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A 12-Month Greenhouse Plan



Efficient, tasty food production in your home greenhouse

Karin Kirk | Text

Karin and Dave Kirk | Photography

Though activity slows during the winter, there's something happening inside the author's greenhouse every month of the year.

As you will soon see, much of this article is filled with reasons why you need a greenhouse. But I'll begin with one important drawback of greenhouse ownership: it can make you smug! Most evenings, just prior to cooking dinner, I head out to the greenhouse for some fresh ingredients. I make the journey back to the kitchen clutching sprigs of cilantro or a bowl of fresh baby spinach or better yet, two fistfuls of sweet cherry tomatoes. Along the short pathway between greenhouse and kitchen, as I pass beneath the often-snowy mountains, I find myself thinking, "Here we are in inhospitable Montana, and I am holding the freshest, local-est, tastiest food. Without heat. Or pesticides. Or needing to ship it in from California. I love this."

Just as with every other part of the garden, success in the greenhouse takes some trial and error. Perhaps I can save you some heartache by sharing the general formula that seems to work well here in USDA plant hardiness zone 4. Although everyone's structure, site,

and conditions are different, there are enough commonalities that this overall strategy can be adapted to many different situations.

THE GREENHOUSE

We've all seen those beautiful ads in certain garden magazines featuring elaborate glass-paneled conservatories that cost more than your actual house. Thankfully, a fancy greenhouse is not necessary for success. *[Technically, a greenhouse has an auxiliary method of heating, but most gardeners apply the term simply to the structure—Ed.]* That said, a flimsy cheap one will most likely wind up in your neighbor's field after the next storm, so you'll need some middle ground. For this climate, there are two key factors in selecting your greenhouse. First is **heat retention**. Polycarbonate panels come in twin-wall and triple-wall varieties. These panels trap air between the layers, but let light shine through. The more walls and the thicker the space between the layers, the greater the insulating properties. If you go

this route, shop around for R-value, which tells you the insulating ability of the material. If a greenhouse with flexible polyethylene sheeting is more your style, consider a design that allows for two layers of plastic with an air space in between. A single layer of plastic offers virtually no heat retention once the sun goes down. In addition to insulating materials, a cold-weather greenhouse will benefit by minimizing cracks, seams, and other draft-inducing openings. Insulating the foundation is another way to create the warmest possible structure without added heat.

The second major factor in our area is overall **sturdiness**. I don't need to tell you about wild windstorms, brutal hail, and deep snowfall. So, whatever plan you make for a greenhouse, be sure that your structure is appropriately strong and rugged. The greenhouse frame should be wood or metal, and the entire structure needs to be firmly affixed to the ground. Glass panels look pretty but are susceptible to hail damage, so plastic is likely a more durable choice. That said, any



Left—Karin’s greenhouse is a Rigo IV kit made in Germany. “Like a lot of German products,” she says, “it’s very solidly built, which is why we bought it. So far it has survived all the wind, hail, and snow Montana can dish out!” **Below left**—In April and May seedlings are stepped up to larger pots, and others, like tomatoes, are transplanted into the soil floor of the greenhouse.

There is a wealth of information out there, and many people are generous to share their own knowledge and experiences.

A YEAR IN AN UNHEATED GREENHOUSE

Once you’ve got your greenhouse, then what? The possibilities are limitless, right? Well, not quite. Despite the allure of February tomatoes, that’s not really feasible without pouring heat and artificial light into your greenhouse, which sort of defeats the purpose of efficient, small-footprint food production. But a greenhouse buys you a zone or two or three of warmth, plus offers a reprieve from storms, animals, and other atrocities.

You can garden in your greenhouse almost all year, even without heat. Naturally, the action slows down in December and January, but you’ll be out skiing then anyway. During the other 10 months, a greenhouse offers astounding productivity. My greenhouse calendar begins in February, which signals the beginning of the growing season. The table on the following page describes what’s going on in my greenhouse each month of the year.

SPECIAL TIPS AND SUGGESTIONS

A successful greenhouse isn’t a hands-off project. While it’s almost never hard labor (in fact, it’s much lighter work than an outdoor garden) it does require a certain level of babysitting. For example, if the sun comes out on an otherwise gloomy March day, an unventilated greenhouse will quickly overheat. If you travel or work long days away from home, consider having automation in your greenhouse, such as thermostatically controlled vents and fans.

