you can and use compost and green manures to make up the difference. See what vegetables to grow for how to choose the crops.

Closing the Loop: Where the Nutrients Come From

Every harvest takes nutrients out of the soil. In a closed system, you put them back. The most important ways are:

- Compost everything you can: crop waste, kitchen scraps, weeds before they seed, and household materials like cardboard and paper.
- Return nutrients from outside the plot by cutting comfrey or nettles, collecting leaves, seaweed, straw or manure from neighbours and livestock.
- Grow legumes and green manures to capture nitrogen from the air.
- Keep the soil covered, so that nutrients are not washed away.

It is honest to say that nitrogen is the easy part, since legumes supply it for free. Phosphorus and potassium come only from what you bring in, so over many years a plot that exports a great deal of food and imports nothing will gradually run down. That is why even strongly self-reliant gardeners usually bring in some manure, seaweed, comfrey or ash from outside the plot.

Common Soil Problems and Fixes

PROBLEM	SIGNS	WHAT HELPS
Heavy clay	Sticky when wet, hard when dry, slow to warm	Mulch with compost on the surface every year, avoid walking on wet soil, and grow deep-rooted green manures such as rye or field beans.
Sandy soil	Drains fast, dries out and loses nutrients quickly	Add plenty of compost and mulch, grow green manures, and water deeply and less often.
Compacted soil	Water puddles, roots stay shallow, few worms	Loosen once with a fork if needed, then keep off the beds (use permanent paths) and mulch.
Acid soil	Mosses, poor brassica growth, pH below 6	Compost helps, and a little garden lime or wood ash can raise pH. Test first.
Waterlogged soil	Stays wet, smells sour, plants yellow	Improve drainage, grow in raised beds, and add organic matter.
Depleted soil	Pale, weak growth and poor yields	Add compost and manure, grow legume green manures, and rest the bed.

Soil-Building Mistakes to Avoid

1. **Leaving soil bare.** Bare soil dries, erodes and loses nutrients. Keep it mulched or planted.
2. **Using fresh manure.** It can burn plants, spread pathogens and carry weed seeds. Age it first.

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3. **Over-digging.** It damages structure and soil life, and it is more work.
4. **Ignoring pH.** A simple test saves guesswork.
5. **Composting diseased plants or perennial weed roots in a cool heap.** They can survive and spread.
6. **Expecting overnight results.** Soil improves over seasons. See how long it takes to become self-sufficient.

Frequently Asked Questions

How do I build healthy soil without bought fertiliser?

Through compost, green manures, crop rotation and minimal disturbance of the soil structure: compost returns nutrients from kitchen and garden waste back into the ground, green manures (crops grown specifically to be dug in or cut down rather than harvested) add organic matter and, for legumes, fix nitrogen directly from the air, and rotating crop families around the plot prevents the same nutrients being stripped from the same spot year after year.

What is a green manure, and how does it help the soil?

A green manure is a crop grown specifically to improve the soil rather than to be harvested and eaten, typically sown to cover bare ground between main crops, then cut down and dug in (or left on the surface in a no-dig system) before it seeds, where it breaks down and adds organic matter; legume green manures like clover or vetch also fix nitrogen from the air into the soil as they grow, a genuine free source of fertility.

Does crop rotation actually make a measurable difference to soil fertility?

Yes: different crop families draw on soil nutrients differently and are vulnerable to different pests and diseases, so growing the same family in the same spot every year depletes specific nutrients and lets pest and disease populations build up in the soil, while rotating families through a multi-year sequence spreads that demand out and breaks the cycle for many soil-dwelling pests and diseases.

How do I test my soil at home?

Try the jar test to see how much sand, silt and clay it holds, the squeeze test for texture, and a worm count in spring. A cheap pH kit shows whether it is acid, neutral or alkaline.

What is the best green manure?

It depends on the season and soil. Crimson clover and winter tares add nitrogen, grazing rye is excellent over winter, and buckwheat and phacelia are quick summer covers. Avoid mustard where you grow brassicas.

Is no-dig really better than digging?

It saves labour, protects soil life and structure and conserves moisture, and many gardeners find it produces equal or better crops. It needs a good supply of compost or mulch, and very compacted or weedy ground may need a first-time loosening.

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How often should I rotate crops?

Move each crop family to a different bed every year, ideally on a three- or four-year cycle. Where space is limited, rotate in groups and avoid planting the same family in the same spot two years running.

Can I use fresh manure?

Not directly on crops. Fresh manure can burn plants and carry pathogens. Let it rot for at least six months, or compost it first, and apply it well before sowing or planting.

Do I need to add anything besides compost?

Usually compost, green manures and mulch cover most needs, especially nitrogen. Over many years, phosphorus and potassium may run down, and a little manure, seaweed, comfrey or wood ash from outside the plot helps.

How long does it take to build good soil?

You will see improvement in the first season, but it typically takes three or more years to build deep, fertile, easy-to-work soil, depending on where you start.

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GUIDE 8

How to Make Compost Without Buying Anything

Short answer: build it entirely from what your household and garden already produce. Kitchen scraps, garden trimmings, lawn clippings, fallen leaves, cardboard, and manure if you keep animals: balanced roughly between nitrogen-rich "green" material and carbon-rich "brown" material, kept appropriately moist, and turned occasionally for air. No bought activator, bin or bagged fertiliser is actually required. Compost is the one source of soil fertility that costs nothing and never runs out, because the inputs are things you already have.

KEY POINTS

- **Green Material (Nitrogen).** Kitchen scraps, fresh grass clippings, and fresh garden waste: moist and quick to break down, but too much on its own turns slimy.
- **Brown Material (Carbon).** Fallen leaves, cardboard, straw and woody prunings: dry and slow to break down, but essential for structure and airflow.
- **Moisture and Air.** A heap needs to stay damp like a wrung-out sponge, not soaked or bone-dry, and benefits from occasional turning to keep oxygen reaching the middle.
- **Climate Changes the Method.** The same heap needs rain protection in a wet climate and active moisture management in a dry one: the biology is universal, the practical details aren't.

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Compost Is Free Fertility, Not a Product to Buy

Garden centres sell compost activators, tumbling bins, and bagged fertiliser, and all of it can be genuinely useful, but none of it is required. Compost happens because of biology, not brand names: carbon-rich and nitrogen-rich material broken down by microorganisms, with moisture and oxygen keeping the process running. A heap built from kitchen scraps, garden waste, fallen leaves and cardboard, in a roughly 50/50 mix of green and brown material, will compost perfectly well in a simple pile or a homemade enclosure of pallets or chicken wire.

Getting the balance right matters more than any bought input. Too much green material (fresh, wet, nitrogen-rich) and a heap turns slimy, compacted and smelly. Too much brown material (dry, carbon-rich) and it breaks down agonisingly slowly. The practical fix is simple: alternate layers, or mix as you

add material, aiming for roughly equal parts by volume rather than by weight, since brown material is usually much lighter.

One thing that genuinely does change the details is climate. The core biology is identical everywhere, but a heap in a cool, wet maritime climate needs protection from excess rain and some insulation to keep working through winter, while the same heap in an arid climate needs the opposite: deliberate moisture management to stop it drying out and stalling completely. This site's dedicated compost section covers a full method built specifically for each of the 8 climate zones, rather than one generic guide stretched to fit everywhere.

THE RECIPE

Greens and Browns: What Goes In

Every heap needs two kinds of material. Greens are rich in nitrogen and rot quickly. Browns are rich in carbon, rot slowly and keep the heap open and airy.

GREENS (NITROGEN)	BROWNS (CARBON)
Kitchen scraps: vegetable and fruit peelings, coffee grounds, tea leaves	Fallen leaves
Fresh grass clippings	Cardboard and brown paper, torn up
Weeds that have not gone to seed	Straw and hay
Spent crops and soft prunings	Woody prunings and sawdust, chopped small
Animal manure from herbivores, such as rabbits, chickens, horses and cows	Dry plant stalks, bracken, and bedding from rabbits and poultry
Seaweed and comfrey leaves	Egg boxes and paper towel tubes

The ratio. Aim for somewhere between equal parts and about two parts brown to one part green, by volume. Greens are heavy and wet, and browns are light and dry, so measuring by weight misleads. When in doubt, add more brown if it is wet and smelly, and more green if it is dry and slow.

Chop or shred tough material first, since small pieces rot faster. See our compost section for guides specific to your climate zone.

What to Leave Out

- **Meat, fish and dairy,** which attract rats and flies and can smell. They can be composted in a hot, enclosed system, but not in a simple open heap.
- **Cat and dog droppings,** which can carry parasites and diseases harmful to people.
- **Diseased plants,** such as potatoes with blight, unless your heap gets properly hot.
- **Perennial weed roots and seeding weeds,** such as bindweed, couch grass and docks, which survive a cool heap. Drown them in a bucket of water for a few weeks first, or use a hot heap.

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- **Glossy or coloured paper, treated wood, and coal or charcoal ash,** which can contain unwelcome chemicals.
- **Large amounts of citrus, onion or cooked food,** which rot slowly or attract pests.

NO BOUGHT BIN NEEDED

Building a Heap

You can compost in a simple pile, but a bay or bin keeps it tidy and holds in warmth. Nothing needs to be bought:

- **A pallet bay.** Three or four old pallets, wired or screwed together, make a good bin. A second bay beside it lets you turn the heap across.
- **Chicken wire or mesh cylinder.** A tube of wire mesh, held with stakes, is the cheapest option of all.
- **A simple open pile** works too, especially in a dry climate, though it dries and cools faster.
- **A cover.** A bit of old carpet, cardboard or a board on top keeps off excess rain and holds in heat.

How to build it:

1. Place it on bare soil, so worms and microbes can move in, in a spot that is not too exposed.
2. Start with a layer of coarse brown material, such as twigs, for drainage and air.
3. Add greens and browns in layers, or mix them as you go, watering any dry material.
4. Keep it as damp as a wrung-out sponge.
5. Turn it every few weeks if you can, so that outer material moves to the centre and air gets in.

Hot or Cold Composting

	HOT COMPOSTING	COLD COMPOSTING
How it works	A big heap, at least about a cubic metre, built all at once and turned often. It heats to around 55 to 65 °C.	You add material as it comes, and let it rot slowly with little or no turning.
Time to finish	About 1 to 3 months	About 6 to 12 months or more
Kills weed seeds and disease?	Largely, when the heat is held	Not reliably
Effort	More, because you need enough material and need to turn it	Very little
Best for	Large amounts of material, weeds and speed	A small garden and a relaxed approach

Most home gardeners do a mix: fill one bay over time and let it rot, then start a second. Both give good compost.

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Where to Find Free Materials

If your own garden does not produce enough, there is often plenty to be had for free:

- **Leaves.** Autumn leaves from streets, parks and neighbours are one of the best free carbon sources. Make leaf mould, or add them to the heap.
- **Cardboard.** Shops and households throw it out in huge amounts. Remove tape and labels.
- **Grass clippings and prunings.** Neighbours with lawns often welcome help clearing them, but avoid lawns treated with weedkiller.
- **Manure and bedding.** Horse owners, stables and farms may give away manure and straw. Let it age before use.
- **Coffee grounds and kitchen waste.** Cafés and neighbours sometimes keep them for gardeners.
- **Seaweed.** Gathered in small quantities from the strandline, where permitted, it is a great addition.
- **Wood chip.** Tree surgeons often have loads to dispose of. It suits paths and mulch more than the heap.

Check that anything you collect is free of herbicide residues, particularly manure and hay, because some weedkillers survive composting and can damage crops.

FIX IT

Troubleshooting

PROBLEM	LIKELY CAUSE	FIX
Smelly or slimy	Too many wet greens, or too little air	Mix in dry browns such as shredded cardboard, and turn it.
Dry and not rotting	Too dry, or too much brown	Water it, add some greens, and cover it to hold moisture.
Cold and slow	Too small, too dry or too much brown	Add greens, turn it, and make the heap bigger.
Flies	Exposed food scraps	Bury scraps in the middle, and cover with browns.
Rats or mice	Cooked food, meat or open sides	Leave out cooked food and meat, and use a closed bin or mesh underneath.
Ants	The heap is too dry	Water it and turn it.
Slow, with whole bits left	Material was too big	Chop it smaller and mix it back in.

Compost is forgiving. Nearly every problem comes down to moisture, air or balance, and can be fixed by turning it and adjusting what you add.

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Knowing When It Is Ready, and Using It

- **Ready compost** is dark, crumbly and earthy-smelling, and you can no longer recognise what went into it. A few twigs and eggshell pieces are fine; put them back in the next heap.
- **Top dressing.** Spread 5 to 10 centimetres on beds, either in autumn or before planting. See building healthy soil without fertiliser.
- **Planting.** Mix a handful into planting holes for hungry crops such as squash and brassicas.
- **Seed compost.** Sieve well-rotted compost, ideally mixed with sand or leaf mould, for seedlings.

As a guide, a heap shrinks to roughly a third of its original volume as it rots, so you need a lot of raw material to make a little compost. That is why collecting extra from outside the garden is worthwhile.

Other Free Fertility Alongside Compost

- **Leaf mould.** Leaves piled in a wire cage for a year or two make a wonderful soil conditioner.
- **Comfrey and nettle feed.** Steep the leaves in water for a few weeks for a nutrient-rich liquid, diluted before use. It smells strong.
- **Green manures.** Sown and dug in, they add organic matter and, for legumes, nitrogen.
- **Mulch.** Straw, grass and leaves laid on the soil feed it as they rot, and cut watering.
- **Worm composting.** A worm bin turns kitchen scraps into rich compost in a small space, even for a flat.

Common Mistakes

1. **Too much green and not enough brown.** The usual cause of smell and slime.
2. **Letting it dry out.** A dry heap does nothing.
3. **Adding meat, dairy or cat and dog waste.** It attracts pests and may carry disease.
4. **Using composted manure or hay with herbicide residues.** It can damage crops.
5. **Making the heap too small.** A bigger heap holds heat and breaks down faster.
6. **Giving up too soon.** Cold compost takes months, and that is fine.

Frequently Asked Questions

How do I make compost without buying anything?

By building a heap entirely from what a household and garden already produce (kitchen scraps, garden trimmings, lawn clippings, fallen leaves, cardboard and paper, and manure if any animals are kept) balanced roughly between nitrogen-rich "green" material and carbon-rich "brown" material, kept appropriately moist, and turned occasionally to keep it aerated. No bought activator, bin or fertiliser is actually required for compost to work.

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What's the difference between green and brown compost material?

Green material is nitrogen-rich and usually fresh and moist (kitchen scraps, grass clippings, fresh garden waste) while brown material is carbon-rich and usually dry: fallen leaves, cardboard, straw, woody prunings. A heap needs a reasonable balance of both; too much green turns slimy and smelly, too much brown breaks down painfully slowly.

Does compost-making change depending on climate zone?

Yes, genuinely: the core biology (carbon, nitrogen, moisture, oxygen) is the same everywhere, but what that means in practice changes a lot by climate: a heap in a cool, wet climate needs protection from excess rain and insulation to keep working, while the same heap in an arid climate needs the opposite, active moisture management to stop it drying out and stalling.

What is the right ratio of greens to browns?

Somewhere between equal parts and about two parts brown to one part green, by volume. Add more brown if it is wet and smelly, and more green if it is dry and slow.

How long does compost take to make?

A hot, turned heap can be ready in one to three months. A cold, unturned heap usually takes six to twelve months or longer.

Can I compost cooked food, meat or dairy?

Not in a simple open heap, because they attract rats and flies. They can be composted in a hot, enclosed system, but it is simplest to leave them out.

Do I need a compost bin?

No. A pile, a pallet bay or a wire mesh cylinder all work. A bin helps by keeping it tidy and holding in heat and moisture.

Why does my compost smell?

Usually too many wet greens and not enough air. Mix in dry browns such as shredded cardboard or straw, and turn the heap.

Can I compost weeds?

Weeds that have not set seed can go in. Perennial roots and seeding weeds should be drowned in water first, or only added to a properly hot heap.

Where can I get free compost materials?

Autumn leaves, cardboard, neighbours' grass clippings, manure and bedding from stables or farms, coffee grounds, seaweed and tree-surgeon wood chip are all often free.

How much compost can I make from a heap?

A heap shrinks to roughly a third of its starting volume as it rots, so a cubic metre of raw material makes about a third of a cubic metre of compost.

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PART 3

Calories and Quantities

Turning food into numbers: what feeds a person, and what a family needs.

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GUIDE 9

What Crop Gives the Most Calories Per Square Metre?

Short answer: potatoes, almost everywhere. They're usually the single highest-calorie crop per square metre of any commonly grown vegetable, with other starchy staples close behind. Crops grown mainly for flavour or nutrition (tomatoes, peppers, lettuce) give a fraction of the calories per square metre that a staple does. But the exact ranking shifts by climate zone, since a crop's real yield depends on how well it actually grows where you are, not just its calorie density on paper.

