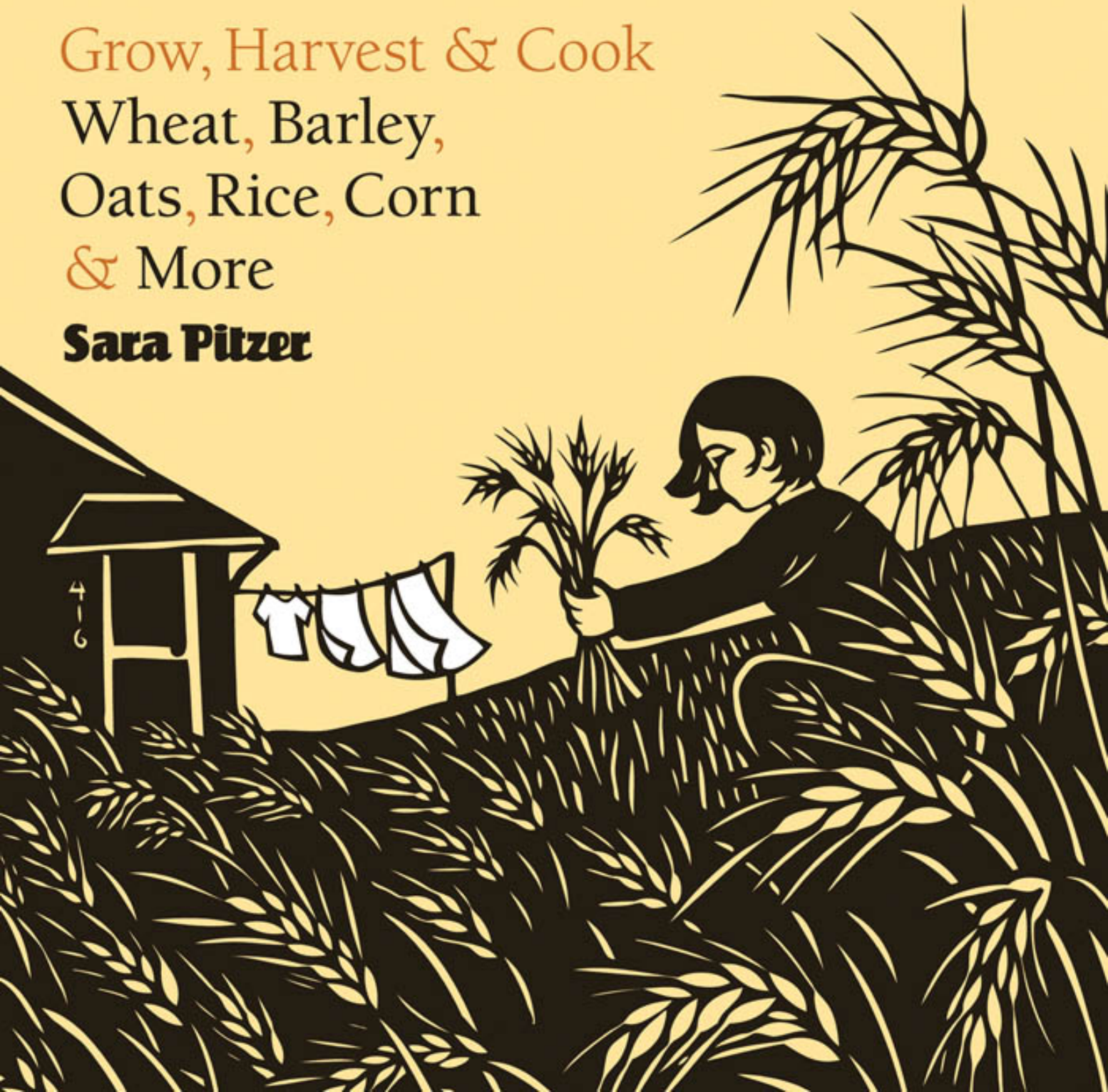
HOMEGROWN WHOLE GRAINS

Grow, Harvest & Cook Wheat, Barley, Oats, Rice, Corn & More

Sara Pitzer



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Storey Publishing

The mission of Storey Publishing is to serve our customers by publishing practical information that encourages personal independence in harmony with the environment.

Edited by Carleen Madigan and Marilyn Rogers
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Cover illustration by © Nikki McClure
Interior illustrations by © Elayne Sears

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Originally published as *Whole Grains: Grow, Harvest & Cook Your Own*, by Garden Way, Inc., © 1981

Printed in the United States by Versa Press
10 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging-in-Publication Data

Pitzer, Sara.
Homegrown whole grains / by Sara Pitzer. — [New ed.]
p. cm.
Earlier edition published under title: Whole grains.
Includes index.
ISBN 978-1-60342-153-9 (pbk. : alk. paper)
1. Grain—Varieties—United States. 2. Sustainable agriculture—United States.
I. Pitzer, Sara. Whole grains. II. Title.
SB189.P55 2009
633.1—dc22

2009016763

CONTENTS

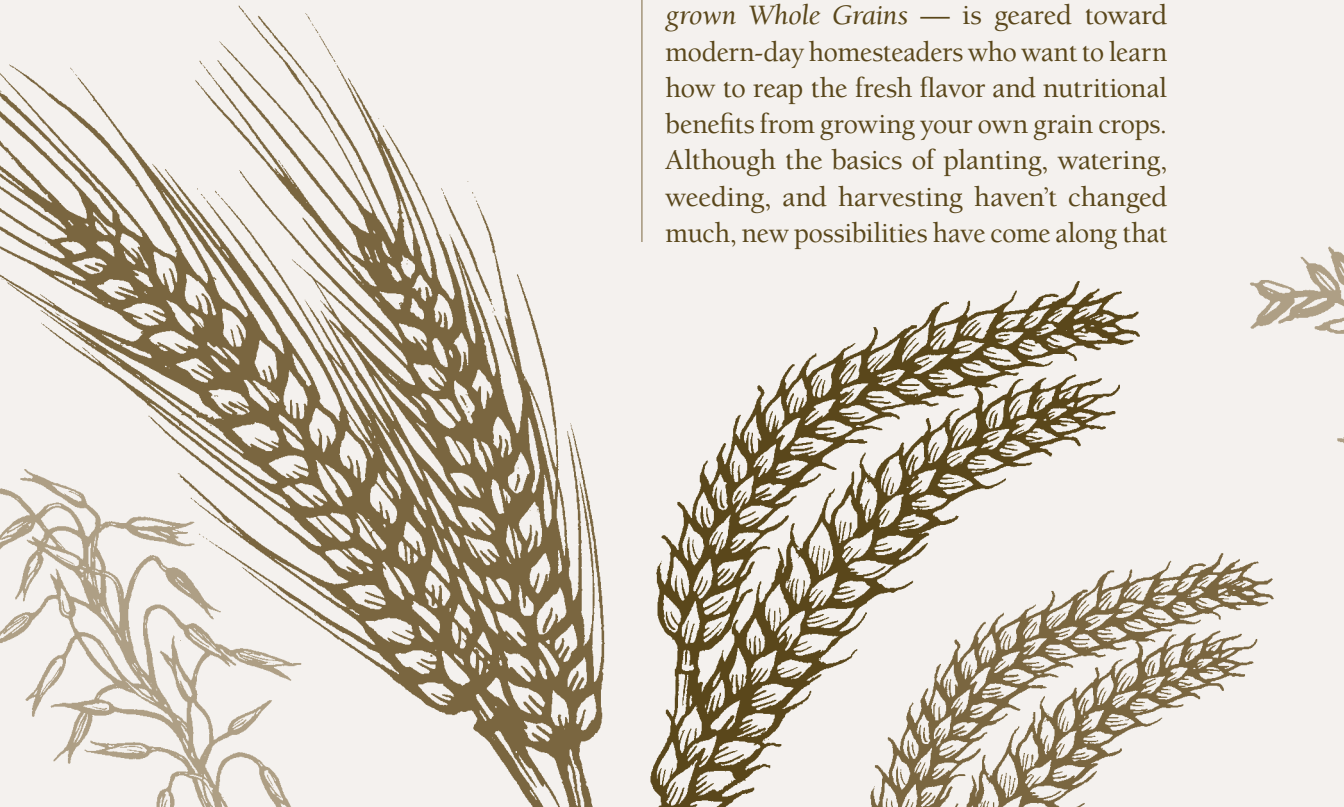
INTRODUCTION

It's been almost thirty years since I first wrote *Whole Grains,* which was aimed especially at small-scale homesteaders, or what I call the back-to-nature people. Back then, the dream of homesteaders, including myself, was complete self-sufficiency, preferably off the grid. But most of us got tired. As reality set in, many of us scaled down our ambitions to something we could manage. People returned to town and learned to make do on suburban lots. Others gave up on the notion of self-sufficiency altogether.