MANAGING COLD

During the winter, cover the overwintering crops with several layers of frost blankets. On sunny days the covers can be taken off, but during the depths of winter I leave the plants covered for days on end, much like a snowfall would (*cont. on p. 35*)



plastic materials used in your greenhouse need to be made of UV-stable plastic lest it disintegrate in a few short years.

Greenhouses come in many shapes and sizes and can be assembled from a ready-made kit, built from scratch or made from repurposed windows and doors. There are plentiful options to suit your taste and budget. That said, you’ll likely never regret having a greenhouse that is a tad larger and a bit stronger and better insulated, so it pays to save up for a plan that will truly suit your needs. There are many resources where you can learn more about greenhouse design and construction. One of my favorites is *The Greenhouse Grower’s Companion* by Shane Smith, which was written by a Wyoming gardener. Another impressive resource is the GardenWeb Greenhouse Forum (<http://forums2.gardenweb.com/forums/strucs/>) where you can ask questions or simply browse through others’ questions.

By June, Karin has well-formed fruit on her indeterminate tomato plants.

MONTH	ACTIVITY
February	<p>Planting: By mid-February the days lengthen and the occasional sunny day will warm up the greenhouse. I can start seeds of cool-weather crops like spinach, lettuces, some herbs, and broccoli. I put the seed trays on heat mats to speed germination.</p> <p>Harvesting: I can trim leaves from overwintered greens and pull carrots that were planted last year. But in both cases the plants grow slowly so the harvest is not large.</p>
March	<p>Planting: March is go-time for my greenhouse. It is phenomenally warm and cozy inside! By mid-March it's generally safe to start even warm-weather seeds. I find they grow much stockier and more quickly than seedlings grown indoors under lights.</p> <p>Harvesting: Anything that made it through the winter will suddenly grow like mad. Carrots, green onions, and perennial herbs will resume growing and can be lightly harvested. Lettuces in particular will produce county-fair-worthy heads this time of year. I make sure to start new lettuce plants to replace these.</p>
April	<p>Planting: This is a good time to start seeds for plants that are destined to grow outside, but will germinate and grow quickly, such as pumpkins and zinnias.</p> <p>Existing seedlings can be stepped up to larger pots. They will grow fast given the room. Tomatoes, peppers, eggplant, melons, cucumbers, and other warm-weather plants that will be growing permanently in the greenhouse can be transplanted into their beds.</p> <p>Harvesting: The last of the overwintered greens will be used up or will be bolting by now, but greens that were started in February will be harvestable.</p>
May	<p>Planting: Most of my seeding will be done by now. Next I will be potting up seedlings into larger pots and managing all my plants as the greenhouse heats up. This is one of the most crowded times of the year for the greenhouse, but things start to empty out as I plant things outside. This is also a good time of year to win over my friends and neighbors by giving away extra seedlings.</p> <p>Harvesting: Some warm-weather plants that are grown entirely in the greenhouse become usable by now, notably basil. We aim for a benchmark of our first pesto dinner by May 15. I might also get some early harvests of broccoli.</p>
June	<p>Planting: All the seedlings should be planted outside or adopted to a foster garden. Now my efforts will shift to growing my summer greenhouse crops for the remainder of the season. Tomatoes will need training and pruning to control suckers (trust me, this is essential), peppers and eggplants will grow better if staked, and cucumbers and melons will climb up strings that are provided for them. Stand back because things will get huge in a hurry. I leave ample space between the plants for this. This is also the time of year that the greenhouse can begin to get hot. I keep vigilant about keeping the vents open, putting up shade cloth, and watering frequently.</p> <p>Harvesting: Basil will be growing great guns, but the greenhouse will start to be too warm for lettuce and cool-weather greens.</p>
July	<p>Plant tending: The main story in July is managing heat buildup in the greenhouse. Heat-loving crops like tomatoes, peppers, or cucumbers can ride out the whole summer in the greenhouse without a problem, but I do what I can to keep it cool inside. If the plants are looking tired, I give them a pep with some compost tea, diluted foliar fertilizer or a light side-dressing of a low-dose organic fertilizer.</p> <p>Harvesting: I should be getting ripe tomatoes, peppers, broccoli, cukes and whatever else I've planted. At this point, my greenhouse crops will be a month or more ahead of the same plants grown outdoors.</p>
August	<p>Planting: Continued heat-management and harvesting. The tomato plants will go wild and will likely be up near the ceiling of your greenhouse. I do what I can to train, prune, and maintain order. Cucumber vines can go up to the ceiling and then be trained back down toward the floor. Again, I prune off side shoots or things will get really out of control. By late August, I can resume planting cool-weather seeds like spinach and salad greens. I also sow carrot seeds in the greenhouse now for early spring harvest.</p> <p>Harvesting: I do the best I can to keep up. If I've played my cards right up until now, I should be swimming in produce!</p>
September	<p>Planting: If it didn't cool down enough in August to plant cool-weather greens, I do so now.</p> <p>Harvesting: Thanks to the warmth of my greenhouse, I'll be able to safely harvest all my warm-weather crops all the way through September.</p>
October	<p>Planting: OK, this is important. I usually don't feel like planting anything in dreary October. But I must. This is the ideal time to start any cool-weather crop that I hope to overwinter. The seeds need warmth to germinate and a few weeks of warm weather to establish themselves. Spinach, lettuce, carrots, and green onions are some that I've had success with getting through the whole winter.</p> <p>Harvesting: If I started cool-weather greens in August or early September, those will be harvestable now. Meanwhile, I'll put in a big effort to harvest the last of the warm-weather crops as nights get cold. I keep an eye on the weather forecasts and am proactive. I don't let a greenhouse full of ripe fruit freeze during an early cold snap!</p>
November	<p>Planning: I think about my greenhouse setup for the winter. Now is the time to implement heat-conserving strategies such as additional insulation, frost blankets, soil heating cables, or thermal storage via buckets of water. I give the greenhouse a good cleaning, address soil fertility issues, and seal up cracks and holes. The plants I want to overwinter should be in the warmest parts of the greenhouse.</p> <p>Harvesting: Meanwhile, I'll be enjoying salads and herbs, which will be especially fun at Thanksgiving. Remember: be thankful, and it's okay to feel a little smug!</p>
December and January	<p>Low-light and cold temperatures limit growth in the greenhouse. I keep my overwintering plants under frost blankets and hope for the best. I'll be able to snip the occasional salad, and some stray Johnny jump-ups will probably bloom right through the winter, but otherwise it's a dormant time for the greenhouse. I enjoy the hiatus because it will be starting right up again before I know it!</p>