KEY POINTS

- **Potatoes Usually Win.** High yield per plant combined with a genuinely high calorie density per kilogram puts potatoes at or near the top of the list in most climate zones.
- **Grains and Sweet Potato Follow.** Wheat, maize and sweet potato are usually the next-best calorie-per-area performers, though the exact order depends on the zone.
- **Vegetables Trail Far Behind.** Tomatoes, lettuce, peppers and most other popular garden vegetables give a small fraction of the calories per square metre that a staple crop does.
- **Zone Changes the Ranking.** A crop's real yield, and therefore its calories per square metre, depends on how well it actually grows in your specific climate zone.

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Calorie Density Isn't the Whole Story

Two numbers determine how many calories a crop delivers per square metre: how many calories it provides per kilogram, and how many kilograms it actually yields from that square metre. A crop can have modest calorie density but still win on this measure by producing a huge amount of bulk, which is exactly what potatoes do. They're not the most calorie-dense food by weight, but they yield heavily enough per plant to come out on top almost everywhere.

This is also why a generic "best crop" list can mislead. A crop's real yield changes with climate: the same potato variety planted in a long, warm growing season will out-yield the identical variety in a short, cool one. So while potatoes are the safe general answer, the precise ranking for your own zone can differ, and it's genuinely worth checking rather than assuming.

SHOW YOUR WORKING

The Sum: Yield Times Calories

The calories a crop gives per square metre is simply the weight of food you harvest from that square metre multiplied by the calories in each kilogram. The calorie figures below are from this site's own crop data. The yields are rough, typical figures for a well-managed home garden in a reasonable climate. They are illustrations, so the exact numbers will differ for your site.

CROP	TYPICAL YIELD PER M²	CALORIES PER KG	ROUGHLY KCAL PER M²	COMMENT
Potato	3 kg	770	2,300	High yield and decent density.
Sweet potato	2.5 kg	860	2,150	Needs a long, warm season.
Carrot	4 kg	410	1,650	Good, and keeps well.
Wheat	0.4 kg	3,400	1,350	Dense, but a modest yield per area.
Maize (flour)	0.4 kg	3,650	1,450	Needs warmth and space.
Winter squash	3 kg	340	1,000	Low density but heavy yield, and stores well.
Dried beans	0.25 kg	3,400	850	Modest calories per m², but rich in protein.
Kale	2 kg	490	1,000	Valuable nutrition, but few calories.
Tomato (outdoor)	5 kg	180	900	Tasty and useful, but low in calories.
Lettuce	2.5 kg	150	400	The lowest of all.

The pattern is what matters. Potatoes and other starchy roots deliver the most calories per square metre, because they combine a heavy crop with a respectable calorie density. Grains are very calorie-dense but yield less weight per area. Watery crops such as lettuce and tomatoes sit at the bottom, no matter how well you grow them.

For zone-specific yields calculated from this site's data, see the calorie rankings.

The Crops in Tiers

TIER	CROPS	ROLE IN A PLAN
Top: heavy starchy crops	Potatoes, sweet potatoes, Jerusalem artichokes, cassava in the tropics	The foundation of a calorie plan in most zones.

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High: roots and squash	Parsnips, carrots, beetroot, winter squash	Good yields, good storage, and excellent for filling out the plot.
Dense but lower per area: grains and legumes	Wheat, maize, oats, dried beans and peas	Store for years, provide protein, but need more space per calorie.
Low: leafy and fruiting crops	Kale, cabbage, tomatoes, peppers, courgettes, lettuce and spinach	Essential for vitamins and variety, not for calories.

See what vegetables to grow for how these fit together.

What Calories Per Square Metre Does Not Tell You

The number is a very useful starting point, but it leaves things out:

- **Protein, fat and vitamins.** Potatoes are almost pure carbohydrate. Beans give protein, and greens give vitamins. A plan of only the top-ranked crop would leave gaps. See can you survive on vegetables alone?.
- **Storage.** A crop that rots in a month is worth less than one that keeps all winter. See vegetables that store longest.
- **Labour and processing.** Grain must be threshed and milled, while potatoes can be dug and eaten. A crop that looks efficient on paper may cost more work than you can give.
- **Risk.** Potatoes are at risk from blight, and a poor year hits a single staple hard. Spreading across several crops is safer than chasing the single best number.
- **Water and fertility.** Thirsty or hungry crops may not suit your site. See drought-prone climate.
- **Rotation.** You cannot grow potatoes on the same ground every year without trouble.

How Your Zone Changes the Ranking

Yield depends on climate. Some examples from this site's data:

- Sweet potato is a strong performer in warm zones, but it is not viable in the cold boreal zone at all, and is only marginal in a maritime climate.
- Potatoes are viable in most zones, and typically perform best in maritime and continental climates, with lower yields in the arid and boreal zones.
- Wheat, barley and oats yield very differently from zone to zone, and are not viable in the hottest, wettest tropical zone.
- Winter squash is viable in every zone, but yields more in warm, long-season climates.

That is why a generic best-crop list can mislead. Use the calorie rankings for your zone, and see the crop guides for each climate for the full picture.

If You Have a Small Plot

When space is tight, the calories-per-metre figure matters even more. A few ways to make the most of it:

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- Put the most calorie-rich crops, potatoes, squash and roots, in the largest share of the space.
- Grow squash and beans upwards on supports, so that the ground beneath can be used.
- Use succession sowing and catch crops, so that no ground is empty for long.
- Choose compact varieties and grow in good, fertile soil, which raises yields.
- Leave the low-calorie crops to a few well-chosen plants, or to containers.

See how much land do I need to find out whether a plot can ever be enough.

Using the Numbers in a Plan

1. **Work out the calories you need** for the household for a year.
2. **Fill most of that with high-yield staples** that suit your zone, using the rankings.
3. **Add storage and protein crops,** such as beans, so the diet is balanced and lasts the winter.
4. **Add fresh vegetables** for nutrition and variety, in the space that is left.
5. **Check the land.** Add up the square metres, and see whether you have enough.

Common Mistakes

1. **Chasing the single best crop.** One staple is a risk, and a diet of one food is poor.
2. **Comparing calories per kilogram instead of per square metre.** Density alone is not the whole story.
3. **Using yields from another climate.** A figure from a warm zone will mislead in a cool one.
4. **Ignoring storage and processing.** A crop must be edible in February, too.
5. **Dismissing the low-calorie crops.** They supply vitamins and variety that staples cannot.

Frequently Asked Questions

What crop gives the most calories per square metre?

Potatoes are usually the single highest-calorie crop per square metre of any commonly grown vegetable, with other starchy staples like sweet potato and some grains close behind: vegetables grown mainly for flavour or nutrition, like tomatoes, lettuce or peppers, are far behind by comparison. The exact ranking shifts by climate zone, since yield per plant changes with growing conditions.

Does the highest-calorie crop change depending on climate zone?

Yes: a crop's calorie yield per square metre depends on how well it actually grows in a given climate, so the top performer in a warm, long-season zone isn't necessarily the top performer in a short, cool-season one, even though the crop itself provides the same calories per kilogram everywhere.

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Should I only grow the highest-calorie crops?

No: a diet of nothing but the single highest-calorie crop would leave a household missing vitamins, minerals and dietary variety that no amount of one staple crop can provide, so calorie-dense crops should form the bulk of a growing plan alongside a real range of other vegetables, not replace them entirely.

Which crop gives the most calories per square metre?

Potatoes, in most climates, followed by sweet potatoes where it is warm enough, and other heavy starchy crops. Grains are very calorie-dense but yield less weight per area.

How many calories per square metre does a potato crop give?

Using a typical garden yield of around 3 kilograms per square metre and about 770 calories per kilogram, roughly 2,300 calories per square metre. Real yields vary with climate, variety and care.

Why do lettuce and tomatoes rank so low?

They are mostly water, so a kilogram contains very few calories, and they cannot be stored for long. They are valuable for nutrition, but not for calories.

Is wheat or potato better for calories per square metre?

Potatoes usually give more calories per square metre, because they yield much more weight per area. Wheat is far denser by weight and keeps for years, but yields less per area and needs threshing and milling.

Does climate zone change the best crop?

Yes. Sweet potatoes do well in warm zones but not in cold ones, and potatoes, grains and squash vary in yield from zone to zone. Check the calorie rankings for your own zone.

Should I only grow the highest-calorie crop?

No. One crop leaves gaps in protein, fat and vitamins and is vulnerable to disease. A mix of staples, beans and vegetables is more resilient and more nutritious.

How can I increase calories per square metre?

Build fertile soil, choose high-yielding varieties, grow vertically where possible, use succession planting, and put the most calorie-rich crops in the best ground.

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GUIDE 10

Can You Survive on Vegetables Alone?

Short answer: not on most vegetables people picture when they hear the word. Lettuce, tomatoes, courgettes and most salad crops are genuinely low in calories per kilogram: surviving on them alone would mean eating an unmanageable volume of food every single day. The word "vegetables" is doing a lot of hiding here, because calorie staples like potatoes, grains and dried beans are technically vegetables too, and they behave completely differently from a head of lettuce.

KEY POINTS

- **Salad Vegetables Are Low-Calorie.** Lettuce, tomatoes, cucumber and most fresh salad crops provide relatively few calories per kilogram: filling, but not fuel.
- **Staples Are the Real Answer.** Potatoes, grains and dried beans are calorie-dense enough to actually carry a diet: they're vegetables too, just a completely different category functionally.
- **A Workable Diet Needs Both.** Staples supply the energy; nutrition vegetables supply the vitamins, minerals and variety: neither category does the other's job well.
- **Calories Aren't the Whole Picture.** Even a calorie-sufficient plant-based diet needs deliberate planning for nutrients that are harder to get without any animal products.

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Not All Vegetables Are Created Equal

"Vegetables" is a loose category that hides an enormous range in calorie density. A kilogram of lettuce might provide well under 150 kcal; a kilogram of potatoes provides several times that. This is exactly why this site's own crop guides split vegetables into **calorie staples** and everything else, because treating them the same way when planning a diet leads to a serious shortfall.

One honest caveat: the calorie figures here cover calories, not a fully complete nutritional profile. A plant-based plan can be nutritionally sound with the right variety and planning, but it's worth actively thinking about nutrients that are harder to source without any animal products, rather than assuming enough volume automatically covers everything.

THE FIRST PROBLEM

The Volume Problem

Here is how much of each food an adult would have to eat to get 2,000 calories in a day, using the calories-per-kilogram figures from this site's crop data:

FOOD	CALORIES PER KG	KILOGRAMS NEEDED FOR 2,000 KCAL
Lettuce	150	13.3 kg
Cucumber	150	13.3 kg
Tomato	180	11.1 kg
Cabbage	250	8.0 kg
Carrot	410	4.9 kg
Kale	490	4.1 kg
Potato	770	2.6 kg
Sweet potato	860	2.3 kg
Wheat	3,400	0.6 kg
Dried beans and peas	3,390	0.6 kg

That is more than 13 kilograms of lettuce a day, or about 3 kilograms of potatoes, compared with well under a kilogram of grain or dried beans. This is why leaf and salad vegetables cannot be the basis of a survival diet, while staples can.

Where a Plant-Based Diet Can Fall Short

Even when calories are covered, a diet of only plant foods, grown at home, can run short of some nutrients. The ones to think about are:

NUTRIENT	THE ISSUE	WHAT HELPS
Vitamin B12	Not found in plant foods in a usable form. A shortage develops slowly, often over years, and can cause serious nerve and blood problems.	Eggs, dairy, meat or fish, or a B12 supplement or fortified food. This is the one gap you cannot grow your way out of.
Fat and essential fatty acids	Hard to produce in a garden, and needed for energy and for absorbing some vitamins.	Nuts and seeds such as sunflower, walnut and flax, plus eggs, poultry fat and animal products. See are chickens worth it?.
Protein	Plant protein is plentiful but can be low in some amino acids when one food is eaten alone.	Eating grains and beans together, plus a variety of other plant foods, covers it.
Iron and zinc	Plant forms are less easily absorbed.	Beans, lentils, greens and whole grains, with vitamin C-rich foods eaten alongside.

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Calcium	Plant sources are present, but less than in dairy.	Kale, cabbage family greens, beans, nuts, seeds and fortified foods.
Iodine	Depends on the soil, and inland soils can be low.	Seaweed, fish, dairy or iodised salt.
Vitamin D	Comes mainly from sunlight on the skin and is scarce in food, especially in winter at high latitudes.	Sunlight when available, oily fish, eggs, or a supplement.

This is general information, not medical advice. If you are planning to rely on a largely plant-based, home-grown diet for a long time, talk to a doctor or dietitian about your own needs.

What a Workable Plant-Based Plan Looks Like

A plan that can genuinely carry a household has the following parts:

- **Calorie staples** for most of the energy: potatoes, grains, and sweet potatoes or squash where they grow. See what vegetables to grow.
- **Dried beans, peas and lentils** for protein, iron and zinc, eaten together with grain.
- **Dark leafy greens and brassicas** such as kale and cabbage, for vitamins A, C and K, calcium and folate.
- **Onions, garlic and root vegetables** for flavour, storage and variety.
- **A deliberate source of fat** such as sunflower seeds, nuts, or eggs and poultry.
- **A reliable B12 source** and, where needed, iodine and vitamin D.

The amounts needed are worked out in how much potato, wheat and rice per person.

Winter Nutrition

Winter is when a home-grown diet is most at risk, because fresh food is scarce. Plan specifically for:

- **Vitamin C.** Potatoes, cabbage, kale, Brussels sprouts and stored squash all contribute. Sauerkraut and other ferments keep much of their vitamin C. Pine needle or rosehip tea can help in an emergency.
- **Vitamin A.** Stored carrots, squash and sweet potatoes, and kale from the garden.
- **Fresh greens.** Hardy greens that overwinter, and sprouted seeds and beans grown indoors, can add fresh food at any time.

See vegetables that store longest and storing food without a fridge.

Filling the Gaps from Your Own Land

- **Eggs and poultry.** Provide B12, fat, protein and vitamin D from a small space. See are chickens worth it?.

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- **Dairy animals.** Provide B12, calcium and fat, but need much more land. See land for a homestead with animals.
- **Fish and shellfish,** where you live near the coast or a lake.
- **Foraging.** Wild greens, nuts and berries add variety, but only if you can identify them with certainty.
- **Stored supplies.** A stock of B12 supplements, iodised salt and cooking oil is a cheap safety net.

Who Needs Extra Care

Plant-heavy diets need more care for people with higher nutritional needs or less margin:

- Pregnant and breastfeeding women.
- Infants and young children, who need energy-dense food and adequate fat and B12.
- Older adults and anyone who is ill.
- Anyone doing heavy physical work, who needs more calories than the usual 2,000.

In these cases, take medical advice before relying on a diet with few or no animal products.

Common Mistakes

1. **Counting vegetables as one thing.** Salad and staples are very different.
2. **Ignoring B12.** A shortage may take years to show, and can be serious.
3. **No fat source.** Calories may be adequate, but fat is hard to grow.
4. **Forgetting winter.** Plan for vitamin C and vitamin A when fresh food is scarce.
5. **Assuming a calorie-sufficient diet is a complete one.** Calories are the first test, not the last.

Frequently Asked Questions

Can you survive on vegetables alone?

Not comfortably, and not on most common vegetables: crops like lettuce, tomatoes and courgettes are low in calories per kilogram, so surviving on them alone would require eating an impractically large volume every day. A genuinely calorie-sufficient plant-based diet needs to lean on calorie-dense staples like potatoes, grains and dried beans, which behave more like the backbone of a diet than a typical salad vegetable does.

What's the difference between a calorie staple and a nutrition vegetable?

A calorie staple (potatoes, grains, dried beans) provides a large, reliable amount of energy per kilogram and per square metre grown, while a nutrition vegetable (lettuce, tomatoes, peppers) provides comparatively few calories but contributes vitamins, minerals and flavour; a workable diet needs both, but only staples can actually cover a household's core energy needs.

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Is a vegetable-only diet nutritionally complete even if the calories work out?

Not necessarily: a well-planned plant-based diet with enough variety can cover most nutritional needs, but the figures on this site specifically cover calories rather than a nutritionally complete diet, so growers relying entirely on plants should also plan deliberately for nutrients that are harder to get without any animal products, rather than assuming volume alone solves it.

Can you survive on potatoes alone?

For a while, people have done so, since potatoes contain vitamin C and decent protein for a vegetable. But a diet of only potatoes lacks fat, vitamin B12 and some other nutrients, and is not healthy in the long run.

How many calories are in a kilogram of lettuce?

Only about 150, according to the data this site uses. An adult would need to eat more than 13 kilograms of lettuce a day to reach 2,000 calories, which is not realistic.

Can you get enough protein from vegetables?