The sixties and seventies were a period of economic and cultural uncertainty, not unlike today's climate, with its dire economic forecasts and worries over food safety. It's no wonder that people are starting to produce their own food again. But today's focus is much more realistic: a manageable-size vegetable garden with a patch of grain.

It's not easy to find information on growing grains in your backyard. Most advice is geared toward large-scale farmers with giant equipment and hundreds of acres. Yet a small but growing group of people — gardeners, farmers, tinkerers, teachers, researchers, cooks, and tasters — have dedicated their lives to small-scale, sustainable agriculture. Many of them contributed to this book, sharing their ideas and experiences.

This new edition — now called *Homegrown Whole Grains* — is geared toward modern-day homesteaders who want to learn how to reap the fresh flavor and nutritional benefits from growing your own grain crops. Although the basics of planting, watering, weeding, and harvesting haven't changed much, new possibilities have come along that



I've included in this edition (with substantial input from horticultural experts whose detailed knowledge goes well beyond what most of us were thinking about in earlier years). For instance, new, hull-less varieties of barley and oats have become more readily available, making it possible for home growers to harvest edible grain from their plants without the difficulty of removing hulls. Ancient grains such as spelt, emmer farro, amaranth, and quinoa have experienced a welcome renaissance, so I've added information about these crops, as well. White whole wheat — long popular in Asian countries — has become more available in the United States. It has a creamy color and a mild flavor that is less aggressive than that of the more familiar red wheat.

As for cooking grains, tastes have changed quite a bit in thirty years. Back in the peace-and-love days on the commune, grains were often cooked up into bland, dense, heavy casseroles. Nutritious? Yes. Tempting? No way. I've added recipes reflective of our more sophisticated palates, including some for grains cooked whole and some that incorporate a variety of whole-grain flours into baked goods.

In case you don't want to tackle growing grains but still want the experience — not to mention the better nutrition and flavor — of cooking or grinding your own, the appendix lists sources for whole grains that I've found to be reliable and helpful.

So what hasn't changed in the last thirty years? The pure joy of growing. You plant the seed. You continue nature's cycle. What a reward!

— Sara Pitzer

CHAPTER ONE

GETTING STARTED

Grains are among the easiest plants to grow in home gardens. Before you jump whole hog into raising your own, though, it will pay for you to think about what you expect from a crop. Preparing the ground and planting the seed is only the first step. Without planning ahead, you could spend the summer admiring your amber waves only to realize that you scheduled your cruise vacation for the same week that the grain is ready for harvest. Before dropping the first seed to the ground, answer these questions:

- How much grain do you want — or need — to harvest? Do you plan to grow all the wheat you'll need to make bread for a year or are you simply interested in experimenting with a new crop? My advice is to start small so that you get the hang of harvesting, threshing, winnowing, and hulling grain before dealing with a large yield.

- Does your yard offer the growing conditions the plants need to thrive? Most grains require sun from dawn to dusk, an inch or

Which Grain to Grow?

Amaranth and Quinoa

These broadleaf native American plants are as colorful as they are productive and nutritious. Both are high in protein and other nutrients, easy to grow, and useful as grains or as vegetables. They are also large plants that need quite a bit of room. Amaranth does best in warm climates, quinoa in cool regions.

Barley

Barley is a fast-maturing grain that thrives in cool weather, does well in alkaline soil, and contains more soluble fiber than do oats. Common barley has a tough, inedible hull that fits tightly in the crease of the grain and is extremely difficult to remove. Commercial processing removes the hull — and most of the nutrients in the grain — in a process called pearling. Grow hull-less barley to avoid the pain of dehulling and gain all of the available nutrition.

Buckwheat

Buckwheat improves soil as you grow it. The seeds grind into a strong-flavored flour that takes some getting used to. Once hooked, though, you'll enjoy having it around. Like barley, buckwheat has a hard, inedible hull. Although no hull-less varieties are available, hulling is not an impossible task.

Corn

For beginning grain growers, the first crop probably should be corn. Consider the advantage: if you already grow vegetables, you probably know how to grow corn. To harvest corn as a grain, all you have to do is to let a few ears go past their prime. Dried corn is easy to harvest: simply twist it off the ears. Although the ears are encased in husks, they are easily stripped away, and the dried kernels have no hulls to remove. The taste of homegrown cornmeal is delightful and you'll wonder why you waited so long to try it.

so of rain or irrigation per week, and well-drained, moderately fertile soil.

➢ What will the neighbors think about sharing the block with farm crops? Are they likely to give you grief over your garden? Are you up to the conflict?

➢ Will your budget allow you to invest in specialty equipment, such as seed cleaners and flour mills? Some items — seed hullers, for example — are so expensive, they're not worth the cost compared with the amount of use they'll get, unless you buy the equipment jointly with other growers. Some of these pieces, such as winnowers, can be improvised from ordinary household items. Others, such as flour mills, are an absolute necessity if you hope to get the most from your harvest.

➢ Will you have the time, energy, and equipment to harvest, thresh, winnow, and hull the grain? Some grains can stand in

Millet

Millet makes tasty flat breads as well as a healthful substitute for rice in casseroles. It is easy to grow, thriving in hot, dry climates. Although the seeds are encased in a hull, the hulls are easy to remove: rub a handful of grain between your palms and the thin hulls will slip off.

Oats

Oats have traditionally been one of the easiest grains to grow and one of the hardest to hull. A new, hull-less oat strain solves the problem for gardeners. If you're growing old-style oats to eat, find a method of hulling before you sow. One experiment that has worked with some success: Dry the oats for an hour in a 180°F oven to crisp the hulls, then run the oats through a mill with the stones set so that they crack the hulls without grinding the oats. Oats are best suited to cool climates.

Rice

Rice is a delicious grain that can be used in many ways, but it will be the most difficult for you to grow. Even though you don't need to set up flooded paddies, rice requires wet soil as well as a long, hot growing season. It's the perfect crop for those low spots in your yard that never dry. You could also start out growing rice in pots.

Rye

Rye is almost immune to failure. It's hardy, so you don't have to worry about timing plantings to avoid frosts, and it'll grow in poor soil. It's a good cover crop for the garden, makes a fine green manure to turn under to replenish the soil, and is easy to harvest, thresh, and grind.

Wheat

Wheat is the most popular grain for making bread. You'll find wheat easy to grow, harvest, thresh, store, and grind in small amounts. Wheat is a cool-season crop, and in most regions you'll plant it in fall and harvest the following spring.

the field for a short period before you harvest it, but the longer it stands, the more grain you'll lose to birds, rodents, storms, and shattering. That means you need to be around when the crop is ready to harvest. And because harvesting, threshing, winnowing, and hulling take a lot of muscle, you may need help.

- Do you have storage space for the grain? You need a dry spot that is free of insects and rodents, and where the temperature is consistent and no higher than 70°F.

This is a good place to mention that even when you can't harvest what you plant, your efforts won't be wasted. Most small grains make a fine cover crop that cuts down on weeds and reduces erosion while it is growing and a nutritious green manure that enriches the soil after you till the plants under. Avoid letting the grain that you plant solely as a cover crop set seed; what started as this year's cover crop could become next year's weed problem.

HOW MUCH TO GROW?

The size of the area you plant depends on how much grain you want to harvest. The amount you can grow is limited only by the size of your garden space. But if you're eyeing the entire backyard for planting, beware. Like your mother used to tell you: your eyes are bigger than your stomach.

Start small. Growing grains is easy. Threshing, winnowing, and hulling them, on the other hand, takes raw, brute energy. As you start out, it's likely you'll lose a lot of grain in these final steps. In fact, you'll notice in the following chapters that each grain has a wide range of yield. The range varies from what the beginning grower can expect to harvest, the lowest yield, to that for a well-experienced grower, the highest yield. Consider a small trial area the first year so that you can learn how the grain behaves, what its cultivation problems are, how long it

Why Grow Your Own Grains?

- **Some are difficult to come by otherwise. Many of the most nutritious grains have no market interest for large-scale farmers, and so they're not grown. Others are so much shorter or their grain so much smaller than typical crops that the farmer needs different equipment to harvest them. As much as a farmer might want to grow these nutritious crops, if she can't make money at it, it's unlikely she'll try.**

- **You can ensure maximum nutrition. Commercial grain processing removes the germ and bran. The best way to make sure that you retain all minerals and vitamins in the grain is to grind or cook your own.**

- **Growing grain is easy and just plain fun!**

takes you to handle it, and how it is affected by varying climate conditions.