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1. For overwintering crops, the author uses several layers of frost blankets and keeps the plants in the warmest part of the greenhouse. 2. There's no sense in heating the whole greenhouse when heat mats can provide the extra warmth needed for seedlings to get established. 3. Greenhouses don't have to be the exclusive domain of vegetables; this hot pink petunia managed to overwinter itself and adds needed cheer to early spring.

do. I don't bother with heat mats or any other means of heating during the winter. Instead, I work with what I've got to get the most results without added heat.

In the springtime, you may wish for a little added warmth for your new seedlings. This can be accomplished easily with heat mats. There's no need to heat your whole greenhouse when in reality you only need a localized space to be warm. Because a greenhouse can heat up and cool down quickly, use a thermostat with your heat mats so that the mats turn on only when needed, and won't overcook your plants once the day warms up. I put Styrofoam sheets underneath the heat mats so that the heat doesn't flow out the bottom of the shelf. For more warmth you can put clear plastic domes over the seedling trays. At night, you can put the trays on the floor and cover them with frost blankets. Since the plants are so mobile at this stage, think about how you can create a happy microclimate for them. In the worst-case scenario of a late March polar vortex event, you can bring the flats into the house for a day or two.

Managing cold in the autumn is a bigger challenge because your full-grown plants aren't easy to cover up and protect. The key then is to watch the weather and try to harvest as needed if subzero weather approaches. A portable space heater can be just the ticket to ride out an untimely cold snap.

MANAGING HEAT

This facet of greenhouse growing is easily overlooked, but a closed greenhouse can get astonishingly hot, even on a cold day. There are many strategies to avoid overheating. A functional greenhouse design includes roof vents, end walls that open or have windows in them, and fans to move out hot air. Shade cloth is also essential. Beyond that you can use a misting system to cascade cool water droplets over your plants, or a swamp cooler to circulate cool air through your structure.