Yes, mainly from dried beans, peas and lentils, eaten together with grains or other plant foods. It takes dedicated growing space for beans, not just a few plants.

What nutrient is hardest to get on a home-grown plant-based diet?

Vitamin B12, which is not found in plant foods in a usable form and cannot be grown. Eggs, dairy, meat, fish, fortified foods or supplements are the sources.

How can I get fat without animals?

Sunflower seeds, flax, squash seeds, walnuts and other nuts are the main garden sources. They take space and effort to grow and process, and most people find animal fat or eggs easier.

Is a plant-based survival diet safe for children?

It needs careful planning and medical advice, because children need energy-dense food, fat and vitamin B12. Do not rely on a diet with no animal products for children without professional guidance.

What vegetables give the most calories?

Starchy staples such as potatoes, sweet potatoes and winter squash, plus grains and dried beans, which are by far the most calorie-dense.

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GUIDE 11

How Much Potato, Wheat or Rice Do I Need Per Person Per Year?

Short answer: there's no single weight, because the real starting point is calories, not kilograms. An adult needs roughly the same annual calorie total no matter which staple supplies it, but potato, wheat and rice each provide very different calories per kilogram, so the weight required differs by crop before climate is even considered. Add in that yield per plant varies enormously by zone, and a single "you need X kg" answer would be wrong for almost everyone who reads it.

KEY POINTS

- **Start From Calories, Not Weight.** The honest calculation begins with how many calories a person needs in a year, then works out how much of a given staple supplies that.
- **Every Staple Has a Different Density.** Potato, wheat and rice each provide a different number of calories per kilogram, so "how much weight" is never the same answer across crops.
- **Zone Changes the Yield.** The same seed quantity produces very different amounts of food depending on your climate zone: a generic weight figure ignores this entirely.
- **Spreading Risk Across Staples.** Relying on one staple crop concentrates risk: a mix of two or three, where the zone supports it, is generally the more resilient plan.

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Why Published "You Need X kg" Figures Are Usually Wrong

Search for "how much wheat do I need per person per year" and you'll find confident-sounding numbers, usually a single figure in kilograms, presented as if it applies universally. It doesn't, for two separate reasons that stack on top of each other.

First, calorie density differs by crop. A kilogram of potato provides meaningfully fewer calories than a kilogram of wheat, because potato is mostly water by weight. So even starting from the same annual calorie target, the weight of potato needed and the weight of wheat needed to hit that target are two different numbers: comparing them directly as if "a kilogram is a kilogram" misses the point entirely.

THE NUMBERS

If One Staple Supplied Everything

To see why weight is the wrong starting point, imagine one adult living entirely on a single staple. The table uses the calories-per-kilogram figures from this site's own crop data (), and a daily need of 2,000 or 2,500 calories.

STAPLE	CALORIES PER KG	KG PER YEAR AT 2,000 KCAL A DAY	KG PER YEAR AT 2,500 KCAL A DAY
Potato	770	950	1,185
Sweet potato	860	850	1,060
Winter squash	340	2,145	2,685
Wheat	3,400	215	270
Oats	3,350	220	270
Barley	3,540	205	260
Maize (flour)	3,650	200	250
Rice	3,640	200	250
Dried beans and peas	3,400	215	270

The gap is enormous. On potatoes alone, one person would need well over a tonne a year, while on wheat it is closer to 200 to 270 kilograms. That is why "how many kilograms per person" has no single answer, and why published figures that give one number for all staples can mislead.

Nobody actually eats this way, of course, which is why the next section matters more.

A Realistic Mix: Several Staples Sharing the Load

A more practical plan uses a mix of staples, with fresh vegetables, eggs and other foods on top. As an illustration, suppose one adult needs 2,250 calories a day and the staples supply about 60 percent of that, with the rest coming from vegetables, fruit, eggs, fats and other foods. That is roughly 490,000 calories a year from staples. Here is how three different splits translate into weight, per person per year:

SPLIT OF THE STAPLE CALORIES	POTATOES (KG)	WHEAT GRAIN (KG)	DRIED BEANS (KG)
Potato-led: 50% potato, 30% wheat, 20% beans	320	45	30
Balanced: 35% potato, 40% wheat, 25% beans	225	60	35
Grain-led: 20% potato, 60% wheat, 20% beans	130	85	30

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These are illustrations, not recommendations. A cold, wet climate favours potatoes, a warm, dry one favours grain and beans, and your own tastes and land decide the rest. Notice that even in the potato-led plan, the weights of wheat and beans are small, because they are so much more calorie-dense.

Spreading across two or three staples also reduces risk: if blight hits the potatoes or the grain crop fails, you are not left with nothing. See what vegetables to grow for how staples fit into a whole plan.

What That Looks Like on a Plate

A day on the balanced plan above might look something like this, for one adult needing about 2,250 calories:

- **Potatoes, about 0.45 kg** (about 347 kcal)
- **Wheat flour or grain, about 0.35 kg** as bread, porridge or pasta (about 1,190 kcal)
- **Dried beans or peas, about 0.12 kg** (about 408 kcal)
- **Vegetables, 0.5 kg or more,** such as carrot, kale and cabbage (roughly 150 to 250 kcal)
- **Fat, eggs, fruit and other foods** make up the rest.

Those figures add up to roughly 2,100 calories, leaving only a little room for fat, eggs and fruit, which is why a plan built on staples and vegetables still needs a deliberate source of fat. See can you survive on vegetables alone?

How Much Seed Do You Need?

Once you know the weight you need, the next question is how much seed to plant. In this site's model, the harvest from each kilogram of seed (or per plant for crops grown from single plants) depends on your zone. Across the zones where each crop is viable, the figures run roughly like this:

CROP	HARVEST PER KG OF SEED (OR PER PLANT)	NOTES
Early potato	About 6 to 15 kg per kg of seed potato	Lower in cool and arid zones, higher in maritime and continental.
Maincrop potato	About 10 to 19 kg per kg of seed potato	Higher yielding, but a longer season.
Wheat	About 8 to 25 kg of grain per kg of seed	Wide range, from marginal zones to the best.
Oats	About 7 to 25 kg of grain per kg of seed	
Barley	About 11 to 22 kg of grain per kg of seed	
Rice (upland)	About 8 to 35 kg per kg of seed	Only viable in some zones.
Dried beans (per plant)	About 25 to 45 g of dried beans per plant	Plan on many plants for a worthwhile weight.

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Losses and Safety Margin

The figures above are what you need to eat, not what you need to grow. Real life takes a cut:

- **Processing losses.** Grain loses some weight to husks, bran and waste when it is threshed, cleaned and milled. Plan on a loss of perhaps 10 to 30 percent, depending on the crop and how finely it is milled.
- **Storage losses.** Rot, sprouting, mice and moisture eat into stores. See vegetables that store longest.
- **Poor years.** A wet summer or a late frost can cut a harvest sharply.
- **Seed for next year.** Keep back some of the harvest to sow.

Scaling to a Household

Multiply the per-person figures by the number of people, adjusting for children, who need fewer calories, and for heavy work, which needs more. For a family of four, the balanced plan above comes to roughly 900 kilograms of potatoes, over 200 kilograms of wheat and about 150 kilograms of dried beans each year, before losses and a safety margin. At those weights, the amounts of land needed are what really decide whether the plan works.

See how much land do I need for the land side, and highest-calorie crops per square metre for which staples give the most food from the least space.

Common Mistakes

1. **Using a single weight for all staples.** A kilogram of potato and a kilogram of wheat are not alike.
2. **Forgetting processing and storage losses.** Plan for a margin.
3. **Relying on one staple.** Spread the risk across two or three.
4. **Ignoring fat and protein.** Staples supply energy, not everything else.
5. **Planning from another climate's figures.** Yield depends heavily on your zone.

Frequently Asked Questions

How much potato, wheat or rice do I need per person per year?

There's no single universal weight, because the real starting point is calories, not kilograms: an adult needs roughly the same annual calorie total whichever staple supplies it, but potato, wheat and rice each provide a different number of calories per kilogram, so the actual weight needed varies by crop, and the actual land and seed needed varies further still by how well that crop yields in your specific climate zone.

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Why can't staple crop quantities just be looked up in a table?

Because yield, how much a given amount of seed or seed potato actually produces, depends heavily on climate zone, and a generic table has to either pick one climate (making it wrong for everyone else) or average across climates (making it inaccurate for everyone), so a real answer has to start from your own zone's yield figures, not a single published number.

Should I grow just one staple crop, or several?

Several is generally more resilient: relying on a single staple crop means a single pest, disease or bad season can threaten a large share of a household's calories, while spreading staple growing across two or three different crops (for example potatoes and grain) reduces that risk, provided the zone can support more than one of them well.

How many kilograms of potatoes does one person need in a year?

If potatoes supplied all of an adult's calories, roughly 950 to 1,200 kilograms. In a realistic mixed diet where potatoes supply around a quarter to a third of the calories, it is more like 250 to 350 kilograms.

How much wheat does one person need in a year?

Roughly 215 to 270 kilograms if wheat supplied all of the calories, and much less in a mixed diet. In the illustrations on this page it comes to roughly 40 to 90 kilograms per person, plus some extra for milling losses.

Why do potato and wheat quantities differ so much?

Potatoes are mostly water, so a kilogram contains far fewer calories than a kilogram of dry grain. The same calorie target needs a much greater weight of potatoes.

How much seed do I need to sow a kilogram of grain?

It depends on your zone. In this site's model, a kilogram of wheat seed produces roughly 8 to 25 kilograms of grain, so you would sow about 40 to 125 grams for each kilogram you want.

How much margin should I allow?

At least a fifth extra is a sensible minimum, allowing for processing losses, storage losses and a poor year, and more if you are new to growing.

Do I need all three: potatoes, wheat and rice?

No. Choose the staples that suit your zone. Rice is viable in only some zones, and two or three staples are enough to spread the risk.

What about beans and peas?

Dried beans and peas are calorie-dense and rich in protein, and they pair well with grain. They have lower yields per plant, so plan on a good number of plants.

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GUIDE 12

How Many Seeds Do I Need to Feed a Family of 4?

KEY POINTS

- **Calories Drive the Number, Not Habit.** A seed quantity that "feels about right" almost always undershoots: the honest way to size a seed order is to start from how many calories four people actually need in a year, then work backwards.
- **Staples Need Real Quantity.** Potatoes, grain and dried beans carry most of a household's daily energy: these are the crops that need to be sown at real scale, not a few plants in a corner bed.
- **Losses Eat Into Every Sowing.** Not every seed germinates, and not every plant survives to harvest: pests, wind and poor germination all take a bite, so a realistic seed order builds in a buffer rather than sowing the bare minimum.
- **Your Number Is Specific to You.** Activity level, climate zone and how much of your diet comes from vegetables versus staples all change the final figure: a family of 4 in a Mediterranean zone needs a different seed order than the same family in a Boreal one.

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Why a Single Seed Packet Is Never Enough

Seed packets sold at a garden centre are sized for a hobby garden: a few plants for fresh eating through the season, not a year's food supply for a household. The gap between "a packet of seeds" and "enough seeds to actually feed four people" is much bigger than it looks, for a simple reason: most vegetables provide surprisingly few calories per plant.

A family of four eating a full, calorie-sufficient diet for a year needs their food to come from somewhere, and vegetables alone, however many you grow, rarely supply enough energy to carry a household through. That's why calorie staples (potatoes, grains, dried beans and peas) matter so much: they're the crops that need to be grown at real scale, while vegetables round out the diet with nutrition and variety rather than bulk calories.

A WORKED EXAMPLE

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What a Family of Four Might Actually Sow

This example is for four adults eating 2,000 calories a day for a year (2,920,000 calories in total) in a temperate maritime climate, using this site's own yield, germination and loss figures for that zone. The split between crops is one reasonable choice, not the only one.

CROP	SHARE OF CALORIES	HARVEST NEEDED	SEED TO SOW
Potato (maincrop)	35%	about 1,330 kg	about 120 kg of seed potatoes
Wheat	30%	about 260 kg of grain	about 22 kg of seed grain
Broad beans (dried)	15%	about 130 kg dried	about 4,900 seeds
Winter squash	5%	about 430 kg	about 150 seeds
Carrot	5%	about 360 kg	about 3,100 seeds
Onion	3%	about 220 kg	about 3,000 seeds
Kale	3%	about 180 kg	about 430 seeds
Winter cabbage	4%	about 470 kg	about 480 seeds

How the Numbers Are Worked Out

Every figure above follows the same chain:

1. **Calories needed from the crop.** The household total multiplied by the crop's share of the diet.
2. **Kilograms to harvest.** Calories divided by the calories per kilogram of that food.
3. **Plants or units to harvest.** Kilograms divided by the typical yield per plant (or per kilogram of seed, for potatoes and grain).
4. **Allow for pests and failures.** Divide by the share of plants that survive to harvest.
5. **Allow for germination.** Divide by the share of seeds that sprout.

The result is a sowing figure, not a harvest figure. In the table above, you need roughly 1.6 to 2.2 times as many seeds as the number of plants you hope to harvest. See how much potato, wheat and rice per person for the food quantities and how much land do I need for the area they occupy.

Germination and Losses

Two losses stack on top of each other, and both are worth planning for:

- **Germination.** Fresh seed of most vegetables sprouts at 80 to 90 per cent, but carrots are often much lower, and old or badly stored seed can be far worse. See how to store seeds long term.
- **Pests, weather and disease.** The site assumes that around a quarter to a third of plants are lost before harvest in a typical year. A bad year can be worse, and slugs, birds and blight are the usual causes.

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The practical advice is to sow a little more than the calculation says for the crops you cannot afford to lose, and to keep part of the seed back for a second sowing if the first fails.

Buying Versus Saving Your Own

A seed order for a family-sized garden is a real cost the first year, and a much smaller one afterwards if you save seed:

- **Buy open-pollinated varieties** so you can save seed from them. Hybrid seed does not come true. See open-pollinated versus F1 hybrid.
- **Save the easy crops first:** beans, peas, lettuce and tomatoes are simple. Biennials such as carrots, onions and cabbage need two seasons and more care. See how to save seeds.
- **Keep potatoes and grain from your own harvest** as next year's seed, in the case of grain, and as seed tubers if blight and virus have been absent.

Saving seed also means a bigger first-year plan, because you need to leave some plants to go to seed rather than eating them all.

Ordering and Timing

- **Order early.** Popular varieties and seed potatoes sell out well before spring.
- **Buy by weight for the big crops.** Seed potatoes, grain, and beans in bulk are far cheaper per seed than small packets.
- **Store seed cool, dry and dark** until it is needed, and test any old seed on damp paper before relying on it.
- **Stagger sowings** of quick crops so that they do not all mature at once.

Common Mistakes

1. **Counting packets instead of plants.** A packet holds a hobby quantity.
2. **Forgetting the loss factors.** Planning for a perfect year leaves no margin.
3. **Ordering by variety instead of by calorie.** Salad seeds are cheap and pleasant, but the staples are what feed you.
4. **Using old seed without testing it.** Low germination quietly wrecks the plan.
5. **Buying hybrids and then being unable to save seed.**

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Frequently Asked Questions

How many seeds do I need to feed a family of 4 for a year?

Far more than a single packet or two of each vegetable: feeding four people for a year typically means hundreds of seeds for calorie staples like potatoes and grain, and many dozens for most other crops, because a few salad leaves are nowhere near enough calories to matter, while the staples that actually keep a household fed take real quantity to grow. The exact number depends on your climate zone, activity levels and which crops you choose, which is why a generic answer is only ever a rough starting point.

Why do seed catalogues undersell how many seeds you actually need?

Seed packets are sized for a hobby garden, not for feeding a household: a typical packet of, say, carrot seed is nowhere near enough to grow a year's supply for four people, and most people don't realise this until they actually do the maths on how many calories a family needs and how few calories most vegetables provide per plant.

Do I need the same number of seeds for every crop?

No: calorie staples like potatoes, wheat and beans need to be grown in real quantity because they carry the bulk of a household's energy needs, while high-value, fast-growing vegetables like lettuce or radish contribute much less per plant and are usually grown in smaller, repeated batches through the season rather than one huge sowing.

How many potato seeds do I need for a family of 4?

Potatoes are planted as tubers, not seeds. In the worked example above, a family of four getting about a third of its calories from potatoes would plant roughly 120 kg of seed potatoes in a temperate maritime zone, to harvest around 1,300 kg.

How much wheat seed does a family of 4 need?

About 22 kg of seed grain in the same example, which would produce roughly 260 kg of grain for about 30 per cent of a family's calories. Yield per kilogram of seed is higher in some zones than others.

Why do I need more seeds than plants?

Because not every seed germinates and not every seedling reaches harvest. With the loss rates this site uses, you need about 1.6 to 2.2 seeds for each plant you want to harvest.

How many seeds does a family need for salad and herbs?

Much less than for the staples, since salads and herbs add flavour and vitamins but few calories. A modest number of packets covers them, and they are cheap.