If you plant so much that you're unable to stay ahead of the weeds, provide enough water, or harvest before the birds get to the grain, you'll be very disappointed. And you're apt to lose steam halfway through threshing a huge plot of grain. Worse yet, the hard work could drive out all interest in growing grains, and that would be a shame.

You'll have a better yield and less grief from a modestly sized, manageable row in the garden. All the growing directions and yields in this book are based on 100-square-foot plantings. That size of bed — 10 by 10 feet or 20 by 5 feet — fits nicely in a typical backyard, is a manageable size for planting and harvesting, and provides a decent yield. Your first harvest of wheat may give you 4 pounds of grain, which will grind into 14 cups of flour, enough for 3 or 4 loaves of bread. But as you gain experience, that same 100-square-foot plot could yield as much as 26 pounds of grain, which translates into about 90 cups of flour and enough bread for half a year.

PREPARING THE GARDEN FOR GRAINS

It takes no more work to prepare the soil for grains than for any other garden plant. Most grains thrive in a loose, well-drained, moderately fertile soil. If you have such a spot that receives full sun all day, you're in business. If the soil's not quite right but you do have full sun, you can work on the soil to make it more to the liking of grains.

Testing Soil

You'll need a rake or spade, a trowel, a clean bucket, a clean bag, and the soil test form available from your local Cooperative Extension Service.

1. Clear the ground in 10 spots around the garden, removing any vegetation or debris and the first inch of soil.

2. Collect a trowelful of soil from each spot, taking care to get a sample from the entire root zone and not just the surface soil. The easiest way to do this is to dig an 8- to 12-inch-deep hole and mix soil from the top and bottom of the hole before scooping out the sample.

3. Place each sample in the bucket. Once you've collected samples from all 10 spots, thoroughly mix them together.

4. Measure out 1 cup of soil. Pour it into a clean paper bag or the soil test sample bag provided by the Cooperative Extension Service.

5. Fill out the test form. Be sure to note which grain you intend to grow and provide any extenuating information, such as the fact that you garden organically. Add the payment for the test to your package, then mail or deliver it to the Cooperative Extension Service.

Before preparing the garden, send a soil sample to your Cooperative Extension Service to learn whether any nutrients are in short supply (see Testing Soil, page 13). The results will provide recommendations for amendments geared to the specific plants you will be growing.

The best time to test the soil and apply amendments is fall. The weather is warmer, making it more pleasant to work in the garden, and it is drier. Dry weather is key for cultivating soil. Preparing soil in the fall also means that your planting area will be ready for sowing come springtime.

Tilling when soil is too wet creates compaction, which reduces drainage and makes it difficult for roots to grow through the soil. You'll tire quickly working wet soil, especially if it's clay, which is sticky and dries into hard, impenetrable clods.

The soil can be too dry to work as well. Cultivating very dry soil creates a cloud of dust that allows topsoil to blow away.

So how do you know when the soil is ready? Pick up a handful and squeeze it. If water drips or the soil forms a tight ball that won't break apart, it's too wet to cultivate. If the soil sifts through your fingers, it's too dry. What you want is for the soil to form a loose clump that falls apart with a light touch. Then you can cultivate to your heart's desire.

Clear the Ground

While you wait for the test results, start getting the soil ready. Begin by stripping off the lawn. There are several ways to do this:

Removing sod with a sharp spade

Slice into the soil with a spade, digging just below the mesh of stems under the grass

Testing Soil Moisture

Soil that forms a tight ball when squeezed is too wet to cultivate.

Soil that sifts through your fingers easily is too dry to cultivate.

Soil that forms a loose clump that falls apart with a light touch is ready to be cultivated.

blades. Pull up on the spade to pop out a clump of grass and create an opening from which to work. Get down on your knees, turn the spade upside down, and jab it into the opening under the grass. You need to cut the grass under the crown, which is just below the thatchy mesh under the leaves; otherwise, the grass will grow back. You don't need to go any deeper than that. Pull or roll up the sod as you work. Place it on the compost pile, grass-side down, or use it to patch holes in other parts of the lawn.

Using a sod cutter

Both manual and gas-powered cutters are available. Gas-powered sod cutters are

How Does Your Soil Drain?

Most grains prefer soils that are moderately to well drained; only rice will love growing in areas where the water puddles. If your soil drainage is poor, however, it can be modified. The first step is to find out how well your soil drains.

Check Drainage

Dig an 18-inch-deep hole. Fill it with water, let the water drain, then fill it again. This time, monitor how long it takes for the hole to empty. You want to see the water level drop 1 inch per hour. If you soil drains much faster than that — say it empties in 3½ hours — it is excessively well drained and will benefit from the addition of organic matter, which holds moisture. Check the hole in 24 hours. If any water remains, you have a drainage problem that needs to be corrected before planting.

Raise the Bed

If you find that your soil drains poorly, you may need to plant your grains in raised beds. The key is to make the bed high enough to get above the drainage problem. To do that, measure the water depth. For every inch of water left in the hole after 24 hours, you want to raise the bed 1 inch. If the water was 8 inches deep, for example, you'll need to add 8 inches of topsoil to the bed.

You can raise the bed by building a frame with brick, stone, or landscape timbers and filling it with new, well-amended topsoil, or you can simply pile additional soil on the garden. To determine how much soil to order, multiply the area of the bed (length times width) by the depth of the soil. This gives you the amount of soil in cubic feet. Because soil is sold by the cubic yard, divide the cubic feet by 27.

Order topsoil from a reliable supplier who is known to provide good-quality soil. Ask for a loam — either sandy or clay loam. Before the driver dumps it out, check the soil to make sure you're getting what you ordered; if he delivers heavy clay, you'll continue to have drainage troubles.

Spread a few inches of the topsoil over the garden — even if you've framed the beds — then till it in. This ensures that the native soil and the new soil don't form layers that reduce drainage. Top with the rest of the soil, making the depth even across the bed.

Lawn grass can be easily removed with a sod cutter.

probably easier to find at a rental store. Manual cutters involve kicking a bar that drives the cutter under the sod. When it comes to using a manual sod cutter or a spade, it's a matter of choosing your poison. Do you prefer wearing out your shoulders or your legs?

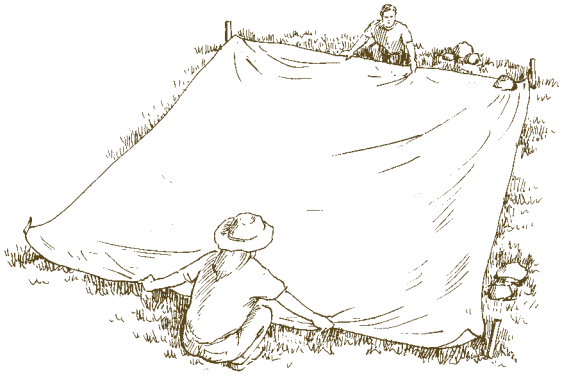
Smothering the lawn

This method kills the lawn by preventing light from reaching it. You'll need to start about a year before planting the garden. Mow the area where you plant to grow grains, then cover the grass with several layers of newspaper. Wet the paper, then cover it with 4 to 6 inches of organic matter, such as chopped leaves. Keep the area moist and replenish the organic matter as it breaks down. The next spring, till the organic matter into the soil, making sure to work the soil only when it is moist but not sodden.

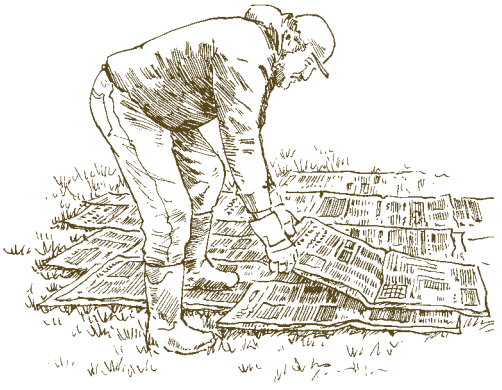
Solarizing the lawn

Solarizing essentially cooks the soil, heating it to 140°F or warmer. It kills the lawn as well as any weed seeds, insect eggs, nematodes, and disease spores in the soil.

To solarize, till the planting area and rake it smooth. Place bricks or rocks every few feet across the bed, then water well. Once the



Solarizing the planting area with a thick sheet of clear plastic is a good idea if the lawn grass is especially vigorous or filled with perennial weeds.