GROW IN POTS OR IN THE GROUND?

For plants that will live their entire lives inside the greenhouse, give some thought

about whether they'll live in containers or in beds inside your greenhouse. Large plants like tomatoes and cucumbers will do best in the ground. It's possible to grow them in large containers, but it's tricky to keep them adequately watered and nourished. When grown in the ground, they'll have better access to nutrients and moisture. In-ground growing in the greenhouse can be accomplished by simply leaving the greenhouse floor open to the ground below, and then amending the soil. Raised beds are another nice way to go.

For quick-producers like salad greens and herbs, containers are best. That way you can move the pots around as the conditions change and you can keep cycling new seedlings to keep yourself steadily harvesting. My favorite technique is called the "factory box." This is a simple, plastic window box planted with your favorite herbs or greens. Our "pesto factory" yields one yummy dinner per week, while multiple "lettuce factories" serve up tangy mesclun or crispy 'Buttercrunch'. Bok choy, mizuna, arugula, spinach, and other greens all do very well in



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1. The Kirks call this September phenomenon “the tomato cathedral” as cascades of ripe ‘San Marzano’ signal the beginning of sauce season. 2. By early June, all of the starts have been moved outside except for some basil and lettuce; plants in the ground are starting to take off. 3. When you own a greenhouse, it’s hard not to be smug! Compared to unprotected garden plants, you can be eating fresh produce months earlier—and later.

containers. These low-commitment plantings offer many opportunities for experimentation.

MONITORING GROWING CONDITIONS

One of the reasons a greenhouse is fun is because it offers a miniature-scale version of an intense growing environment. But that has its downside, too. Your greenhouse soil, whether in the ground or in containers, will need help to keep up with the nutrient demands of near-constant growth, warm soil temperatures and leaching of nutrients. But that doesn’t mean you can overcompensate by dousing everything in fertilizer either. Aim to build the soil with slow-release organic nutrients and minerals. Keep an eye on your plants for signs of nutrient deficiency or for overly rich growth that can result from imbalanced nutrient levels. When in doubt, get a soil test. I use organic pelleted (5-5-5) fertilizer, plus peat moss, gypsum, and homemade compost to boost overall tilth.

Similarly, insects and diseases can wreak havoc in the closed environment of the greenhouse. Your best defense here is to be a vigilant plant-watcher, which you

will be, because who doesn’t love frequent greenhouse visits to fawn over your ripening crops? If you spot trouble early, you can intervene with least-toxic methods. In some cases, growing varieties that are resistant to diseases can help solve problems. We get aphid outbreaks from time to time, which I control by hand-squashing (*gross!*) or by using a soap spray. I’ve also found that minimizing the ant population with Borax traps helps to keep aphid populations in check. Like all other matters in your greenhouse, you will learn best by hands-on experience.

EXPERIMENTATION, RECORDKEEPING, AND WEATHER PREDICTION

I like to think of the greenhouse as an ongoing, edible science fair project. What happens if I try to grow sweet peas in November? (Not much.) Will potatoes grow in the greenhouse? (Sort of.) Will daffodils bloom in the winter? (Yes!) Every greenhouse is different and each season offers a new opportunity to try something. Seeds are relatively cheap and you’ll learn a lot faster if you keep trying. That said, keep a journal

of everything you do. Starting dates, harvest dates, unusual weather, seed varieties, yield, and so on. My greenhouse journal is a gold mine of accumulated experiences, triumphs, and blunders.

One of the things you will learn about your greenhouse is how it will respond to various weather conditions. Purchase a wireless thermometer that records the high and low temperatures for each day. Then watch the weather and see what happens. How much warmer is your greenhouse than the night’s outdoor low? How is this number different if the previous day was sunny vs. cloudy? Just how much can I push it weather-wise and get away with it? You’ll learn fast by making lots of observations and keeping good notes.

After a few seasons, you too may find yourself a bit smug as you haul in a basket of sweet carrots for Easter dinner, dive into that first ripe tomato in early summer, or assemble a perfectly grown salad in November. Smugness may not be the most flattering trait, but it pairs well with the sweet, satisfying flavor of your own home-grown food. 🍷