Is it cheaper to save my own seed?

After the first year, yes, particularly for beans, peas and potatoes. Buy open-pollinated varieties and keep the best plants for seed.

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How long does seed stay viable?

It depends on the crop and the storage. Beans and peas last several years if kept cool and dry; onions and parsnips are short-lived. Test older seed before you plan around it.

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PART 4

Seeds

Choosing seed that you can save and replant.

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GUIDE 13

Open-Pollinated vs F1 Hybrid Seeds: Why It Matters in a Crisis

Short answer: open-pollinated (OP) seed breeds true year after year; F1 hybrid seed doesn't. In ordinary times, that distinction barely matters: you buy new seed each spring either way. The moment buying new seed stops being an option, it becomes the entire question. A garden full of F1 hybrids is a garden that runs out the moment the seed packets do. A garden full of open-pollinated varieties can, in principle, keep producing indefinitely from its own saved seed.

KEY POINTS

- **OP Seed Breeds True.** Save seed from an open-pollinated plant, and next year's crop reliably resembles this year's, generation after generation.
- **F1 Seed Doesn't.** F1 hybrids are a deliberate one-generation cross: their saved seed reshuffles back toward the original parent lines, not the plant you grew.
- **Neither Is "Better": Just Different Jobs.** F1 hybrids are genuinely useful for buyers who purchase fresh seed every year: the issue is specific to relying on saved seed.
- **Check Before You Rely on It.** F1 seed is almost always labelled as such: checking the packet or variety name before building a seed-saving plan avoids an unpleasant surprise.

A Garden That Can Outlast the Seed Rack

An F1 hybrid is bred by deliberately crossing two distinct, stable parent lines to combine specific traits: disease resistance, uniform size, a particular flavour or yield characteristic. That first-generation cross is genuinely useful, which is why F1 varieties are so common in modern seed catalogues. But the traits that make the F1 generation valuable don't carry forward reliably. Plant seed saved from an F1 plant, and the next generation reshuffles genetically back toward a mix of the original parent lines, not a repeat of the plant you actually grew. Some of that seed might resemble the parent, some won't, and you have no reliable way to know which is which until it's already growing.

Open-pollinated varieties work completely differently. They're stabilised lines that, when allowed to pollinate naturally (with appropriate isolation from other varieties of the same species), reliably reproduce the same characteristics generation after generation. This is what makes them the only realistic choice for a household planning to rely on saved seed rather than a continuous supply from a shop or catalogue.

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In an ordinary year, this distinction is close to academic: most gardeners buy fresh seed regardless of type. It stops being academic the moment a household actually needs its garden to be self-renewing rather than shop-dependent. That's exactly why every seed-saving section on this site's crop guides flags whether the featured varieties are open-pollinated, and why the seed-saving basics page leads with this same distinction before anything about drying or storage technique.

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What Happens When You Plant Saved F1 Seed

An F1 hybrid is made by crossing two different, very uniform parent lines. Because every F1 plant gets the same mix of genes from the same two parents, the first generation (F1) is usually very even: the same size, the same colour and the same ripening date. That is what you are paying for.

The trouble starts with the next generation. Each F1 plant carries genes from both parents, and in its seed those genes are shuffled and dealt out again, so the plants grown from saved seed (the F2 generation) are all different from each other. In practice, you might see:

- some plants that look a lot like the F1 you grew,
- some that look like one or other of the original parents,
- some with a mixture of traits, and a few that are weak, small, bitter or fail to crop,
- and no reliable way of telling which is which until they are growing.

The seed itself is usually fertile and will germinate, so saved F1 seed is not useless. It simply cannot be relied upon to give you the same crop twice, which matters most when you are counting on that seed to feed you.

Open-Pollinated, Heirloom, Hybrid, GM: The Terms Explained

Seed catalogues use a lot of overlapping words. Here is what each one means in practice.

TERM	WHAT IT MEANS	WILL SAVED SEED GROW TRUE?
Open-pollinated (OP)	A variety pollinated naturally (by insects, wind or by itself) that has been stabilised, so its offspring match the parents.	Yes, if you stop it crossing with other varieties of the same species.
Heirloom	An open-pollinated variety with a long history, usually handed down for decades. There is no single legal definition.	Yes. All heirlooms are open-pollinated, but not every open-pollinated variety is an heirloom.
F1 hybrid	The first-generation offspring of a deliberate cross between two different parent lines.	No. The next generation varies a lot.

F2 and later	Seed saved from F1 plants, and from the plants grown from it.	Not at first. It becomes more uniform again only if you select and re-save over many generations.
Stabilised cross or landrace	A cross that has been selected over many generations until it is reliable, or a locally adapted population kept going by farmers.	Mostly, with more natural variation than a modern variety.
GM (genetically modified)	Seed whose genes have been altered in a laboratory. A different thing from hybrids, which are made by ordinary pollination.	Not sold in normal garden seed packets, so rarely relevant to a home gardener.
Organic seed	Seed from plants grown to organic standards. This says how it was grown, not what type it is.	Depends on the variety. Organic seed can be OP or F1.

The important point is that F1 hybrids are not GM and not "unnatural" in any harmful sense. They are the product of conventional plant breeding, and the only practical difference for a gardener is what happens to the saved seed.

Why F1 Hybrids Exist, and When They Are Fine

F1 hybrids are not a trick. Breeders use them because they genuinely improve some crops:

- **Uniformity.** Everything ripens together and looks the same, which suits market growers and anyone freezing or storing a single big harvest.
- **Disease resistance.** Breeders can combine resistance to several diseases in one variety, which is a real advantage in a damp or disease-prone year.
- **Vigour and yield.** First-generation hybrids are often unusually strong and productive, a effect known as hybrid vigour.
- **Particular traits.** Examples include short, compact plants, standing without bolting, or sweeter sweet corn.

When F1 is a sensible choice: if you buy fresh seed every year and are not relying on saved seed, an F1 variety with good disease resistance can be a very good option, especially for a crop that is hard to grow in your area.

When it is not: if you want a garden that can renew itself from its own seed, particularly if the shops or the post stop working, you need open-pollinated varieties for the crops you plan to save from. A sensible approach is a mixture, with OP varieties as the backbone and F1s only where they truly earn their place. Hybrid seed also tends to cost more, because the parent lines have to be carefully maintained and crossed again for every batch.

READ THE LABEL

How to Tell What You Have

F1 seed is nearly always labelled, because it is a selling point. A few quick checks will tell you what is in the packet:

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1. **Look for "F1" or "hybrid".** It is usually in the variety name (for example "Tomato Sungold F1") or in small print on the back of the packet. If you see it, do not save seed from it.
2. **Look for "open-pollinated", "OP" or "heirloom".** Many suppliers print this on the packet or in the catalogue description. Seed-saving and heritage suppliers often list only OP varieties.
3. **No label at all?** Check the supplier's website, or ask them. Without a clear answer, treat the variety as unproven and test it by growing it for a season before you rely on it.
4. **Check our crop guides.** Every vegetable guide on this site lists named varieties that are open-pollinated and worth saving seed from, and says so on the page.

Shop-bought vegetables. Most supermarket onions, carrots, brassicas and tomatoes are F1 hybrids, so their seed is unreliable. Squash and pumpkin are often an exception, as covered in our guide to saving seeds.

Where F1 Dominates, and Where OP Is Easy

Some crops are almost entirely hybrid in modern catalogues, while others have plenty of good open-pollinated choices. Knowing which is which saves you time.

GROUP	WHAT TO EXPECT	ADVICE
Beans, peas, lettuce, tomatoes	A wide choice of open-pollinated varieties, and these crops are the easiest to save seed from.	The best place to start. Choose OP varieties and save every year.
Kale, cabbage, broccoli, kohlrabi	Plenty of OP varieties, though they cross with each other freely.	Choose OP and save seed from one variety at a time.
Brussels sprouts and cauliflower	Heavily bred as F1 hybrids commercially. The open-pollinated varieties are the exceptions.	Look for OP varieties by name and check the packet.
Pak choi, Chinese cabbage, spinach	Much of what is sold is F1, bred for uniformity or disease resistance.	Stick to the traditional OP types named in our crop guides.
Onions and carrots	Many catalogue varieties are F1, and supermarket ones almost always are. Both are biennials, so saving seed takes two seasons.	Choose OP varieties, and expect to save seed only once you have some experience.
Sweet corn and squash	A mixture of OP and F1. Open-pollinated corn is less sweet but saves true. Most squash are OP.	Choose OP types for seed saving, and watch isolation distances.

Our Seed-Saving Helper shows how easy each crop is to save seed from.

A PLACE TO START

Open-Pollinated Varieties to Try

These varieties are listed as open-pollinated in our crop guides, so seed saved from them breeds true if you keep them from crossing with another variety of the same species. Catalogues change, so always check the packet. Each crop name links to its guide, which has many more.

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CROP	OPEN-POLLINATED VARIETIES TO LOOK FOR
Tomato	Brandywine, San Marzano, Cherokee Purple, Amish Paste, Black Krim, Roma, Stupice
Runner bean	Scarlet Emperor, Painted Lady, Czar, Gigantes, Enorma
French bean	Blue Lake, Tendergreen, Kentucky Wonder
Pea	Alderman, Little Marvel, Sugar Snap
Broad bean	Aquadulce Claudia, Windsor, Masterpiece Green, The Sutton
Lettuce	Black Seeded Simpson, Little Gem, Rouge d'Hiver, Grand Rapids
Kale	Red Russian, Dwarf Blue Curled Scotch, Lacinato, Siberian
Winter cabbage	Late Flat Dutch, Danish Ballhead, Savoy Perfection Drumhead
Carrot	Nantes 2, Chantenay Red Cored, Autumn King, St Valery
Beetroot	Boltardy, Detroit Dark Red, Chioggia, Bull's Blood
Parsnip	Tender and True, Hollow Crown, White Gem, Student
Onion	Yellow Sweet Spanish, Walla Walla, Red Wethersfield, Stuttgarter
Leek	Musselburgh, Carentan, American Flag, Autumn Giant
Squash	Waltham Butternut, Uchiki Kuri, Delicata, Blue Hubbard, Black Beauty zucchini
Cucumber	Marketmore 76, Boston Pickling, Straight Eight, Vert de Massy
Pepper	California Wonder, Corno di Toro, Jimmy Nardello, Marconi
Sweet corn	Golden Bantam, Country Gentleman, Stowell's Evergreen
Spinach	Bloomsdale Long Standing, Giant Noble, Viroflay
Chard	Fordhook Giant, Bright Lights, Lucullus

What If You Have Already Grown an F1?

Nothing is wrong with the crop. Eat it, store it and enjoy it as normal. The seed is the only issue.

If you would like to experiment, you can sow the saved seed the following year and see what you get. Some gardeners do this deliberately, a process called "dehybridising" or "stabilising". The idea is to grow a good number of F2 plants, save seed only from the best ones, and repeat over several generations until the plants become more uniform again. You end up with a variety adapted to your own garden.

It takes patience. It needs room for plenty of plants, careful isolation from other varieties of the same species, and typically four to six years of selection, and there is no guarantee that you will end up with something as good as the original. It makes a rewarding long-term project, but it is not a way to get a dependable crop next year.

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For next year's guaranteed crop, buy open-pollinated seed, or buy the F1 again.

Starting Your Open-Pollinated Collection

1. **Start with the easy crops.** Choose open-pollinated beans, peas, lettuce and tomatoes, and save seed from them this year.
2. **Check every packet** for "F1" before you buy, and look in our crop guides for open-pollinated varieties of the crops you want.
3. **Add one or two harder crops each year,** such as squash or brassicas, once you are confident about isolation and timing.
4. **Save from several plants** of each variety, as described in our guide to saving seeds, so your collection stays healthy.
5. **Dry, label and store the seed properly,** using our long-term storage guide.
6. **Swap with other gardeners.** Seed swaps and local seed libraries are a good way to widen your range, and the seed is already adapted to your area.

Over a few seasons you will build a collection of varieties that suit your soil and climate, and that you can keep growing without buying seed again.

Free printable seed packet labels
One A4 sheet of ten labels for 105 x 57 mm sticker sheets, with space for the crop, variety, year saved and where the seed came from. Write "OP" or "F1" on the label so you know which seed is safe to save.

Download the labels (PDF) ↓

Frequently Asked Questions

What's the difference between open-pollinated and F1 hybrid seed, and why does it matter in a crisis?

Open-pollinated (OP) seed breeds true generation after generation, so seed saved from this year's crop reliably grows the same variety next year; F1 hybrid seed is a deliberate one-off cross bred for a specific combination of traits, and seed saved from it doesn't reliably reproduce the parent plant. In a genuine crisis where buying new seed isn't an option, that difference is the whole ballgame. OP seed lets a household keep growing the same reliable crop indefinitely, while F1 seed is effectively a one-time purchase.

Are F1 hybrid seeds bad, or just unsuitable for seed saving?

F1 hybrids aren't inherently bad: many are bred for genuinely useful traits like disease resistance or uniform ripening, and they're an entirely reasonable choice for someone who buys fresh seed every year. The issue is specific to seed-saving: they simply weren't designed to reproduce true from their own seed, which makes them the wrong choice for anyone planning to rely on saved seed rather than a continuous seed supply.

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How do I know if a seed packet is open-pollinated or F1?

F1 hybrid seed is almost always labelled as such on the packet or in the catalogue description, since it's a selling point for the specific traits being marketed, if a variety isn't explicitly labelled F1 or hybrid, it's most likely open-pollinated, but checking the specific variety name against a seed-saving reference is the more reliable approach than assuming.

Is an F1 hybrid the same as a GMO?

No. An F1 hybrid is made by ordinary cross-pollination between two different parent plants, the same method breeders have used for over a century. GMO plants have had their genes altered in a laboratory, and are not normally sold in packets for home gardeners.

What does heirloom mean for seeds?

An heirloom is an open-pollinated variety with a long history, usually handed down for several decades or more. There is no single legal definition. All heirlooms are open-pollinated and breed true from saved seed, but not every open-pollinated variety is an heirloom.

Is organic seed the same as open-pollinated seed?

No. Organic describes how the seed was grown, without synthetic chemicals. It does not tell you whether the variety is open-pollinated or an F1 hybrid, so you still need to check the packet.

Why are F1 hybrid seeds more expensive?

The two parent lines have to be kept pure and crossed again by hand for every batch of seed, which is labour-intensive. Open-pollinated seed can be produced simply by letting a variety flower and setting seed.

Can I save seed from supermarket vegetables?

Sometimes. Most supermarket onions, carrots, brassicas and tomatoes are F1 hybrids, so their seed will not grow true. Squash and pumpkins are often an exception and will usually grow well. See our seed-saving guide for details.

What is dehybridising?

Dehybridising means growing saved F1 seed and selecting the best plants over several generations, usually four to six, until they become uniform and reliable again. It makes a satisfying long-term project but needs plenty of plants and patience, and it is not a quick route to a dependable crop.

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PART 5

Storing the Harvest

Keeping food through winter and the hungry gap without a freezer.

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GUIDE 14

Which Vegetables Store the Longest Over Winter?

Short answer: winter squash, onions, garlic, and root vegetables like potatoes and swede: these are the genuine long-haul keepers, often lasting several months to most of a winter with nothing more than cool, dark, appropriately humid storage. Leafy greens, tomatoes and most fresh salad crops are the opposite: they keep for days, not months, and need to be eaten fresh, preserved, or grown in smaller repeated batches instead of stored in bulk.

KEY POINTS

- **Winter Squash.** Thick-skinned varieties like butternut, Hubbard and Sweetmeat can keep for months in a cool, dry spot: among the best-storing crops of any kind.
- **Onions & Garlic.** Properly cured and stored somewhere cool and dry, storage onion and garlic varieties keep from harvest right through to the following spring.
- **Root Vegetables in Sand.** Potatoes, carrots, beetroot and swede packed in sand or a similar medium and kept cool and dark commonly last most of a winter.
- **Method Matters as Much as Crop.** The same vegetable can keep for months stored correctly and spoil in weeks stored wrong: matching crop to method is half the battle.

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Storage Life Is a Choice, Not Just a Trait

Every vegetable has some natural storage potential, but two things determine whether that potential is actually realised: the variety you grow, and how you store it afterwards. Within a single crop, some varieties are bred specifically for storage (a maincrop storage onion versus a sweet salad onion, for example) while others are bred for speed or flavour at the cost of keeping quality.

Storage method matters just as much. A winter squash cured properly and kept somewhere cool and dry can last through to spring; the same squash left in a damp shed will rot within weeks. Root vegetables packed in slightly damp sand, away from light and at a steady cool temperature, dramatically outlast the same roots left loose in a bag in a warm kitchen.