Rather than removing sod, you can simply smother it with layers of newspaper or cardboard.

soil is wet 4 to 6 inches deep, spread a 6-mil sheet of clear plastic over the bed; take care not to tear the plastic as your work or leave any gaps that will let heat escape. Bury the edges of the plastic to keep it from flapping in the wind and blowing away. After three to six weeks of sunny weather, the bed will be ready to plant.

Add Amendments

The soil test results will tell you what to add to the soil (for example, phosphorus) and how much of it to add. Spread the amendments evenly over the planting area, then dig them into the top 8 to 12 inches of soil. If you're planting a small bed, you can dig by hand. I use a round-point spade, also called a balling shovel because the angle of the shaft digs straight down and the long handle gives me leverage to pull back and lift the soil. You might prefer a standard, short-handled spade. Don't use a shovel. Shovel blades curve forward, making them better for scooping than for digging.

For larger areas, use a rototiller to mix in amendments. Make only one or two passes over the area to avoid overtilling the soil. Overtilling destroys soil structure.

Some people like to use a broadfork to loosen the subsoil. This tool has five or six long tines and two handles. You step on the crossbar that holds the tines, pressing them deep into the soil; wiggle the handles back and forth to loosen the soil; then pull back toward you to lift the tines out of the soil. You might want to follow tilling with the broadfork to break up any compaction that developed beneath the blades.

No-Till Planting

For the home gardener as well as the farmer, tilling the soil helps create a good seedbed and kills any weeds that have sprouted. But another approach to preparing the bed before planting is gaining favor: organic no-till planting. This method prevents soil erosion, builds the soil by recycling nutrients, minimizes soil disturbance, conserves water, and helps to prevent weed growth.

The no-till method involves planting a cover crop such as vetch or winter rye, then, just before its seeds ripen, mowing or rolling it to knock down and kill the crop. Rather than tilling it in, you sow directly into the debris.

Chris Reberg-Horton, assistant professor and organic cropping specialist in the Department of Crop Science at North Carolina State University, says he has tried this no-till system in his home garden. Instead of using a roller, he simply walks on the cover crop to kill it.

Timing the knock-down is tricky. If you do it too early, the cover crop comes back and competes with your grains. Too late and the seeds ripen, germinate, and become a weed problem.

To plant the grain, you have to cut through the cover crop to reach the soil and dig a shallow trench for the seeds. A sharp spade

Soil Fertility Amendments

Compost	1–3% slowly available nitrogen as well as other nutrients, depending on ingredients; improves soil structure, aeration, and fertility; available in bulk; can make your own
Manure	1–4% nitrogen depending on the source; 2% potassium; improves soil structure, aeration, and fertility; often free for the hauling. Allow to age for several weeks before planting into it — it can burn plants if used fresh
Peat moss	Lightens and acidifies soil. Expensive
Blood meal	Adds nitrogen that quickly breaks down to feed plants; 12% nitrogen
Seed meal	Includes cottonseed meal and other residues left after processing seeds; 6% nitrogen in a quickly available form
Bonemeal	Supplies phosphorus and calcium; 24% slowly available phosphorus, 35% calcium; use steamed bone meal from a reliable source. Expensive
Rock phosphate	30% very slowly available phosphorus; amount of phosphorus varies; also adds micronutrients; works best in acid soil and when combined with large amounts of organic matter
Granite meal	1–4% potassium
Greensand	6% potassium
Seaweed	6% readily available potassium. Expensive unless you live near a coast; must rinse before use to remove salt
Wood ashes	5–10% readily available potassium; 20% calcium. Raises soil pH; don't use on alkaline soils or apply so frequently that the pH climbs too high for plant growth
Gypsum	30% calcium; 23% sulfur; although marketed as a soil conditioner, it works best in soil containing excess sodium
Sulfur	Lowers soil pH
Limestone	Raises soil pH; dolomitic limestone contains calcium and magnesium
Epsom salts	Lowers pH and supplies magnesium; 10% magnesium, 13% sulfur. Expensive in large plots
Iron sulfate	Lowers pH and supplies iron

Rake the Soil Smooth

After digging in the amendments, rake the bed smooth. Take care to break up any clods and to level the soil. Turn over the rake to drag soil into low spots or knock down high ones. You are now ready to plant.

SOWING SEED

Like vegetables, grains are sown in narrow rows, wide rows, or solid blocks. Because some grains are tall, run rows north and south. This ensures that each plant in the row receives an equal amount of sun. When the rows run east–west, taller plants often shade their shorter neighbors.

Narrow Rows

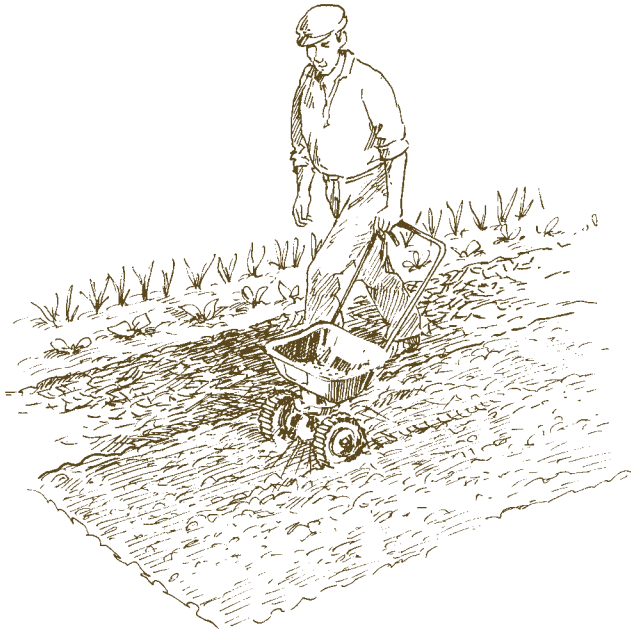
Narrow rows are the traditional planting pattern, but not the most productive. You dig a long, shallow trench with a hoe, sprinkle seeds evenly into the trench, then cover them with soil. The rows are spaced far enough apart that you can walk between them to weed or run the rototiller down them to cultivate. Because so much space is devoted to paths between rows, you lose productive ground. In addition, you must prepare the soil in the entire bed, not just the areas you plant.

Narrow-row planting is not the most productive way to lay out a home garden, because much of the space is utilized by paths instead of plants.

Wide Rows

Wide rows are a great way to start for your first time growing grains. With this method, you create 3- to 4-foot-wide beds that are about 18 inches apart. (The width depends on how far in you can reach to weed from both sides of the bed and the amount of space the plants need while they grow.)

Planting in wide rows has several benefits. Because you never have to walk on the bed to weed, the soil in the rows stays loose and perfect for root growth. You'll save money on amendments with this method because



Planting grains in wide rows avoids much of the soil compaction caused by frequent foot traffic.

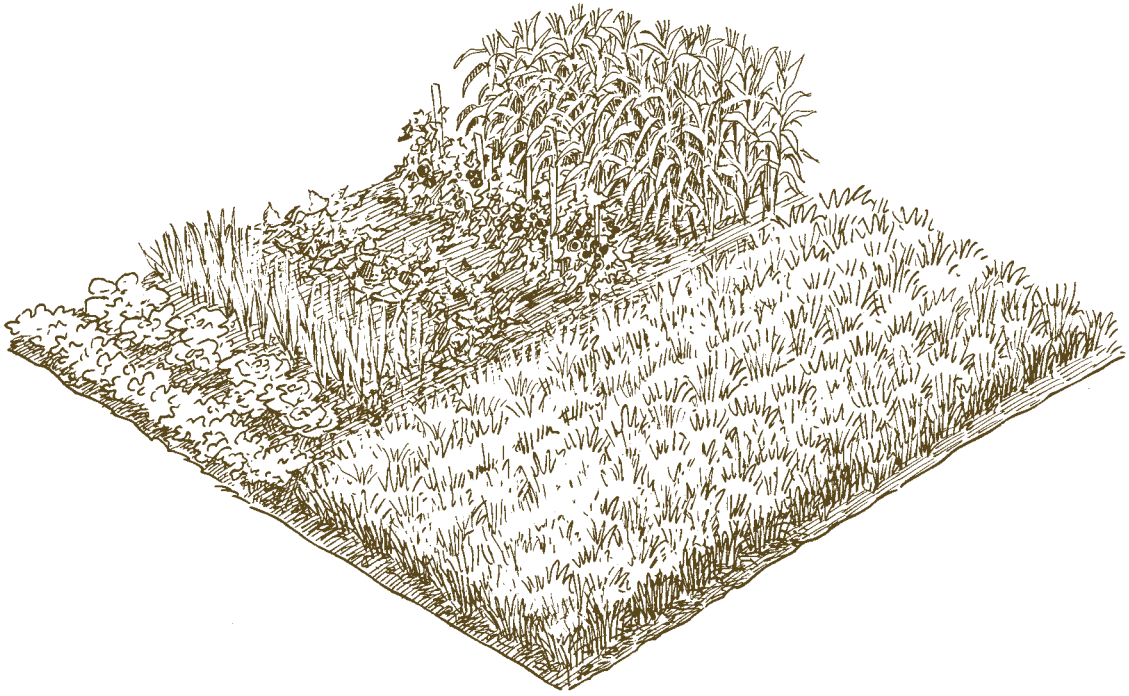
you only need to work the soil in the planted rows. And because so much less space is used for paths between rows, you can fit more plants in the same amount of space for a somewhat larger harvest.

Measure and mark out the rows with twine and stakes, then build up their height a few inches by scooping soil from the path onto the beds. Spread amendments over the rows and till them in. Finally, shape the rows so that the top is flat and level and the sides flare slightly at the bottom. Apply a thick layer of mulch on the path between beds or grow a cover crop such as clover to keep mud and weeds at bay and to help feed the soil for next year's garden.

A wide row accommodates two or more rows of grain, depending on the spacing the plants require. Sow by digging trenches with your hoe, sprinkling in some seed, and covering it, as in narrow rows. Or lightly scatter or broadcast seed by hand across the rows. Some small-scale growers fill a drop spreader with seed and push it down the rows as they walk in the pathway.

Planting in Blocks

Some crops, such as wheat and especially corn, can be grown in a solid block. Essentially, this is a mini-field in which you broadcast the seed evenly over the planting area. After sowing the seed, work it into the soil



Grains can be grown in a large block rather than in rows. This is a particularly good method for crops that need to be densely planted for cross-fertilization, such as corn.

Finding Seed Sources

Most grains are sold in bulk through a dealer network targeted to multi-acre farmers, not to home gardeners. So what's a backyard grain grower to do? You can acquire seed in several ways.

- Locate garden-seed companies that offer grains in backyard-size quantities. (See Resources, page 158.) I have also had good luck by searching the Web for "cover crop seed" and "wildlife seed," especially when it comes to uncommon grains like millet. With all of these suppliers, it will be easier to find unnamed varieties than named cultivars.
- Become acquainted with local farmers and small-scale growers. They may be willing to sell you a small quantity from their order.
- Check the farmers' market. If anyone is selling untreated whole grains for grinding, you can use that seed for planting. Ask the seller about the variety as well as pertinent growing information.
- Be sure to save seeds from each year's harvest to plant the next year. Choose the plumpest seeds or seeds from the most productive plant — or earliest, or most pest-free — and you'll one day be planting your own "improved" variety.

with a rake. How deep to rake it in depends on the grain. Some are sown ½ inch deep, others up to 2½ inches deep.

Making Contact

In order to get a good stand of plants, seeds and soil must be in contact. To ensure this, make a pass over the planting area — whether a narrow or wide row or a block — with a lawn roller. If you don't have access to a roller, put down a plank and walk on it for the same result.

After planting grains, gently tamp down the soil with a board or lawn roller, to ensure good soil-to-seed contact.

Amount of Seed to Buy

The chapter on each grain specifies the seeding rate for planting 100 square feet of soil. Check that amount against the directions on the seed packet, which should list how many feet of row the seed packet will cover.

GROWING AND HARVESTING GRAIN

When the grains are up and growing, thin them to 6 to 12 inches apart, depending on the grain. After that, there's very little to do until the seeds are ripe, except for occasional weeding and watering as needed. After all, most grains grow in huge fields with absolutely no attention. They thrive on natural rainfall everywhere but in the most arid regions; of course, yields go down during dry seasons. Fertilizer is applied just before planting, as is weed control.

At home, water during dry periods, giving them about an inch of water per week. Use a standard overhead sprinkler or string soaker hoses along the rows when you plant and turn them on once a week or so as needed. Soaker hoses are more efficient — the water isn't blown around by the wind — but you have to make sure that the water pressure is high enough to supply the end of the row as well as the beginning.

If you prepared the soil by working in organic matter and fertilizer according to the soil test, the plants should be set for the season. Applying any more will cause them to *lodge* (fall over), which reduces yield because lodged plants don't set seed.

Weed and cultivate the soil once or twice a month. Weeds compete with the grain plants and will reduce yield. Cultivating keeps the soil from crusting over so that water and air can get to the roots. Use a standard three-prong cultivator; as it loosens the soil, it loosens weeds, which you can then just pick up.

Cultivating around plants helps loosen the soil, so that water and air can penetrate it.

Harvesting

As most grains ripen, they go through three distinct phases. First is the milk stage in which the seeds begin to fill with a milky liquid. You can even squeeze out a little out if you pinch a grain. The stalks also start to turn from green to shades of yellow.

Next comes the dough stage, in which the milky liquid begins to harden. At this point, the grain is still easy to dent. Leaves and seed heads are changing to yellow or tan.

Grain reaches the mature stage when the milk has solidified. The leaves, stalks, and seed heads will have become golden brown.

Getting Advice on Grain Varieties

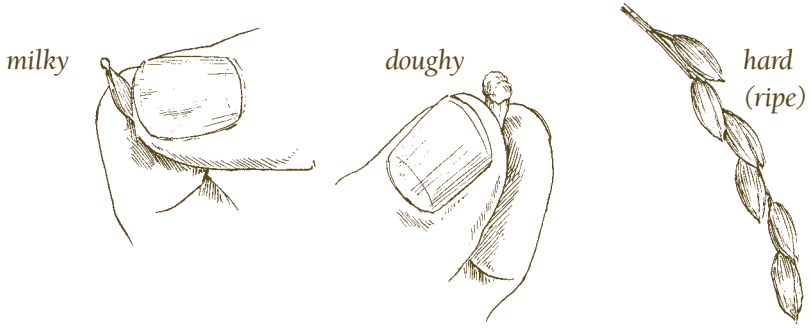
Planting heirloom small-grain crops such as wheat, oats, and barley is risky because they have not been bred for disease resistance. Because small grains have been handled almost exclusively by public breeders, you should be able to find varieties that have great disease resistance (and some insect resistance) in most regions. But you must consult with the agricultural extension for your region to get variety recommendations.

You can save your own seed from all these crops and get the same thing back, says Chris Reberg-Horton, assistant professor and organic cropping specialist in the department of crop science at North Carolina State University, because none of them is a hybrid. Corn is the opposite. Most corn breeding has been done at private companies, and because they are hybrids, saved seed doesn't breed true. A few open-pollinated corn varieties are available, but not many, and they may not be adapted for

Heads often bend over with the weight of the grain.

When the heavy heads tip downward, test the grain for readiness. Pick a head, pluck out a few grains, and pop them into your mouth. If they're soft and doughy, you may leave the grain to mature further before harvesting, waiting until the grain is firm and crunchy. However, many farmers believe that the best quality is assured when the grains are harvested in the late dough stage and then cured for several days in the field or in a shed.

Take care not to wait too long to harvest the grain. Birds move in to take the crop or the heads shatter and the grain falls to the ground, where a hungry band of mice awaits dinner. Also, grains left too long in the field will yield a lower-quality crop, and may increase the odds of diseases becoming established.



Grain ripens in three stages: milky, doughy, and hard. When the grains are hard and crunchy and cannot be dented with your fingernail, they're fully mature.

If you look in old homesteading books under "grain harvesting" while trying to figure out how to get the stuff out of the fields and into the flour bin, you'll find something like this: "Ask a neighbor who has a combine to thresh it for you." Sure. Even if you have combine-equipped neighbors, they probably would hesitate to put that splendid mass of machinery into motion to harvest a small crop — assuming it could even fit into your yard. And can you imagine the sight of a combine maneuvering past the playground signs and down your street?

Combines cut, thresh, and winnow in one step, and unfortunately no one sells such equipment for the home grower. There are small-scale mechanical reapers, binders, and threshers, but they're likely to be too expensive for most backyard growers. Methods for harvesting grains on a small scale take muscle power but are not difficult.

Harvesting small plots

To harvest a small plot — 150 square feet or smaller — simply break the heads off the stems. Drop them into a bucket as you work, then spread them out to dry for several days before threshing. Some people cut the grain with pruners, leaving a 12-inch stem, bundle a few stems, and hang the harvest to dry, as you would to dry herbs and flowers.