This matters most in the period gardeners call the **hungry gap**: late winter into early spring, when last year's stored harvest is running low but this year's new crops aren't ready yet. Deliberately planning storage crops to bridge that window, rather than discovering the gap exists partway through it, is one of

the most practical things a food-growing plan can do. Every crop guide on this site includes a dedicated storage and preservation section covering exactly how long each crop keeps and how to store it properly.

AT A GLANCE

The Storage Chart

Storage lives below are rough and assume good storage varieties kept in the right conditions. Your results will vary with variety, harvest condition and how consistent your storage is.

CROP	ROUGHLY HOW LONG IT KEEPS	HOW TO STORE IT	NOTES
Garlic	6 to 10 months	Cured, then hung or kept in nets, cool and dry	Hardneck types keep less long than softneck.
Onions	4 to 8 months	Cured, then in nets or braids, cool and dry	Choose storage varieties, and keep them dry.
Potatoes	4 to 8 months	In the dark, cool and frost-free, in sacks or boxes	Light turns them green and bitter.
Winter squash	3 to 6 months	Cured, then kept cool and dry on a shelf	Butternut keeps longest; acorn types keep for a shorter time.
Celeriac	4 to 6 months	Cool and damp, in sand or boxes	Trim the leaves and roots.
Carrots	3 to 6 months	Packed in damp sand, or in the ground under mulch	Remove the tops before storing.
Swede	3 to 5 months	Cool and damp, in sand or a clamp	Very hardy.
Beetroot	3 to 5 months	Packed in damp sand, twist off the tops	Do not cut the roots.
Winter cabbage	2 to 4 months	Cool and moist, hung or stored on shelves	Hardy types can stand in the garden too.
Parsnips	Until spring in the ground, or 2 to 4 months stored	Best left in the soil and lifted as needed	Frost improves the flavour.
Turnips	2 to 4 months	Cool and damp, in sand	Fast-growing but keeps less well than swede.
Dried beans and peas	1 to 3 years or more	Fully dried, in airtight, rodent-proof jars	Test old seed for germination before sowing.

Each crop guide on this site has its own storage section with more detail on method and expected life.

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The Right Conditions for Each Group

Not every crop wants the same conditions, and storing them all together in one place is a common reason for losses. As a rough guide:

GROUP	TEMPERATURE	HUMIDITY	LIGHT
Roots (carrots, beetroot, parsnips, swede, celeriac)	Just above freezing, about 0 to 4 °C	Very humid, about 90 to 95 percent	Dark
Potatoes	About 4 to 8 °C, never below 3 °C or they turn sweet	Fairly humid, about 85 to 90 percent	Completely dark
Cabbages	Close to freezing, about 0 to 2 °C	Humid, about 90 percent	Dark
Onions and garlic	Cool, about 0 to 10 °C, but dry and airy	Dry, about 60 to 70 percent	Dim
Winter squash and pumpkins	Cool room, about 10 to 15 °C	Dry to moderate, about 50 to 70 percent	Not important
Sweet potatoes	Warmer, about 13 to 16 °C. Not cold.	Moderately humid	Dark

You do not need to hit these numbers exactly. A cheap max-min thermometer and a small hygrometer, placed where you store, are the best way to learn what your space actually does. See root cellar alternatives for ways to create these conditions without a cellar.

Choose Storage Varieties

Within a single crop, some varieties keep far better than others. Always check the seed catalogue or packet for the phrase "good keeper" or "stores well". In general:

- **Onions.** Choose firm, pungent storage types, often with dark, papery skins. Sweet, mild salad onions often rot early.
- **Potatoes.** Maincrop varieties store better than earlies. Earlies are best eaten fresh.
- **Carrots.** Late-sown maincrop varieties store better than early, quick ones.
- **Squash.** Thick-skinned, hard-shelled types, such as butternut and Hubbard, keep longer than thin-skinned summer types.
- **Cabbage.** Dense, late "Dutch" or "storage" types keep well. Early and spring cabbages do not.

Your own seed, saved from the best keepers, gradually improves keeping quality for your own conditions. See how to save seeds.

Harvest and Curing Make or Break Storage

- **Harvest on a dry day,** and let crops dry briefly in the sun or in an airy spot. Wet crops rot.
- **Handle gently.** Bruises and cuts are where rot starts. Never store damaged crops; eat them first.

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- **Cure where needed.** Onions and garlic need to dry for two to three weeks in a warm, airy place until the necks are tight and the skins papery. Winter squash and pumpkins benefit from one to two weeks in a warm place to harden the skin. Potatoes benefit from a short curing for a week or so in a cool dark place to toughen the skin.
- **Lift before hard frost.** Frost damages potatoes, squash, onions and tender roots, and frozen crops rot in store. Hardy roots like parsnips can stay in the ground.
- **Leave a stalk on squash** and do not carry them by the stem.

Checking and Sorting

Stored crops are not a set and forget system. Rot spreads fast, so look over them regularly.

- Check every week or two, especially in the first month and again in late winter.
- Remove any soft, mouldy or sprouting item at once, before it spoils its neighbours.
- Eat the most vulnerable crops first and keep the best keepers for later.
- Keep apples and other ripening fruit away from potatoes and roots, because the ethylene gas they give off hastens sprouting and spoilage.
- Rotate stock: use the oldest first.

Planning to Bridge the Hungry Gap

The hungry gap, from late winter to early summer, is when stores run low and the new crops are not yet ready. Plan to cross it by combining:

- Late-keeping stores: garlic, onions, squash, potatoes, dried beans.
- Crops that stand in the ground through winter: leeks, parsnips, kale, winter cabbage.
- The first fast crops of spring: overwintered greens, early radish, spinach and sprouting broccoli. See short growing season.
- Preserved food: dried, fermented or bottled produce from the main harvest.

Leave It in the Ground

In many climates the cheapest store is the soil itself. Parsnips, leeks, swede, kale and winter cabbage are all hardy enough to stand outdoors and be harvested as needed. Carrots and beetroot can also overwinter under a thick layer of straw or leaves in milder places.

Watch for slugs and voles, and be ready to lift everything if a very hard freeze is forecast and the ground might become impossible to dig. Where the ground freezes solid or snow lies deep, store a share indoors instead.

Short Keepers: Eat, Preserve or Replace

Tomatoes, lettuce, cucumbers, sweet corn and most salad crops keep only days, or a few weeks at best. They are best handled by:

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- Eating them fresh in season and sowing again regularly for a steady supply.
- Preserving the surplus: drying, fermenting, bottling or making into sauces. See storing food without a fridge.
- Growing hardy leafy crops, such as kale, to cover winter rather than trying to store lettuce.

Common Storage Mistakes

1. **Storing damaged crops.** One bruised potato can spoil a box.
2. **Skipping the cure.** Uncured onions and squash rot early.
3. **Too warm or too damp.** The most common cause of losses.
4. **Letting light in.** Potatoes turn green, and roots sprout.
5. **Never checking.** Rot spreads while you are not looking.
6. **Growing the wrong varieties.** Salad types do not keep.

Frequently Asked Questions

Which vegetables store the longest over winter?

Winter squash, onions, garlic, and root vegetables like potatoes, swede and beetroot kept in sand or a cool, dark spot are among the longest keepers, often lasting several months to most of a winter without refrigeration, by contrast, leafy greens, tomatoes and most fresh salad crops keep for days rather than months and need to be eaten fresh, preserved, or grown in succession instead.

Does how a vegetable is stored change how long it lasts?

Yes, considerably: the same crop can keep for months in the right conditions (cool, dark, appropriate humidity, sometimes packed in sand) and spoil within weeks if stored wrong, so matching each crop to its correct storage method matters as much as choosing crops with good storage potential in the first place.

What's the "hungry gap" and how do storage crops help?

The hungry gap is the period in late winter and early spring when the previous year's stored harvest is running low but the new season's crops aren't ready yet: good storage crops, planned deliberately to last through this window, are what stop that gap turning into a real shortage.

Which vegetables keep the longest without a fridge?

Garlic, onions, potatoes, winter squash and dried beans are the longest keepers, followed by carrots, swede, beetroot, celeriac and winter cabbage. With good varieties and the right conditions, many keep for several months.

How long do potatoes last in storage?

Properly cured and stored in the dark, cool and frost-free, maincrop potatoes keep for roughly four to eight months. Early potatoes are best eaten within a few weeks.

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How do I stop onions rotting in store?

Choose a storage variety, cure them well for two to three weeks until the necks are dry and tight, and keep them somewhere cool, dry and airy. Check regularly and remove any that soften.

Why have my potatoes gone green?

They have been exposed to light. Green potatoes taste bitter and contain solanine, which can make you ill, so store them in total darkness and cut away or discard green parts.

What is the best way to store carrots over winter?

Pack them in slightly damp sand, in boxes or a clamp, in a cool, dark place, or leave them in the ground under a thick layer of straw or leaves in mild climates. Twist the tops off first.

What temperature should a store room be?

It depends on the crop. Roots and cabbages like to be near freezing, potatoes a little warmer, squash and onions cool and dry, and sweet potatoes warmer still. A max-min thermometer shows what your space does.

Can I store apples with potatoes?

It is best not to. Apples give off ethylene gas that speeds up sprouting in potatoes and spoilage in other crops, so keep them in separate spaces.

What is the hungry gap?

The weeks from late winter to early summer when last year's stores are running low and this year's crops are not yet ready. Planning late-keeping stores, hardy winter crops and early spring sowings helps cover it.

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GUIDE 15

Root Cellar Alternatives for Small Gardens

Short answer: you don't need a dedicated structure: you need cool, dark and stable, however you get there. A traditional outdoor clamp, a buried bin or barrel, or simply the coolest, darkest indoor space you have access to (an unheated garage, a cupboard on an outside wall, a cool basement) can all substitute for a purpose-built root cellar. What actually preserves a harvest is the environment, not the structure: a proper cellar is just one convenient way to create that environment.

KEY POINTS

- **The Traditional Clamp.** Root vegetables piled on straw, covered with more straw and a layer of soil: an outdoor mound that insulates against frost while letting moisture escape.
- **A Buried Bin or Barrel.** A dustbin or barrel buried so its lid sits near ground level uses the earth's natural insulation: a smaller-scale, more contained version of a cellar.
- **The Coolest Room You Have.** An unheated garage, a north-facing outbuilding, or a cupboard on an outside wall can meaningfully extend storage life over a warm kitchen.
- **Environment Matters, Not Structure.** Cool, dark, and the right humidity for the crop are what actually preserve a harvest: any structure that provides those three things will work.

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You're Recreating an Environment, Not Building a Cellar

A root cellar works because it's dug into the ground, and soil is an excellent insulator against surface temperature swings: a few feet down, the temperature stays remarkably stable year-round, cool but not freezing. That's the entire principle. Anything that recreates a similarly stable, cool, dark environment will preserve stored crops in roughly the same way, whatever it's actually called.

For a garden without space or resources for a full cellar, a **clamp** is the traditional low-cost alternative: root vegetables built into a mound on a bed of straw, covered with more straw for insulation, then topped with a layer of soil. It insulates against frost from above while the loose straw lets excess moisture escape from below, which is exactly the balance root vegetables need. A **buried bin**, a dustbin or barrel sunk into the ground with its lid at or just below surface level, works on the same principle in a smaller, more contained form, useful where a full clamp isn't practical.

Where no outdoor option exists at all, indoor storage in the coolest available space still helps meaningfully: an unheated garage, an outbuilding, or even a well-insulated box kept in the coolest corner of a home extends storage life over a warm kitchen, even if it can't match a true cellar's volume or consistency over a full winter. Every crop guide on this site's storage section notes which specific method suits that crop best, so the right choice can be matched to what space you actually have.

Which Option Suits Your Situation?

YOUR SITUATION	BEST OPTION	WHY
A garden and a large root harvest	An outdoor clamp	Cheap, big capacity, and uses materials you already have.
A small garden or a small harvest	A buried bin or barrel	Compact and easy to build, and easier to protect from rodents.
No garden space, but a garage or outbuilding	An unheated garage or shed with boxes	Uses an existing structure. Needs frost protection in hard winters.
A flat or house with no outdoor space	A cold cupboard, a balcony box or a cool corner	Smaller scale, and best for short-term use of a few crops.
A very cold climate with deep frost	An insulated indoor store or a deep, well-insulated clamp	Frost protection is the main issue.
A warm climate	A shaded, ventilated store, and crops that tolerate warmth	Cool and damp roots are hard to keep. Choose crops like sweet potato and squash that prefer warmth.

THE TRADITIONAL ANSWER

Building a Clamp

A clamp is a mound that stores roots through the winter outdoors. To build one:

1. **Choose a well-drained, sheltered spot,** on level ground out of the wind and away from standing water. Avoid a hollow where water collects.
2. **Make a base.** Lay a thick bed of dry straw about 15 centimetres deep, on the ground or on a layer of gravel for drainage.
3. **Pile the crop.** Stack clean, dry, undamaged roots in a low cone or a long ridge. Remove the leaves first, leaving a short stub.
4. **Insulate.** Cover with a thick layer of dry straw, around 15 to 20 centimetres, with a small tuft of straw poking out of the top as a vent.
5. **Wait, then add soil.** After a week or so, once the crop has stopped sweating, cover the straw with a layer of soil about 10 to 15 centimetres deep, patted firm. Dig a shallow drainage trench around the base.
6. **Open it carefully.** Take what you need from one end, then close it up again quickly. Do not open the clamp in hard frost.

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Potatoes, carrots, beetroot, swede and turnips all keep well in a clamp. Make several smaller clamps rather than one big one, so you do not have to open the whole store at once. Rats and mice love clamps, so a layer of wire mesh under the base, and a trap nearby, can save the harvest.

The Buried Bin or Barrel

1. **Choose a container.** A clean galvanised dustbin, a metal drum or a plastic barrel with a tight lid. Drill drainage holes in the bottom.
2. **Dig a hole** deep enough for the container to sit with its rim a little above ground level, on a layer of gravel.
3. **Pack it.** Place the roots in layers, with slightly damp sand, sawdust or leaves between layers.
4. **Close it.** Put the lid on, and cover the top with a thick layer of straw, leaves and a board or heavy sheet to keep out rain and frost.
5. **Check it.** Open it once or twice in the winter to remove anything rotting.

It suits a smaller harvest, is easier to protect from rodents than a clamp, and can be dug up and moved if needed. A thick, tight lid helps keep the moisture in and the mice out.

Indoor Spaces That Work

- **Unheated garage or shed.** Cooler than the house and often frost-free, particularly in a mild climate. Use boxes, crates or sacks, kept off the floor. In a hard frost, add insulation or a layer of blankets.
- **A cool cellar or basement.** Often the best indoor option, if it stays cool and not too damp.
- **A cupboard on an outside wall.** A spare cupboard or pantry against a north-facing wall can be a good cool store for a few crops.
- **Under the stairs, or an unheated spare room.** Better than a warm kitchen, though warmer than ideal.
- **A window well or porch.** A closed porch or unheated lobby that stays above freezing but cool can hold potatoes and squash.

Keep the room dark for potatoes, ventilated for onions and squash, and humid for roots, using boxes of damp sand, which lets you offer different conditions in a single space.

Insulated Boxes and In-Ground Storage

- **An insulated box.** Build a wooden box with a hinged lid and line it with polystyrene or straw bales. Placed in a garage or against a north wall, it protects roots from both frost and warmth.
- **A trench.** In well-drained soil, a trench about a half-metre deep, lined with straw, filled with roots and covered with a board and insulation, works like a small clamp.
- **Leave them in the ground.** Parsnips, leeks, swede and kale can be kept in the soil, under a thick layer of straw or leaves. See vegetables that store longest.

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- **Cold frames.** A cold frame with a straw blanket can hold hardy roots and winter salad.

The Conditions to Aim For

Whatever you choose, check that it delivers roughly these conditions for the crops you are storing:

CROP GROUP	TEMPERATURE	HUMIDITY
Roots and cabbages	About 0 to 4 °C	High, about 90 to 95 percent
Potatoes	About 4 to 8 °C, in the dark	About 85 to 90 percent
Onions and garlic	Cool and dry, about 0 to 10 °C	Low, about 60 to 70 percent
Winter squash	About 10 to 15 °C	About 50 to 70 percent

A max-min thermometer, and ideally a small hygrometer, will show you how your space behaves, and when it needs help.

The Storage Year

- **Late summer.** Build the clamp or prepare the store, and make sure the containers are clean. Cure onions, garlic and squash.
- **Autumn.** Harvest on a dry day before a hard frost, and fill the store with clean, undamaged crops.
- **Winter.** Check every couple of weeks. Remove anything rotting, and add insulation in hard cold.
- **Late winter and spring.** Eat the most vulnerable crops first, and watch for sprouting as the weather warms.

See storing food without a fridge for drying, fermenting and other ways to preserve what will not keep fresh.