A sickle is a more traditional tool that is well suited to small spaces. With its short handle and hooked blade, it is easy for a novice to use. Cutting with a sickle is a matter of grab-and-cut, grab-and-cut. If you're right-handed, hold the stalks of grain in your left hand and swing the sickle with the right to cut at ground level. (Left-handed sickles are not as easy to find.) Keep people away from the work area for their safety. You'll want to kneel or crouch as you harvest, so you won't tire too quickly.

Lay the cut grain in windrows — small piles along the row — with all heads pointed in the same direction. Let the grain dry for several days before threshing.

Small plots of grain can be harvested with a handheld sickle.

For larger plots, try harvesting with a blade trimmer.

Nontraditional methods

An electric- or gas-powered hedge trimmer can make short work of harvesting small plots. (Because you'll be working on your knees, you probably won't want to try it in a larger area.) Starting at one edge of the garden, cut the plants at their base, working from the inside of the plot so that the cut grain falls onto open areas. Although I've not used this method to harvest grains, it's the way I cut down ornamental grasses in spring. It's pretty slick. An even easier way (and one in which you can stand up while harvesting) is to use a string trimmer with a blade attachment.

Harvesting large plots

A scythe makes easy work of harvesting a large plot. This is a long-handled tool with a 20- to 36-inch-long, slightly curved blade. Choose the shortest blade when working in small spaces and tight quarters, a longer one where you have plenty of room to swing. The blades come in three weights: grass, ditch, and bush. Grass blades are the lightest and best for harvesting grains. The scythe handle (the *snath*) can be fitted with either right- or left-hand blades.

Starting with the handle slightly behind you on the right — or left if you're left-handed — swing the scythe in a long, easy arc to the

Harvesting with a scythe and cradle is an old-fashioned but efficient method.

other side of your body with the blade just skimming the ground. Watch your follow-through so that as you finish the stroke, the cut grain is deposited in a windrow. Develop a rhythm as you swing the scythe back and forth, moving forward with each swing. Use just the first third of the blade to cut. Trying to work faster by cutting with the entire blade will wear you out.

Bind the cut grain into sheaves, each about 12 to 14 inches around — a size you can hold comfortably in your hands. Bind on the same day as you cut, using cord, baling twine, or even some stems to hold the bundles firm. (You'll find it helpful to have a partner so you can take turns cutting and sheaving.)

Shock and Dry

It's important for the grain to be thoroughly dry when you thresh so that it separates easily from the head.

After gathering the grains into sheaves, stack the sheaves into shocks for drying.

Pile eight to twelve sheaves together to form a *shock* (also called a *shook* or a *stook*). Start by pushing the bases of two sheaves firmly in the ground at about a 60-degree angle. Lean the sheaves toward each other and ruffle their tops together for stability. Place two more sheaves at right angles to the first pair, forming a square and meshing their tops. Add as many as eight to ten more sheaves around them. Top each shock with a cheesecloth "hat" to discourage hungry birds. Leave the shocks in the field for a week to ten days to dry.

Threshing

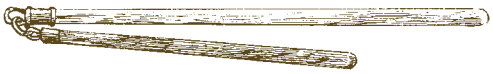
Threshing means to separate the grain from the seed heads and straw (the chaff). You'll find that some grains are easier to thresh than others. You can go about threshing in any number of ways, some more effective than others. Until you build up your muscles and develop a routine, you may be disappointed in how slow and difficult each method is for the amount of grain produced.

Rubbing

Grains such as amaranth and quinoa are easy to thresh: rub the seed heads between your palms, occasionally blowing away the chaff. You can also use this method for small amounts of other grains.

Flailing

The traditional method of threshing is to use a *flail*. A flail consists of one 3-foot-long piece of wood — the handle — attached with a leather thong to a 2-foot-long piece of wood. Lay an old sheet on the driveway or garage floor on which to place the grain. Holding



an old-fashioned flail

the flail by the handle, repeatedly fling the short piece of wood at the grain, shattering a few heads each time. Take care as you work. There's a trick to swinging the flail without rapping yourself on the head. You might want to try beating the grain with a plastic baseball bat instead.

Banging

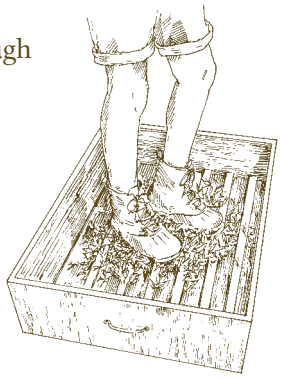
Another method involves hitting the seed heads against the inside walls of a clean trash can. This technique is faster than flailing but leaves a lot of chaff to be winnowed out. Millet and barley work especially well with this method.

Banging sheaves inside a clean trash can releases the grain, but the chaff still needs to be winnowed away.

Instead of using a can, some people beat the grain against a sheet of plywood that has crosspieces mounted on it. Using the plywood goes faster, but grain tends to fly everywhere.

Treading

Simply walking on the grain is sometimes enough to loosen it from the chaff. Dan Jason, of Salt Spring Seeds in British Columbia, built a shallow wooden box with 1-inch slats in the bottom for this purpose.



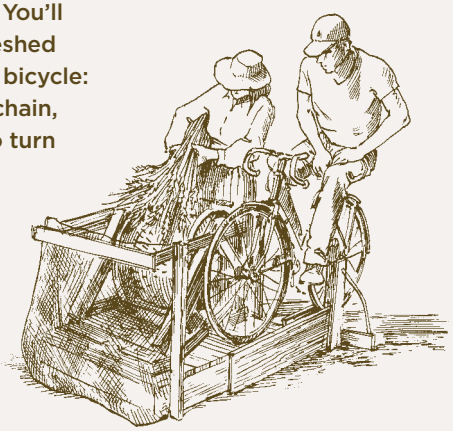
A threshing box (a shallow box with 1-inch slats at the bottom) makes threshing grains a simple task.

Although an old-fashioned flail can be used for threshing, it's safer to use a plastic baseball bat.

A Homemade Drum Thresher

If you're handy and creative, try making this thresher. You'll need wood to build a frame in which to catch the threshed grain, a large utility-wire spool, and parts from an old bicycle: the back portion of a bicycle frame, a chain ring, the chain, the crank, and the spindle. Assemble the bike parts to turn the drum away from you. Stud the center shaft of the spool with xd (common wire) nails, pounding them in every 2 to 3 inches.

To use this contraption, one person feeds the sheaves headfirst onto the drum while a second person pumps the pedal to turn the drum. The nails pluck off the grain, which falls into the bin. With this method, you can thresh about 250 pounds of wheat in about 6 hours with less effort than it takes to beat the grain.



a bicycle-powered drum thresher

Winnowing

Winnowing is the process of separating the chaff from the grain. One way to do this is to pour the grain from one container to another while a helper holds a hair dryer or a fan to blow away the lightweight chaff. On a breezy day, you can let the wind do the blowing, but it's nearly impossible to get the grain perfectly clean with this method and you end up picking out a lot of debris by hand.

Winnowing will not remove rocks, pebbles, metal, and other heavy items. Pick through the grain before grinding to make sure it contains no foreign objects that will damage your flour mill.

After threshing, winnow the chaff by pouring grains from one container to another in front of a fan, or by gently blasting the grains with an air compressor.

STORING GRAIN

To ensure the longest life for stored grain, you must keep it cool, dry, and oxygen-free, and protect it from rodents and insects.

Keep It Cool

The higher the temperature, the faster the oils in the grain turn rancid. You want to find a storage spot that maintains a constant year-round temperature of 60°F or lower.

You can keep grain in plastic bags in a freezer practically forever. Unless you plan to live without electricity, this option is worth considering, especially if you have an energy-efficient freezer. A chest freezer dedicated to storing grain could cost you less than other storage systems.

The Effects of Oxygen

Oxygen changes the nature of food's nutrients and degrades its flavor. Throw a couple of oxygen absorbers into the storage bucket just before you seal it. These absorbers are like the packets of silica gel that are often placed in the box with new shoes, only larger. It'll take 2 to 4 packets per 5- to 6-gallon storage bucket. Wait to open the package of oxygen absorbers until you're just about to seal the bucket; the absorbers go to work as soon as they're exposed to air.