Common Mistakes

1. **Poor drainage.** A waterlogged clamp rots everything in it.
2. **No ventilation.** Without a vent, the crop sweats and rots.
3. **Storing damaged or wet roots.** Only clean, dry, undamaged crops should go in.
4. **Forgetting rodents.** Mesh, tight lids and traps protect your store.
5. **Storing everything together.** Apples, onions and potatoes do not suit each other.
6. **Letting it freeze hard.** Frozen crops rot as soon as they thaw.

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Frequently Asked Questions

What are the best root cellar alternatives for a small garden?

A traditional outdoor clamp (root vegetables piled on straw, covered with more straw and a layer of soil), a buried dustbin or barrel with a lid, or simply the coolest, darkest indoor space available (an unheated garage, a cupboard on an outside wall, or a suitably cool cellar or basement) can all substitute for a dedicated root cellar, since what actually matters is stable cool temperature, darkness and appropriate humidity, not the specific structure providing them.

Does a buried bin really work as well as a proper root cellar?

Reasonably well for a small quantity: a bin or barrel buried so its lid sits at or just below ground level uses the same insulating effect as a cellar dug into the earth, keeping contents notably cooler and more stable than an above-ground container, though it won't hold as large a volume or last quite as consistently as a proper cellar over an entire winter.

What if I have no outdoor space for a clamp or buried bin at all?

Indoor options still work for smaller quantities: an unheated room, an outside-wall cupboard, or even a well-insulated box in the coolest part of a home can extend storage life meaningfully compared with a warm kitchen, though volumes will be smaller and some crops (particularly onions and garlic, which need dry rather than humid conditions) are easier to manage indoors than root vegetables needing damp sand.

How deep does a root cellar need to be?

A cellar a metre or two below ground stays remarkably steady. For a clamp or buried bin, the insulation of straw and soil does the same job at the surface.

How do I build a clamp for potatoes?

Lay a bed of straw, pile dry, clean potatoes in a low mound, cover with a thick layer of straw, and add a layer of soil once the crop has stopped sweating. Leave a straw vent at the top and dig a drainage trench around it.

What can I store in a buried bin?

Carrots, beetroot, parsnips, swede, turnips and potatoes, packed in layers with slightly damp sand or sawdust. Keep the lid tight and insulate the top.

Will potatoes freeze in a clamp?

Not if the clamp is built with enough straw and soil, and kept dry. Hard frost can still damage them if the covering is too thin, so add extra straw before severe cold.

Can I use my garage as a root cellar?

Often, in mild climates. It needs to stay above freezing, so add insulation or blankets in hard frost, and keep crops in boxes or sacks off the floor.

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How do I keep rats and mice out of a clamp?

Lay wire mesh beneath the base, keep the covering thick and complete, and set traps nearby. Smaller bins with tight metal lids are easier to protect.

What humidity do root vegetables need?

High humidity, around 90 to 95 percent, which keeps them from shrivelling. Packing them in slightly damp sand is a simple way to achieve it.

Can I store vegetables in a warm climate?

Cool, damp roots are harder to keep, so choose crops that tolerate warmth, such as sweet potato and winter squash, and use a shaded, well-ventilated store.

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GUIDE 16

How to Store Vegetables Without a Fridge or Electricity

Short answer: the same methods people used for thousands of years before refrigeration existed. Root vegetables packed in slightly damp sand, onions and squash cured and kept somewhere cool and dry, and traditional structures like root cellars and clamps: all of these genuinely work, because they're built on physics (temperature, humidity, darkness, airflow) rather than technology. The trick isn't a single universal method; it's matching each crop to the storage approach that actually suits it.

KEY POINTS

- **Sand Storage for Roots.** Carrots, beetroot and similar roots packed in slightly damp sand, kept cool and dark, stay fresh for months without any mechanical cooling.
- **Curing for Onions & Squash.** Properly cured (dried and hardened off) onions, garlic and winter squash store for months in nothing more than a cool, dry, airy spot.
- **Clamps and Root Cellars.** Traditional outdoor clamps (an insulating mound of straw and soil) and root cellars use the ground's natural insulation to hold a stable, cool temperature year-round.
- **Not Every Crop Stores the Same Way.** Soft, high-water crops like lettuce and tomatoes were never built to store long-term: drying, fermenting or eating fresh suits them better than any storage method.

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Storage Is Physics, Not Technology

A refrigerator does two things: it keeps food cool, and it keeps humidity somewhat controlled. Neither of those requires electricity to achieve: they require the right physical conditions, which traditional storage methods have always provided. A cellar dug into the ground stays naturally cool year-round because soil is an excellent insulator against surface temperature swings. A clamp, a mound of root vegetables layered with straw and topped with soil, does the same job above ground, insulating against frost while letting excess moisture escape so the crop doesn't rot.

The details matter by crop. Root vegetables like carrots and beetroot do best packed in slightly damp sand, which holds just enough moisture to stop them shrivelling without so much that they rot: too dry and they go limp, too wet and they spoil. Onions, garlic and winter squash need the opposite: they need

to be properly cured (dried and hardened) first, then kept somewhere cool, dry and well-ventilated, since damp conditions are exactly what causes them to rot in storage.

What doesn't store well without refrigeration are high-water-content, soft-tissue crops: lettuce, tomatoes, most leafy greens. These were never suited to long-term storage even with modern refrigeration; they're better handled through drying, fermenting, canning, or simply eating fresh and growing more in succession. Every crop guide on this site includes a dedicated storage and preservation section with the specific method and expected storage life for that crop.

Keeping Food Cool Without Power

Roots, squash and onions are covered above, and in the guide to vegetables that store longest. For cool storage of everything else, these low-tech methods help:

- **The coolest place you have.** A north-facing wall, a cellar, a pantry on a shaded side of the house, or a cupboard against an outside wall can run many degrees cooler than the kitchen. See root cellar alternatives.
- **A pot-in-pot cooler.** Also called a zeer pot. A smaller clay pot sits inside a larger one, with wet sand packed between them, and a damp cloth over the top. As the water evaporates, it cools the inner pot. It works best in hot, dry climates, and is much less effective in humid ones.
- **Evaporative coolers.** A damp cloth or a wetted cupboard with mesh sides that sits in a draught keeps butter, milk and cooked food cooler for a short time in dry weather.
- **Cold water.** Standing containers in a spring, a stream or a water trough keeps them cooler than the air. Only use clean water, and keep containers sealed.
- **Winter cold.** In freezing weather, a sheltered, shaded outdoor box or cold frame can act as a natural fridge. Mind the animals, and avoid freeze-thaw cycles.

None of these will keep fresh meat or dairy safely for long in warm weather. They are for short-term cooling, not a substitute for a fridge.

OLDEST METHOD OF ALL

Drying

Drying removes the water that bacteria and moulds need to grow, and it makes food light and compact. Properly dried food can keep for a year or more with no power.

- **Beans, peas and grains.** Leave them on the plant until the pods are dry and rattling, then finish them indoors. Store in airtight, rodent-proof jars.
- **Herbs.** Hang small bunches in an airy, shaded spot until they crumble.
- **Fruit and vegetables.** Slice thinly and dry in the sun on racks, over a stove, in a very low oven or in a simple solar drier. Apples, tomatoes, plums, peppers, mushrooms and onions all dry well. Dry until leathery for fruit, or brittle for vegetables.
- **Chillies and peppers.** String them up and hang them in a warm, dry, airy place.

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- **Meat and fish.** Can be dried as jerky or salted and air-dried, but this needs proper technique, and the food-safety risk is greater.

Dried food must be completely cool and dry before it is stored somewhere dry, since moisture is what spoils it. Use airtight containers and check for signs of moisture or mould in the first few weeks.

Fermenting

Fermentation uses friendly bacteria to turn sugars in vegetables into acid, which preserves them and adds flavour and nutrients. It needs only salt, vegetables and a clean jar.

- **Sauerkraut and kimchi.** Shredded cabbage mixed with salt, about 2 percent of the weight of the vegetables, then packed down until its own juices cover it. It ferments over days to weeks and then keeps for months in a cool place.
- **Brined vegetables.** Whole or sliced cucumbers, carrots, beans and cauliflower in salted water, fully submerged.
- **Keep it under the brine.** Anything exposed to air can go mouldy. Weigh the vegetables down.
- **Use your senses.** A healthy ferment smells pleasantly sour. If it smells foul, or has pink or black mould, discard it.

Fermented foods are particularly good in winter because they stay a source of vitamins, such as vitamin C, when fresh vegetables are scarce.

Pickling and Salting

- **Vinegar pickles.** Vegetables and fruit packed into jars with hot, strong vinegar (at least 5 percent acidity) keep for many months. Beetroot, onions, cabbage, cucumbers and eggs are the usual choices.
- **Salting.** Layering beans, cabbage or fish in dry salt draws water out and prevents spoilage. It was once the main way to keep green beans through the winter.
- **Sugar and jam.** Fruit boiled with plenty of sugar keeps well, and jam, jelly and fruit cheeses are a good way to use a glut.
- **Oil and fat.** Cooked meat sealed under a layer of fat is the old confit method. It needs care and a cool store.

Salt and vinegar are not things you can grow, so keep a stock of both if you plan to rely on pickling.

Bottling and Canning: Handle With Care

Home canning in jars gives long-lasting, ready-to-eat food, but it is the one method here where mistakes can be dangerous.

- **High-acid foods.** Fruit, jam, tomatoes with added acid, and pickles can be processed in a boiling water bath.

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- **Low-acid foods.** Vegetables, meat, fish and soups need to be heated to a much higher temperature than boiling water reaches, which means a pressure canner. If they are bottled without it, they can grow the bacteria that cause botulism, which is rare but can be fatal.
- **Use tested recipes and equipment.** Follow recipes from a reliable canning guide for processing times, jar sizes and altitude adjustments.
- **Check seals and discard doubtful jars.** Never taste food from a jar that is bulging, leaking, spurting or smells wrong.

If you are new to canning, start with jam and pickles, and learn pressure canning from a trusted guide before bottling vegetables or meat.

Eggs, Dairy and Meat

- **Eggs.** Unwashed fresh eggs keep for several weeks in a cool place, and can be pickled, frozen beaten, or water-glassed to keep for months. See are chickens worth it?.
- **Dairy.** Milk spoils quickly. Turning it into hard cheese, butter, ghee or yoghurt makes it last. Hard cheese stores for months in a cool cellar.
- **Meat.** Without a freezer, meat is best salted, smoked, dried or canned. Fresh meat should be eaten within a day or two in warm weather.

Pests and Spoilage

- **Rodents.** Mice and rats can ruin a store. Use metal bins, glass jars and shelves that they cannot reach.
- **Insects.** Grain and bean weevils and pantry moths can get into dried food. Dry food thoroughly, keep it sealed, and check it regularly.
- **Moulds.** Moisture is the cause. Keep stores dry, and ventilated where needed.
- **Check often.** Look over stored food every week or two and remove anything that is going bad.

Building a Store That Lasts

1. **Start with the easy wins.** Cure and store onions, garlic, potatoes and squash, and dry beans.
2. **Add one preserving method at a time.** Learn drying first, then fermenting and pickling.
3. **Label everything** with what it is and the date.
4. **Keep a stock of salt, vinegar and clean jars.** They are the supplies you cannot grow.
5. **Rotate your stock** and eat the oldest first.

See what vegetables to grow to choose the crops, and short growing season if your harvest comes all at once.

Common Mistakes

1. **Bottling low-acid foods without a pressure canner.** The one genuinely dangerous mistake.

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2. **Storing damp food.** It is the main cause of mould and spoilage.
3. **Letting vegetables poke out of the brine.** They will go mouldy.
4. **Trusting a sniff alone.** Botulism has no smell. If in doubt, throw it out.
5. **No labels.** You will forget what is in the jar, and how old it is.

Frequently Asked Questions

How do you store vegetables without a fridge or electricity?

Through methods that predate refrigeration entirely and still genuinely work: packing root vegetables in slightly damp sand in a cool, dark place, curing and storing onions, garlic and winter squash somewhere cool and dry, and using a root cellar, clamp or simply the coolest, darkest part of a building instead of mechanical cooling. Each method suits different crops, and matching the crop to the right method matters more than the method itself.

What is a clamp, and does it still work today?

A clamp is a traditional outdoor storage mound (root vegetables piled on straw, covered with more straw and then a layer of soil, insulating them from frost while letting excess moisture escape) and it still works exactly as well today as it did before electricity existed, since the physics of insulation and moisture control haven't changed.

Do all vegetables store equally well without refrigeration?

No: root vegetables, winter squash, onions and garlic store well with the right traditional method, while soft, high-water-content crops like lettuce and tomatoes were never designed by nature to store for long periods and are better preserved by other means (drying, fermenting, canning) or simply eaten fresh.

What is the safest way to preserve food without electricity?

Drying, fermenting with salt, vinegar pickling and making jam are all low-risk when done correctly. Pressure-canning low-acid foods is safe only with the right equipment and a tested recipe.

How long does dried food last?

Properly dried and stored airtight in a cool, dry place, dried beans and grains last for years, and dried fruit and vegetables for roughly a year or more. Check regularly for moisture.

Is fermented food safe to eat?

Yes, when it is made with enough salt, kept below the brine and smells pleasantly sour. Discard anything with a foul smell, or with pink or black mould.

Can I can vegetables in a normal pan of boiling water?

Not low-acid vegetables, meat or soup. They need a pressure canner to reach a high enough temperature. A boiling water bath is only suitable for high-acid foods like jam, fruit and properly acidified pickles.

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What is a zeer pot?

A pot-in-pot cooler. A small clay pot sits inside a larger one, with wet sand packed between them, and a damp cloth on top. Evaporation cools the inner pot, so it works best in hot, dry climates.

How do I keep mice out of my food store?

Store food in metal bins and glass jars with tight lids, keep shelves off the floor and away from walls, seal gaps, and check for droppings.

What should I stock that I cannot grow?

Salt, vinegar, sugar, cooking fat or oil, and spare jars and lids are the most useful, since preserving methods depend on them.

How do I preserve eggs without a fridge?

Keep fresh, unwashed eggs in a cool place for several weeks. For longer storage, pickle them, freeze them beaten, or preserve them in water glass, which keeps them for months.

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PART 6

Animals

What livestock add, and what they cost in land and feed.

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GUIDE 17

Is It Worth Keeping Chickens for Self-Sufficiency?

Short answer: it depends almost entirely on what you feed them. Chickens fed on bought grain are often close to break-even, or even a net calorie cost, once feed is properly accounted for: you're essentially converting purchased grain into eggs, at a loss. Chickens that forage a real share of their own diet, or are fed on kitchen scraps and garden waste that would otherwise go to compost, are a genuinely different calculation: real calories in, for very little purchased input.

KEY POINTS

- **Feed Source Is the Deciding Factor.** Bought grain makes the calorie maths marginal at best: foraging, scraps and garden waste are what turn chickens into a genuine net positive.
- **Eggs Are Steady, Not Huge.** A productive hen gives a reliable, useful protein source, but the calorie contribution per bird is modest: chickens complement a crop-based plan, they don't replace it.
- **Manure and Waste Conversion.** Chickens turn kitchen and garden waste into manure that improves soil fertility: a real benefit that a pure calorie calculation misses entirely.
- **Pest Control on the Side.** Free-ranged chickens eat a genuine amount of slugs, insects and other garden pests: a secondary benefit worth factoring in alongside eggs.

Free download: The Self-Sufficiency Growing Guide
All 18 Resilience Gardening guides in one printable 121-page PDF. See what's inside

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The Question Isn't "Chickens or Not": It's "Fed How"

The honest calorie case for keeping chickens comes down almost entirely to what goes into them. A hen converts feed into eggs, but that conversion is never 100% efficient: some of every calorie fed in is lost to the bird's own metabolism rather than turned into egg. If that feed is bought grain, you're paying (in money, and in the land that grain itself took to grow) for a conversion that loses calories along the way.

The calculation changes completely if a meaningful share of a chicken's diet comes from sources that would otherwise go to waste: foraging on pasture or scraps, garden and kitchen waste, spoiled produce not fit for the table. None of that has an opportunity cost the way purchased grain does, so chickens fed this way genuinely add calories to a household's food supply rather than converting existing calories at a loss.

There's also real value outside the raw calorie calculation: manure that builds soil fertility for free, pest control from free-ranging birds, and a source of protein that doesn't rely on refrigeration the way stored meat does. This site's livestock and other food sources step lets you model your own animals, including whether their feed costs leave them net positive or net negative for your household's calorie plan.

What Chickens Actually Give You

A flock of laying hens gives you three things: eggs, meat and manure. All three matter in a self-sufficient plan, but eggs are the headline.

- **Eggs.** A good laying hen produces roughly 200 to 300 eggs in her first full year, depending on breed. Heritage and dual-purpose breeds often lay about 150 to 200. Laying drops in winter as the days shorten, and stops for a few weeks each autumn while the hen moults, and output falls a little each year as she ages.
- **Meat.** Surplus cockerels, hens past their best and dedicated meat birds all end up in the pot. An old laying hen is tough, and best slow-cooked or made into stock.
- **Manure.** Chicken manure is rich in nitrogen and one of the best soil boosters you can make. Compost it first, or let it age for several months before it goes near crops. See building healthy soil without fertiliser.
- **Pest control and waste recycling.** Hens eat slugs, insects and kitchen scraps, and turn them into eggs and manure.

How many hens do you need? As a rough guide, aim for about one hen per person for a steady supply, and more if the household eats eggs freely or you want to preserve some. Remember that output varies through the year.

HOUSEHOLD	HENS FOR A STEADY EGG SUPPLY	ROUGHLY HOW MANY EGGS A WEEK IN GOOD LAYING
1 to 2 people	3 hens	About 15 to 18
A family of 4	5 to 6 hens	About 25 to 35
Family of 4 who also want a surplus	8 to 10 hens	About 45 to 60

You do not need a cockerel for eggs. Hens lay perfectly well without one. You only need a cockerel if you want fertile eggs to hatch your own chicks.

The Calorie Maths, Worked Through

Our short answer at the top of the page says it depends on feed. Here is why, with rough numbers:

- A laying hen eats about 110 to 125 grams of feed a day, which is roughly 40 to 45 kilograms a year.
- One medium egg contains about 70 to 80 calories. A hen laying five eggs a week produces roughly 55 calories of egg a day.

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- The 115 grams of layer feed she eats contains something like 300 calories of energy.

So the eggs return only a fraction of the energy fed in, roughly a sixth to a fifth. If that feed is wheat or maize you grew on land you could have used for human food, you would get more calories by eating the grain directly. That is the honest case against chickens as a pure calorie source.

The case for chickens rests on three things the simple sum leaves out:

- **Feed that is not human food.** Kitchen scraps, garden waste, weeds, slugs and insects, spoiled produce and what the hens find themselves cost you no human calories at all. Every calorie they get from these is a calorie gained.
- **Egg quality.** An egg is a compact, complete package of protein, fat and vitamins that is hard to get from a vegetable plot, especially fat, B vitamins and vitamin D.
- **The by-products.** Manure, pest control and the weeding and scratching they do over a bed between crops.

CUT THE FEED BILL

Feeding Poultry (Almost) for Free

The more of the diet you can supply yourself, the better the sums work. Practical ways include:

- **Free-ranging.** Birds on grass, in an orchard or in a movable run find a large share of their food in insects, seeds, worms and greens.
- **Kitchen and garden waste.** Vegetable trimmings, over-ripe produce, bolted lettuce and spent crops. Do not feed raw potato peelings, avocado, mouldy food, or large amounts of onion or citrus.
- **Compost heap life.** Let hens scratch through a compost heap for worms and insects, which are rich in protein.
- **Grow some of their feed.** Maize, wheat, barley, millet, amaranth, sunflowers, squash, kale and comfrey all make good poultry food.
- **Provide the essentials.** Laying hens need grit to grind their food and a source of calcium, such as crushed oyster shell or well-baked, crushed eggshell, or their shells become thin. They need clean water at all times.

Even so, most flocks need a basic grain or layer-feed ration, especially in winter when forage is scarce. If you rely on bought feed, store enough to last, in a rat-proof bin. See how much land do I need and land for a homestead with animals to plan the space for feed crops.

Housing, Safety and Daily Care

- **A secure house.** Plan roughly 0.4 square metres of indoor floor per bird, with perches, nest boxes (one for every three or four hens) and good ventilation without draughts.
- **Outdoor space.** As a minimum, around 1 square metre of run per bird, and much more is better. Moving the run onto fresh ground keeps it clean and gives hens fresh forage.

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- **Predator-proofing.** Foxes, badgers, stoats, rats, dogs and birds of prey are the main threats. Shut the birds in every night, bury or skirt wire below ground, and use strong latches that a fox or raccoon cannot lift. Most losses happen because someone forgot to shut the door.
- **Daily routine.** Let them out in the morning, check water and feed, collect eggs, and shut them in at dusk. In total it takes a few minutes a day, plus a weekly clean and a more thorough clean-out now and then.
- **Winter.** Keep the house dry and draught-free. Hens cope well with cold if they are dry, but water can freeze, so check it daily. Extra artificial light can keep laying going through the winter, but many keepers prefer to let the hens rest.
- **Health.** Watch for mites, lice and worms, and for birds that are hunched, listless or not eating. Keep new birds apart for a few weeks before adding them to the flock.

Check local rules on keeping poultry, and on bird flu. In an outbreak, authorities in many places may require birds to be housed or registered, and wild water birds can carry the disease, so good biosecurity matters, especially for ducks and geese.

Choosing Breeds, and Keeping the Flock Going

There are three broad types of chicken, and the right choice depends on what you want and how self-reliant you want to be.

TYPE	EXAMPLES	EGGS	MEAT	NOTES
Hybrid layers	Many commercial brown and white layers	Highest, often 250 to 300+ a year	Poor, light birds	Excellent for the first one or two years, then decline. Their chicks do not come true, like F1 seed.
Dual-purpose heritage breeds	Sussex, Orpington, Plymouth Rock, Wyandotte, Rhode Island Red	Good, roughly 150 to 250 a year	Decent table birds	Hardy and often good mothers. They breed true, so you can raise your own replacements.
Meat breeds	Fast-growing broilers and slower traditional crosses	Poor	Fast, heavy birds in a matter of weeks	Fast broilers grow quickly but suffer leg and heart problems. Slower birds do better outdoors.

If self-sufficiency is the aim, heritage breeds are the equivalent of open-pollinated seed. They breed true, so you can hatch your own replacements, usually under a broody hen, which takes about 21 days, with no need to buy in each year. Hybrid layers produce more eggs but you will have to keep buying new pullets. See open-pollinated vs F1 hybrid for the same idea in plants.

To keep a flock going you need to replace birds every couple of years, since laying declines with age. Hatching a few chicks each spring from your own hens, and eating the spare cockerels, keeps the cycle running.

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Poultry at a Glance

Chickens are the all-rounder, but other birds may suit your land, climate or purpose better. These figures are rough, and vary widely with breed, season, feed and care.

BIRD	EGGS PER YEAR	MEAT	FEED NEEDS	NOISE AND SPACE	BEST FOR
Chicken	About 150 to 300	About 1.5 to 3 kg dressed	Moderate	Moderate, roosters loud	The all-round choice
Bantam	About 80 to 200, small	Very little	Low	Low, small plots	Small gardens, broody hens
Duck	About 150 to 300, large	About 1.5 to 3 kg	Moderate, forage well	Medium noise, wet and messy	Wet climates, slugs, winter eggs
Goose	About 20 to 60, seasonal	About 4 to 6 kg plus fat	Low if on good grass	Loud, needs grazing land	Grass, fat and meat
Turkey	About 40 to 100, seasonal	About 5 to 10 kg or more	High	Medium, needs space	Large feasts, meat
Guinea fowl	About 60 to 100, seasonal	About 1 kg	Low if free-ranging	Very loud, roam widely	Pest and tick control, alarm
Quail	About 200 to 300, tiny	About 100 to 200 g	Low, but needs high-protein feed	Quiet, tiny footprint	Very small spaces, fast results
Pigeon	Not kept for eggs	Squab, about 250 to 450 g each	Low to moderate	Quiet, needs a loft	Steady meat, strong manure

Bantams

Bantams are small chickens, some true miniatures with no large version (such as Pekin and Sebright) and some scaled-down versions of standard breeds. A bantam is typically a quarter to a half the weight of a standard hen.

- **Pros.** They eat much less, need less space, are gentler on the garden, and many are excellent broody mothers, which makes them ideal for hatching eggs from other birds, including ducks and standard chickens. They are the best choice for a small plot.
- **Cons.** Their eggs are small, usually around half the size of a standard egg, and there is almost no meat on them. Many lay fewer eggs, and some breeds fly well and need a covered run.

Verdict: bantams are great for limited space and as a hatching crew, but you would need roughly two bantam eggs to equal one standard egg, so plan for more birds if eggs are the main goal.

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Ducks

Ducks are often the most underrated poultry for self-sufficiency. Some breeds are outstanding layers, they are tougher than chickens, and they love slugs and snails.

- **Eggs.** Good layer breeds such as Khaki Campbell and Indian Runner can lay around 250 to 300 eggs a year, and ducks tend to keep laying better through cold, dull weather than chickens. Duck eggs are larger and richer, and excellent for baking.
- **Meat.** Meat breeds such as Pekin and Aylesbury reach table size in about two months. Dual-purpose breeds like Rouen and Welsh Harlequin do both jobs reasonably well. Duck meat is rich and fatty.
- **Hardiness.** Ducks are generally hardier than chickens, less prone to disease, and cope well with wet weather and mud.
- **Garden help.** They are excellent slug and snail hunters, but trample young seedlings and will wreck soft crops, so keep them off beds with seedlings and lettuce.
- **Water.** They do not need a pond, but they do need water deep enough to dip their whole head in, to keep their eyes and nostrils clean. They are messy drinkers, so the area around their water turns to mud.
- **Housing.** A simple, well-ventilated, fox-proof shelter is enough, and they should be shut in every night. Ducks lay in the early morning, so keep them in until mid-morning for the eggs.

Verdict: an excellent choice in wet climates, for slug control and for reliable winter eggs. Muscovy ducks are a different species, much quieter, good foragers and good mothers, but lay fewer eggs, more seasonally.

Geese

Geese are grazers. They turn grass, which humans cannot eat, into meat, fat and feathers, which makes them the poultry that most reduces the feed bill, provided you have the grass.

- **Feed.** On good pasture, geese get most of their food from grazing, with extra grain only in winter and when they are growing or laying.
- **Meat and fat.** A goose can provide 4 to 6 kilograms of rich meat and a large amount of fat, which is hard to get from a garden and valuable for cooking and preserving. Geese are normally fattened and killed at around six months.
- **Eggs.** Large but few, and seasonal, typically a few dozen in the spring. Not a major egg source.
- **Lifespan.** Geese can live 15 to 20 years, so a breeding pair or trio can serve a household for a long time.
- **Noise and temperament.** Geese are loud and can be aggressive in the breeding season, which makes them excellent guards but poor neighbours in tight spaces.
- **Space.** They need considerably more room than chickens or ducks, ideally a paddock of grass, plus a pond or tub to bathe in. Geese can weed some established crops such as strawberries, fruit bushes and orchards, but they will eat young vegetables.

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Verdict: a strong choice if you have grassland and want meat, fat and a watchdog. Not suitable for a small garden.

Turkeys

Turkeys are mainly a meat bird, and a large one, so they suit households with space and a reason to cook a big bird.

- **Meat.** Heritage turkeys such as Bronze, Bourbon Red, Norfolk Black and Narragansett typically reach 5 to 10 kilograms, though they take around six to seven months to mature. Commercial broad-breasted turkeys grow faster and bigger, but the commercial type cannot mate naturally, so you would have to buy poults every year.
- **Breeding.** Heritage breeds mate naturally and can be bred on your own plot. Turkey hens are sometimes poor mothers, so many keepers hatch the eggs under a broody chicken.
- **Eggs.** Turkeys lay edible eggs, but only a modest number, seasonally.
- **Feed and space.** They eat a lot and need a good deal of room to range.
- **Health.** Poults are delicate in their first weeks and need warmth and good starter feed. Keep turkeys away from chickens, because a disease called blackhead, carried by chickens, can kill turkeys.

Verdict: worthwhile only if you have space and want a big bird for the table. For most households, chickens and ducks give more food for less trouble.

Guinea Fowl

Guinea fowl are the watchdogs and pest controllers of the poultry yard. They are hardy and half wild, and they roam widely.

- **Pest control.** They eat huge numbers of insects, ticks, slugs and weed seeds, and they are good against crawling pests.
- **Alarm.** They are extremely noisy and raise the alarm at anything unusual, which suits a rural plot but not a close neighbour.
- **Eggs and meat.** The eggs are small with very hard shells, laid mostly in spring and summer, and keep well. The meat is lean and gamey, similar to pheasant, though a bird gives only around a kilogram.
- **Feed.** They find most of their own food if allowed to range, so they are cheap to keep.
- **Habits.** They are flighty, like to roost high, often hide their nests and can be hard to confine. The young keets are delicate in the first weeks.

Verdict: best as a free-ranging working bird on larger plots, for insect and tick control, with eggs and meat as a bonus.

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Quail

Quail, usually Coturnix or Japanese quail, are the smallest domesticated egg birds, and the best answer for a household with almost no space. They grow fast and need very little.

- **Speed.** Coturnix quail mature quickly. They can start laying at around 6 to 8 weeks old, far sooner than chickens at roughly 5 months, so a flock gives results within a season.
- **Eggs.** A good hen can lay close to an egg a day, roughly 200 to 300 a year. The eggs are tiny, so about three to five equal one hen egg, but they are rich and very good eaten whole, boiled, pickled or in baking.
- **Meat.** Birds can be eaten at around 8 weeks, but there is little on one, perhaps 100 to 200 grams. Spare males and older hens are usually the ones eaten.
- **Feed.** They eat very little, around 20 to 30 grams a day each, but they need a high-protein feed, such as a game-bird or quail ration, so they are harder to feed from scraps and garden waste alone than chickens.
- **Space.** Quail can be kept in raised hutches, or in a floor pen in a shed or garage. Plan on roughly 0.1 to 0.2 square metres per bird, and give them a low roof, since they shoot upward when startled.
- **Warmth and light.** They are sensitive to cold and draughts, and for steady laying they like about 14 hours of light a day. They need a dry, draught-free shelter in cold weather.
- **Breeding.** Keep one male for every three to five females if you want fertile eggs. Eggs take about 17 to 18 days to hatch, and the chicks are tiny and need a heated brooder for the first couple of weeks.
- **Lifespan.** Laying falls off after the first year or so, so a flock needs replacing regularly. A quick hatch each year keeps it going.

Verdict: the best choice where space is very tight or you want fast results. They give a lot of eggs for very little room, but do not expect much meat, and you will need a supply of protein-rich feed.

Pigeons

Domestic pigeons are one of the oldest sources of home-raised meat. Medieval dovecotes supplied manor houses with fresh meat all winter. The meat comes from squab, the young birds, which are taken just before they fledge.

- **How it works.** A pair mates for life and raises young over and over through the year. Both parents feed the squab, first on a special "crop milk" and then on grain, so you are not hand-rearing anything.
- **Yield.** A pair typically raises two squab per clutch and can manage many clutches a year, perhaps ten or more squab a year from each pair. Utility breeds such as King, Carneau and Texan Pioneer are bred for larger squab, though even these are small, perhaps 250 to 450 grams dressed.
- **Feed.** Roughly 30 to 40 grams of grain and seed a day per bird. Peas, wheat, maize and small seeds all suit them, and free-flying birds find part of their own food. They need grit and clean water.
- **Housing.** A dry, draught-free loft or dovecote, with a nest box for each pair, perches, and an aviary or landing area. Plan on at least 0.2 to 0.3 square metres of floor per pair, and more is better. Keep it

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clean and well ventilated.

- **Manure.** Pigeon droppings are very rich in nitrogen, and a prized fertiliser once composted.
- **Cautions.** Pigeons can carry diseases, including some that affect people, such as ornithosis, so wash your hands and wear a mask when cleaning out. Some diseases are notifiable, and keeping rules vary, so check local regulations and neighbour sensitivities before starting. Keep them confined if you do not want them to mingle with feral birds.

Verdict: a quiet, low-labour way to get a steady supply of dark, rich meat plus excellent manure, if you have the loft space and the local rules allow it. The yield per bird is small, so you need several pairs for it to matter.

Other Birds, and Why They Are Not Recommended

- **Pheasants and partridges.** These are game birds, mostly raised for release. They need aviaries, are prone to disease and cannibalism when crowded, and give little return for a household, and game-bird rules may apply.
- **Peafowl.** Ornamental, extremely loud and destructive to gardens. They are not practical as a food source.
- **Swans.** Wild swans are protected in many places, and swans are not kept for food.
- **Ostriches and emus.** They are very large, can be dangerous, and need big, strongly fenced land and specialist knowledge. They are not a realistic choice for a household food plan.

If you want one of these, research the local rules and the real workload first.

Which Poultry Suits You?

YOUR SITUATION	GOOD CHOICE
Small garden, limited space	Bantams, or a few standard hens or ducks
A family wanting reliable eggs	Dual-purpose heritage chickens, plus a few ducks for winter eggs
Wet, slug-prone climate	Ducks
Plenty of grass and a wish for meat and fat	Geese, with ducks or chickens for eggs
Large plot and a rural setting	Add guinea fowl for pest control
A big plot and a taste for roast turkey	A few heritage turkeys, kept apart from the chickens
Aiming to breed your own replacements	Heritage chickens or ducks, with a broody hen or bantam to hatch them
Almost no space, such as a shed, garage or yard	Quail

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A steady supply of small meat birds with little labour	Pigeons, if local rules allow

Start with a small number of one type, learn their needs, and add others later. A mixed flock needs a little care: chickens and turkeys do not mix well, ducks make the ground wet, and geese can bully smaller birds.