Dealing with Moisture

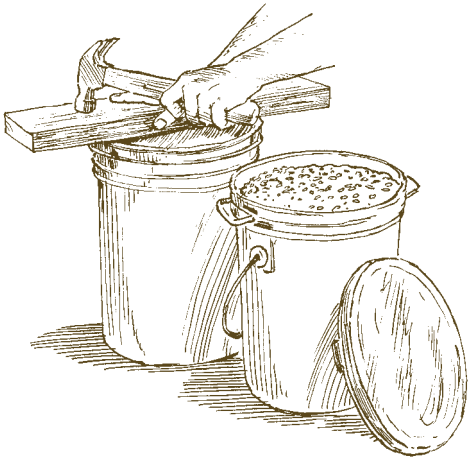
Bacteria and fungi start to grow on the grain when the moisture content is greater than 10 percent. As they feed on the grain, they release heat and moisture, which enable more organisms to grow. Eventually the whole container of grain is spoiled. There's also a slight chance that the grain will spontaneously combust if the temperature rises too high.

There are two easy ways to determine the moisture content of the grain when you store it. One is to hit a few grains with a hammer. If they're pulverized into powder, they're dry enough. The other is to bake 20 ounces of grain at 180°F for two hours, stirring occasionally (be sure to weigh the grain before baking; don't just estimate). Cool the grain and weigh it again. If it lost 1 ounce in weight, the grain was at 5 percent moisture. A loss of 2 ounces equals a 10 percent moisture content; 3 ounces equals 15 percent; and so on. If the grain tests higher than 10 percent, let it dry several more days before retesting it. When the moisture content is lower than 10 percent, it is ready to store.

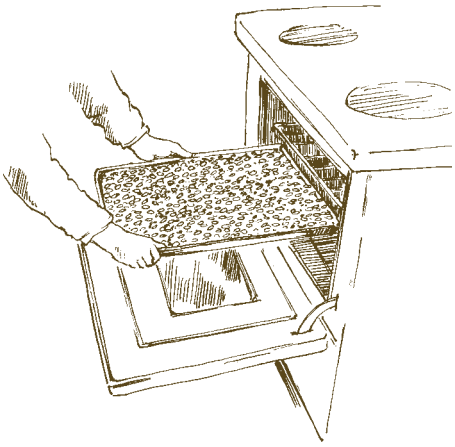
Storage Containers

The container itself provides a physical barrier to insects and rodents. Five-gallon plastic and metal buckets that can be sealed airtight are ideal. Each will hold around 20 pounds of grain. Don't use plastic food-storage bags unless you're storing the grain in the freezer; rodents readily gnaw through them, and they let in oxygen.

Make sure the container is food-safe. Some plastic buckets have an odor that contaminates the grain; some metal ones have a plastic lining that does the same. A variety of food-grade plastic and metal pails with airtight lids is available, mainly via Internet sites offering items for disaster preparedness.



To keep out insects, store cured grains in a plastic or metal bucket fitted with an airtight lid.



Heating grain in an oven before storage will kill any insect larvae and help reduce the moisture content of the grain.

You may also find such storage containers at a good hardware store or a brewing-supply shop, too. Pails used as fermenters in homebrewing have airtight lids fitted with an air lock. These usually come with a hole drilled near the base to accommodate a spigot, but you can request a pail that hasn't been drilled. Garbage cans are not good for storage because it's difficult to make them airtight, and there's no guarantee that they are food-safe.

Use a 2×4 and a hammer to ensure that the container is sealed — pressing down with your hands is usually not enough. Lay the 2×4 across the lid and hit it with the hammer. Move and hit the 2×4 around the entire lid, completing the seal.

Keeping Out Insects

Although cans and plastic containers will prevent insects from getting into grain, you must take steps to eliminate any eggs or larvae in the grain before storing it. A simple method is to heat the grain in the oven for 30 minutes at 140°F, which also will help reduce the moisture content. If you're not sure about the accuracy of your oven's thermostat, check it against an oven thermometer; temperatures higher than 140°F can damage the grain.

GRINDING GRAIN

One of the joys of growing your own grain is the ability to grind it as needed. That's just what I recommend: to get the best flavor, grind as you go rather than milling a large quantity in advance.

The piece of equipment you'll need for grinding grains into flour and meal is a home grain mill. Some sources say that you can use

a blender for making flour, but that doesn't really work well. You can make only a coarse meal with particles of uneven size — not a nice fine flour. There are also grain-grinding attachments to stand mixers, as well as a variety of stand-alone mills.

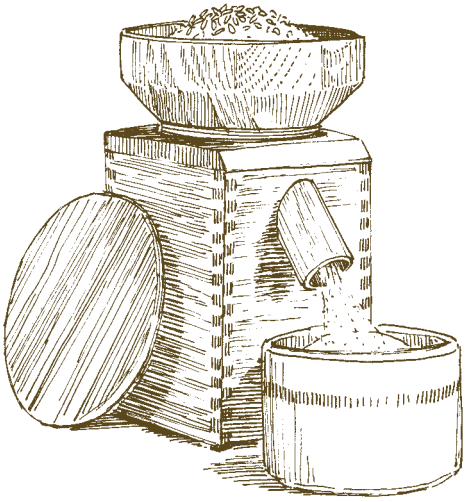
Comparing Grain Mills

Both electric and hand-cranked grinders are available. Buying an inexpensive hand-cranked mill sounds right and romantic — back to nature all the way. But how much flour will you be grinding? Hand grinding is hard work. It takes a long time to grind enough flour for 6 loaves of bread. If you make lots of bread, that's apt to discourage you from baking after the first few tries. But if you need only 2 or 3 cups of flour a week, a hand grinder should be just right for you.

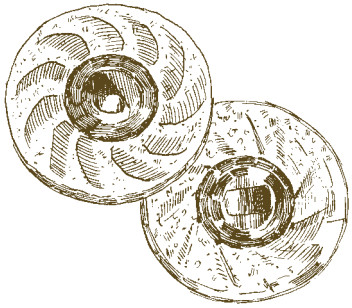
Stone mills

Stone mills consist of two circular stones, one that is stationary and one that revolves. You pour the grain down a chute. As the one stone revolves, it pulls the grain out between the stones, crushing it into flour. The original mills were huge millstones powered by water or animals. The stones in home mills are only about 3 inches in diameter. Both hand-cranked and electric models are available.

Stone mills can be adjusted from cracked grain to fine flour. In fact, of all the mills, they grind the finest flour. The stones stand up to pebbles and other debris in the grain and the mills are very durable. There are some problems with these mills, however: they are large and bulky, and oils in the grain build up and glaze the stones, thus reducing their grinding power. You must clean the stones frequently as well as forgo grinding very oily seeds, such as flax, with them. Hand-cranked and electric models are available.



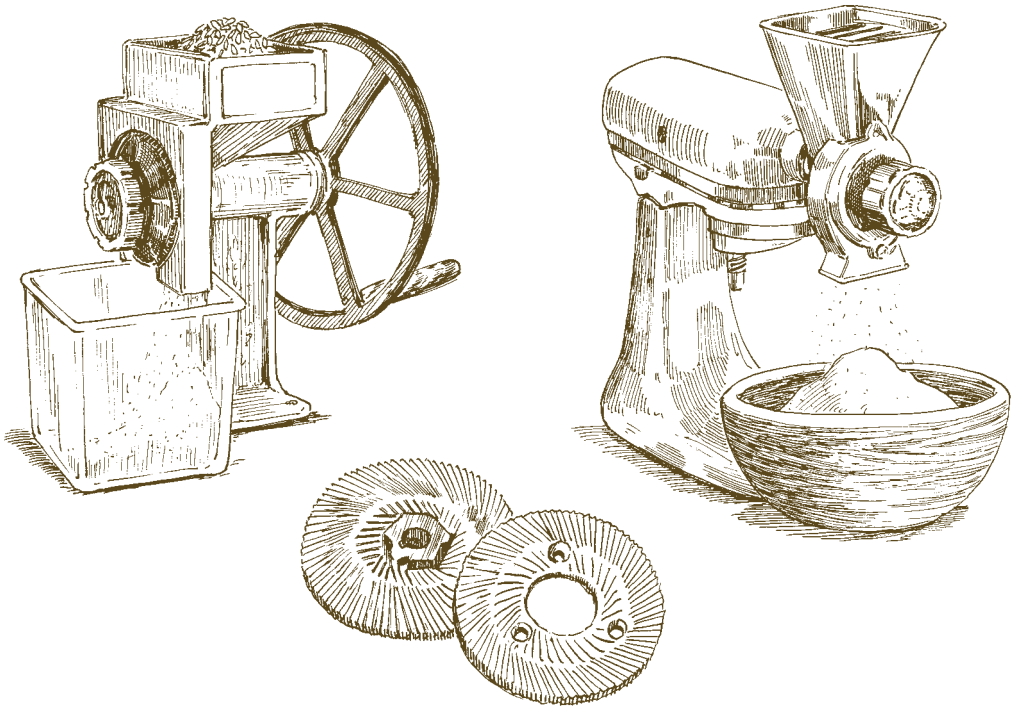
stone mill



stone mill disks

Burr grinders

Burr grinders are similar to stone mills in that they have one stationary wheel and one rotating wheel. The grinding wheels are made



burr mills and burr mill disks

from steel covered in teeth, or burrs. Both dry and oily seeds work well in burr grinders. You can adjust the grind from coarse to fine, but the resulting flour is coarser than that from a stone mill. Hand and electric models are available. Coffee grinders are essentially burr grinders, and some people have been known to grind small amounts of grain in them.