MAKE THE MOST OF IT

Preserving and Using the Harvest

Poultry produce in surges, with lots of eggs in spring and few in winter, so preserving the surplus makes the flock far more useful.

- **Keep eggs unwashed.** Fresh eggs have a natural protective coating, and unwashed eggs kept in a cool place stay good for several weeks.
- **Freeze them.** Beat whole eggs, or separate them, and freeze in small containers or ice-cube trays. Do not freeze them in the shell.
- **Pickle or water-glass them.** Pickled eggs keep for months in vinegar, and water-glassing, a traditional method using sodium silicate solution, keeps fresh, unwashed eggs for many months.
- **Use the whole bird.** Make stock from carcasses, render goose and duck fat for cooking, and keep feathers for stuffing and down.
- **Preserve meat.** Birds can be canned, frozen, or cured. See storing food without a fridge.

Always cook eggs and poultry thoroughly, and follow food-safety guidance for any preserving method.

Common Poultry Mistakes

1. **Leaving the door open at night.** The single biggest cause of lost flocks.
2. **Overstocking.** Too many birds in too little space leads to mud, disease and stress.
3. **Relying entirely on bought feed.** It makes the sums poor and leaves you exposed if supply stops.
4. **Mixing the wrong species.** Chickens and turkeys especially.
5. **Ignoring the neighbours.** Roosters, geese and guinea fowl are loud.
6. **Not planning for winter.** Short days mean fewer eggs, and frozen water and wet housing cause trouble.
7. **Buying more than you can care for.** Start small and add birds as your confidence grows.

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Frequently Asked Questions

Is it worth keeping chickens for self-sufficiency?

It depends on whether you can feed them cheaply: chickens fed on purchased grain are often close to break-even or even a net calorie cost once feed is accounted for, while chickens that forage a meaningful share of their own diet, or are fed on kitchen scraps and garden waste, can be a genuine net positive, providing eggs and eventually meat for relatively little ongoing land or purchased input.

Do chickens produce more calories than they cost to feed?

Only if their feed costs are kept low: a hen fed entirely on bought grain converts that grain into eggs at a real calorie loss, so the calorie case for chickens depends heavily on how much of their diet comes from foraging, scraps and garden waste rather than purchased feed.

What do chickens add beyond calories?

Chickens contribute things a pure calorie calculation misses: pest control, converting kitchen and garden waste that would otherwise be discarded, and manure that improves soil fertility for free, all of which matter for a genuinely self-sufficient system even when the raw calorie maths is close to break-even.

How many eggs does a hen lay a year?

Roughly 200 to 300 in the first year for a good laying hybrid, and about 150 to 200 for many heritage breeds. Output drops in winter, during the autumn moult and as the hen gets older.

Do I need a rooster to get eggs?

No. Hens lay without one. You only need a rooster if you want fertile eggs to hatch chicks.

How much space do chickens need?

As a rough guide, about 0.4 square metres of indoor floor and at least 1 square metre of run per bird. More space is better and keeps the ground cleaner.

Are ducks easier than chickens?

In many ways, yes. They are hardier, lay well in cold weather and eat slugs. But they are messy around water, trample seedlings and are best shut away at night like any other poultry.

Are geese worth keeping?

If you have grassland and want meat and fat, yes. They graze rather than rely on grain, live a long time and make good guards. They are loud, need plenty of room and are not suited to small gardens.

Can chickens and turkeys live together?

It is best to keep them apart. Chickens can carry a disease called blackhead which is often harmless to them but can kill turkeys.

What are bantams good for?

Small spaces and hatching eggs. They eat little, are gentle on the garden and many make excellent broody mothers, but their eggs are small and there is almost no meat.

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Are guinea fowl worth keeping?

On a larger rural plot, yes, as free-ranging insect and tick controllers and as a loud alarm. They give small eggs and a little lean meat, but are noisy and roam widely.

Can I keep poultry through the winter without bought feed?

It is hard. Forage is scarce, so you need stored grain, root crops, squash, kitchen scraps or a feed crop. Geese on pasture and free-ranging guinea fowl need the least extra feed.

How do I store surplus eggs?

Keep them unwashed in a cool place, freeze beaten eggs, pickle them in vinegar, or use water glass. Unwashed eggs keep several weeks, and the other methods keep them for months.

Are quail worth keeping for eggs?

Yes, especially where space is tight. Coturnix quail start laying at around 6 to 8 weeks and can lay roughly 200 to 300 small eggs a year, though you need three to five of their eggs to equal one hen egg. They need a high-protein feed and a warm, draught-free shelter.

How much space do quail need?

Roughly 0.1 to 0.2 square metres per bird. They can be kept in raised hutches or in a floor pen in a shed or garage, with a low roof, since they fly straight up when startled.

Can you eat pigeons that you keep?

Yes. The meat comes from squab, the young birds, taken just before they fledge. Utility breeds such as King and Carneau give the largest squab, though they are still small, so you need several pairs for a worthwhile supply.

Are pigeons hard to keep?

They need little daily labour, since the parents raise the young, but they need a clean, dry loft and good hygiene. They can carry diseases, some of which affect people, and local rules and neighbour concerns vary, so check before starting.

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GUIDE 18

How Much Land Do I Need for a Homestead With Animals?

Short answer: considerably more than a crops-only plan for the same household. Livestock need to be fed from land too: either dedicated pasture, purchased feed grown somewhere else, or a slice of your own crop land diverted to growing animal feed instead of food for people. Small livestock like chickens add relatively little to the land equation. Grazing animals like goats, sheep or cattle add a lot, because pasture-based feeding genuinely needs real acreage even for a small herd.

KEY POINTS

- **Small Livestock: Modest Addition.** Chickens and rabbits can be kept in a small run or hutch, largely on scraps, garden waste and some purchased feed: they add relatively little to the land total.
- **Grazing Animals: Real Acreage.** Goats, sheep and cattle need genuine pasture to feed economically: trying to substitute purchased feed for real grazing land usually isn't cost-effective.
- **Crops Usually Win on Calories.** Growing food directly is more land-efficient than growing feed to raise an animal that converts it into food: some calories are always lost in that conversion.
- **Livestock Add Value Beyond Calories.** Manure, pest control and dietary resilience through diversity are real benefits: they just don't show up in a pure land-per-calorie calculation.

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Why Livestock Change the Land Question

A crop grows directly from land, sun and water. An animal grows from feed, which itself was grown on land, sun and water, somewhere. That extra conversion step is why livestock nearly always need more land per calorie delivered than growing crops directly: some of every calorie fed to an animal is lost to its own metabolism rather than turned into meat, milk or eggs. This doesn't make livestock a bad idea, but it does mean the land-area math for a homestead with animals is a genuinely different calculation from a crops-only plan.

The scale of the difference depends enormously on which animals. Small livestock like chickens or rabbits can be kept in a modest run or hutch and fed substantially on kitchen scraps, garden waste and scavenged forage, with purchased feed making up the rest: their land footprint is comparatively small.

Grazing animals are a different proposition entirely: goats, sheep and cattle need real pasture to feed economically, and a household trying to substitute purchased feed for genuine grazing land will usually find the economics don't work, since bought feed itself represents land used somewhere else to grow it.

None of this means livestock aren't worth it: manure that builds soil fertility, pest control from free-ranging birds, and the resilience of having more than one food source all matter for a genuinely self-sufficient system. But on land that's genuinely limited, crops should usually be prioritised first, with livestock added according to how much spare land and feed capacity is actually available. This site's livestock modelling step lets you add your own animals to a plan and see the real net calorie impact, feed costs included.

THE LAND SUM

How Well Animals Turn Feed Into Food

Every animal is a converter. It eats feed from land and turns a share of its energy into eggs, milk or meat, spending the rest on staying alive. The rough share that ends up as food on the plate is:

ANIMAL AND PRODUCT	ROUGHLY HOW MUCH OF THE FEED ENERGY BECOMES FOOD	WHAT THAT MEANS FOR LAND
Dairy (cow or goat milk)	About 15 to 25 percent	The most efficient way to get calories from grass and hay.
Eggs (chickens, ducks)	About 15 to 20 percent	Efficient, especially on scraps and forage.
Poultry meat	About 8 to 12 percent	Moderate, and best on forage and waste.
Pigs	About 8 to 12 percent	Needs grain, dairy by-products or waste, since pigs do not live on grass alone.
Sheep, goat and beef meat	About 2 to 5 percent	Poor in energy terms, but turns grass, which people cannot eat, into food.

These are broad estimates, and real figures vary with breed, feed and management. The lesson is the same, though: milk and eggs convert far better than meat, and a crop eaten directly beats any animal if the land could grow human food.

The exception is land that cannot grow crops. Steep, stony, wet or rough ground can often carry grazing animals when it cannot be ploughed, so animals can add food from land that would otherwise produce none.

Animal by Animal: What Each Needs

The land figures below are rough starting points for good-quality land. Poor or dry land needs much more, and local advice is worth far more than any general number.

ANIMAL	LAND FOOTPRINT	GIVES YOU	MAIN CONSIDERATIONS

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Poultry (hens, ducks, quail)	A small run plus house, and space for feed crops. See are chickens worth it?	Eggs, meat and manure	Predators, nightly shutting-in and winter feed.
Rabbits	A hutch and run, or colony pen, plus a patch for greens and hay	Lean meat and manure	Quiet, small and efficient on greens and hay. Breed quickly.
Pigs	A secure pen or paddock, plus the feed to go with it	Meat, lard, and rooting that clears and turns ground	Eat a lot of grain or waste. Need strong fencing.
Dairy goats	Roughly a quarter to half an acre (0.1 to 0.2 hectare) of good grazing and browse each, plus winter hay	Milk, kids for meat and manure	Milk twice a day, escape artists, need shelter and company.
Sheep	Roughly a quarter to a third of an acre (0.1 to 0.15 hectare) per ewe on good pasture	Meat, wool and manure	Need shearing, fencing and parasite control.
A house cow	Often one to two and a half acres (0.4 to 1 hectare) of good grass, plus winter hay	A lot of milk, and a calf for meat	A big commitment: daily milking, yearly calving, and good fencing.

A good dairy goat gives a couple of litres of milk a day at peak, and a cow many times that. Milk is one of the best sources of calories, protein and B12 from grass-based land. See can you survive on vegetables alone? for why that matters.

Winter Feed: The Hidden Land Cost

Pasture stops growing in winter, so grazing animals need hay or other stored feed. That is often the biggest land and labour demand of all.

- A goat or sheep eats roughly 1 to 2 kilograms of hay a day in winter, which adds up to several hundred kilograms over a winter of a few months.
- A cow eats many times that, typically 10 kilograms or more of hay a day.
- Hay needs a meadow cut at the right time, dry weather to dry it, and dry storage. Many households buy it in, which turns the land question into a money and supply question.
- Other winter feed includes root crops such as mangolds and fodder beet, root vegetables, squash, kale, and surplus grain.

When you count the land for an animal, count the hay meadow and any feed crops as well as the summer grazing.

What Suits the Land You Have

LAND AVAILABLE	REALISTIC LIVESTOCK	NOTES
A small garden, under 0.1 hectare (quarter acre)	A few hens, bantams or quail, and perhaps rabbits	Fed largely from scraps and a little bought feed.

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0.1 to 0.4 hectare (quarter to one acre)	Poultry, ducks, rabbits, and possibly a pair of goats if you have grazing or good hay supplies	Crops come first. Be honest about feed.
0.4 to 2 hectares (one to five acres)	Goats or sheep, a small group of pigs, and poultry	A few animals can graze alongside a good crop area.
Over 2 hectares (five acres)	A house cow, a small flock or herd, and pigs, with hay meadows	Real mixed farming, and a lot of work.

These are only a guide. Soil, rainfall and your own energy matter as much as acreage. See how much land do I need for the crops side.

Making Animals Work With the Crops

The best homesteads use animals to help the crops, so that the same land does two jobs:

- **Manure for fertility.** Animals turn feed and bedding into compost material. See building healthy soil without fertiliser.
- **Poultry in orchards and between crops.** Hens and ducks clean up pests, windfalls and weeds, and fertilise as they go.
- **Pigs as tillers.** Pigs root up and clear rough ground, ready for planting.
- **Rotational grazing.** Moving animals regularly across paddocks gives the grass a rest and spreads the manure.
- **Grazing the leys.** A grass and clover phase in a rotation feeds animals and rebuilds soil.

The Work, the Risks and the Rules

- **Daily labour.** Animals need feeding, watering and checking every day, with no holidays. Milking animals need it twice a day.
- **Fencing and shelter.** Good fencing is often the biggest start-up cost, and needs to keep animals in and predators out.
- **Water.** Animals drink a lot, and need clean water in every season, including when it freezes.
- **Health.** Parasites, foot problems and breeding difficulties are routine. Know a vet, or an experienced neighbour.
- **Slaughter and butchery.** Meat animals need a humane plan for slaughter and butchery. Check local rules, and learn the skills first, or find someone to help.
- **Rules.** Many places require you to register your land or animals, and have movement and disease-control rules. Check them before buying stock.

If you are new to livestock, start small with poultry, learn the routines, and add larger animals later.

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Planning the Land for a Homestead With Animals

1. **Plan the crops first.** Work out the land your household needs for food. See what vegetables to grow.
2. **Choose animals that fit what is left.** Count their grazing, hay and feed crop areas as well as their housing.
3. **Count the winter feed.** It is the number that most often catches people out.
4. **Add the paths, fencing and buildings,** which take more space than people expect.
5. **Start small and scale up.** Add one species at a time, once the last is running smoothly.

Common Mistakes

1. **Buying animals before the land and fences are ready.**
2. **Ignoring the winter feed.** Summer grass is the easy part.
3. **Keeping too many.** Overstocking ruins pasture and animals alike.
4. **Underestimating the daily work.** Animals are a commitment with no days off.
5. **Keeping a single animal.** Goats, sheep and cattle are herd animals, and one alone is unhappy.
6. **Forgetting the plan for the end.** Have a plan for slaughter, sale and old age before you buy.

Frequently Asked Questions

How much land do I need for a self-sufficient homestead with animals?

Considerably more than a crops-only plan for the same household, because livestock need to be fed from land too, whether that's dedicated pasture, purchased feed grown elsewhere, or a share of your own crop land diverted to animal feed. Small livestock like chickens or rabbits add comparatively little land requirement; grazing animals like goats, sheep or cattle add a great deal, since pasture-based feeding needs real acreage to support even a small number of animals.

Do chickens need as much land as grazing animals like goats or sheep?

No, nowhere near as much: chickens can be kept productively in a modest run and fed largely on kitchen scraps, garden waste and some purchased grain, while goats, sheep and cattle need genuine grazing land to feed economically, and trying to feed grazing animals entirely on purchased feed rather than pasture usually makes them a poor use of resources.

Is it better to grow crops or raise livestock on limited land?

For calories per square metre, crops almost always win: growing food directly is more land-efficient than growing feed to raise an animal that then provides food, since some of every calorie fed to livestock is lost to the animal's own metabolism. Livestock still add real value beyond raw calories (manure, pest control, resilience through diversity), but on genuinely limited land, crops should usually take priority.

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How much land does a goat need?

As a rough guide, a quarter to half an acre (0.1 to 0.2 hectare) of good grazing and browse for each dairy goat, plus winter hay. Poorer land needs much more, and goats should never be kept alone.

How much land does a cow need?

A cow often needs one to two and a half acres (0.4 to 1 hectare) of good pasture, plus winter hay, depending on the land and breed. Poor land needs several times more.

Are animals worth it if I have limited land?

Small livestock, such as hens, ducks, quail and rabbits, usually are, because they use little land and turn scraps into food. Grazing animals need real pasture, and crops usually deliver more calories from limited land.

Which animals give the most food per acre?

Dairy animals on good grass and eggs from well-fed poultry. Beef and mutton give the least in energy terms, but can use land that will not grow crops.

How much hay does a goat need for the winter?

About 1 to 2 kilograms a day, so several hundred kilograms for a winter of a few months, depending on the goat, the hay quality and how long the cold lasts.

Can I keep pigs on a small plot?

Pigs can be kept in a small pen, but they need a lot of feed, mainly grain, dairy by-products or waste, so the feed has to come from somewhere. They need strong fencing.

Do I need a lot of land for rabbits?

No. A hutch and run, and a patch of greens, will keep a few rabbits, and they are quiet and efficient, which makes them good for small plots.

What should I start with?

Poultry, such as hens or ducks. They are small, productive and forgiving, and teach you the routine of daily animal care before you move to larger stock.

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