Impact mills

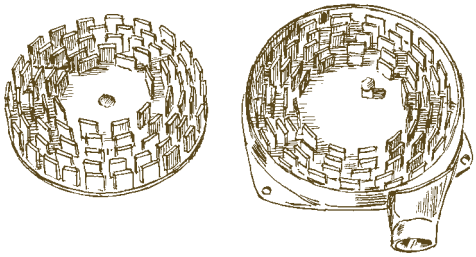
Impact mills don't really grind at all. They toss the grains against rows of blades that spin around at several thousand r.p.m., pulverizing the grain on impact and turning it

impact mill

Shopping for Mills

Which mill you choose depends on your budget, the amount of flour you expect to grind, and even what grains you'll be grinding most often. Here are some questions to ask as you shop for a flour mill:

- **Will it produce the amount of flour you expect to grind in a reasonable amount of time?**
- **Does it grind without overheating the grain?**
- **Is it easy to clean?**
- **Can it be adjusted to grind all the grains you plan to grow into varying degrees of coarseness?**
- **Is it easy to use?**
- **How much space will it take up? Is it portable?**
- **Are replacement parts available if you need them?**
- **Is it manufactured by a reputable company that will honor the warranty?**



impact mill disks

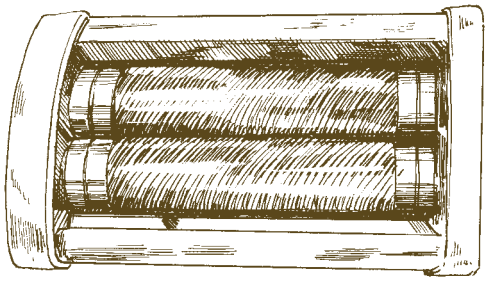
into fine flour. Because the wheels must spin so fast, only electric models are available.

These mills are easy to use, compact, lightweight, and fast. They make very fine flour; newer models can be adjusted from fine to coarse, but they don't make anything coarse enough to call "meal," nor do they crack grain.

Impact mills are noisy. Some of the newer models are advertised as being quieter than earlier versions, but the noise they make is still enough to send a sensitive dog to another room. The blades are fragile and will break if you have missed any small stones or stems in the grain. These mills don't work with grains and seeds that have a high oil or moisture content.

Flakers

Flakers enable you to roll whole grains to varying thicknesses. You can find stand-alone flakers, and some mills come with flaker attachments.



a flaker attachment for a grain mill

SPROUTING GRAIN

Sprouting is something of a cross between cooking and gardening. *Germination* — or sprouting — is the first step in a plant's growth, as well as the first step in making a grain edible without cooking. Typically, sprouts have higher nutritional value than the unsprouted grain.

Although temperatures, soaking, and sprouting time vary from one grain to another, the basic process is the same for most. Soak the grain, drain it, and rinse regularly until the sprouts have emerged. Oats are the exception: these you keep between layers of moist paper towels, dampened daily, until sprouting begins. You can buy all sorts of devices for sprouting, but you don't need them. A Mason jar with cheesecloth across the mouth to allow rinsing and draining works perfectly.

Grains are simple to sprout, using only a Mason jar and a small square of cheesecloth.

Here are the basic directions for sprouting grains, using wheat:

Put ¼ cup of clean, raw wheat berries into a bowl. Pick out any broken kernels, then put the berries in a quart jar. Cover them with 3 cups of warm water. Soak overnight. The next day, fasten a piece of cheesecloth over the mouth of the jar or attach a cap screen (available from natural-food stores and garden catalogs) and pour out the water. The grain may already be showing signs of sprouting.

Hold the jar under gently running warm water to wash the grain. Drain thoroughly. Shake the jar so the grains are scattered along one side, then place it on its side in a warm, dark place.

Take a moment to wash the sprouts at least twice a day. In three or four days, or when they reach the length you want, rinse the sprouts in cold water and refrigerate. Don't let wheat sprouts get too long — not much more than ½ inch. As they grow longer, they develop unappetizing, spidery-looking hair roots.

Incidentally, any grain that naturally germinates in cool soil will continue to grow when refrigerated after sprouting. This is especially true of wheat, so make small batches of sprouts regularly rather than trying to store a large quantity.

Sprouting Grains at a Glance

Grain	Sprouting Time	Sprout Length	Yield
Amaranth	2–4 days	¼ inch	1½ times the amount of seed
Barley	3–5 days	Length of seed	Double the amount of seed
Buckwheat	2–3 days	¼–½ inch	Triple the amount of seed
Corn	2–3 days	½ inch	Double the amount of seed
Millet	2–4 days	¼ inch	Double the amount of seed
Oats*	2–4 days	Length of seed	Double the amount of seed
Quinoa	1–2 days	¼–½ inch	1½ times the amount of seed
Rice, whole brown	2–4 days	Length of seed	Double the amount of seed
Rye	2–4 days	Length of seed	Triple the amount of seed
Spelt	2–3 days	⅛ inch	1½ the the amount of seed
Triticale	3–4 days	½ inch	Four times the amount of seed
Wheat	3–4 days	½ inch	Four times the amount of seed

Don't presoak. Germinate between layers of paper towels. Dampen daily.

Anthony Boutard
Ayers Creek Farm
Gaston, Oregon

If their initial crop had been a disaster, Anthony Boutard says, he might still be a forester. Fortunately, nothing did go wrong the first year that he and his wife, Carol, planted their first shell beans as professional farmers — something he marvels at (because with farming, success is never guaranteed).

"We had a really wonderful year!" he remembers. In fact, it changed their lives. In the almost ten years' worth of growing seasons that have passed since that first planting, their Ayers Creek Farm has blossomed. In addition to maintaining an active clientele of local chefs, the Boutards grow and sell a variety of certified organic beans, specialty grains (whole and ground), berries, squash, and root vegetables that make Ayers Creek a favorite vendor at Portland's Hillsdale Farmers' market. And that's what it's all about for these two farmers: changing people's diets by getting them excited about the quality of the produce and how it's grown, with attentiveness to the soil, and with just enough yield that a small farmer can commit to providing it. The demand for local grains has been substantial, he says.

Anthony, who himself writes with eloquence and enthusiasm about food in various publications, including *Edible Portland,* issues an open invitation for all grain enthusiasts to join a conversation on his blog (see Resources, page 158) that he's been enjoying with other farmers in person for years,

evaluating, among other things, what new varieties each person has successfully grown, and where they've hunted down the seeds. "We get into the esoterica of strange micrograins," he grins. "I like finding a way to make staple foods interesting."

He also contradicts the idea that vegetables are easier to grow than grains. "My okra crops failed every single year," Anthony offers. He keeps trying new crops, though. "Every year we try something new," he says. It's part of his commitment to rotate crops so that the soil's trace minerals are consistently enhanced, not stripped; kelp and other amendments aid this endeavor. He bemoans the reality that much factory-farmed wheat has been grown in the same ground for 40 to 50 years. "It's not the same wheat, nutritionally, that we saw when I was young," Anthony says.

Expensive equipment is, in Anthony's estimation, the biggest challenge for the small farmer — not to mention the substantial government regulations that make otherwise aspiring farmers reluctant to make the investment.

Expensive equipment is, in Anthony's estimation, the biggest challenge for the small farmer — not to mention the substantial government regulations that make otherwise aspiring farmers reluctant to make the investment. "I'm not a tractor person," he admits, though he concedes that when the light and easy little orange Kubota tractors were imported from Japan in the late 1960s, it made the prospect of farming possible for many more people. "We like to work by improving hand efficiency," he says of his farm crew. And they're out working in the fields year-round, through the heavy Oregon winter rains as well as the sun-kissed summers.

For all those who are eager to get started with growing their own grains, popcorn is the "gateway grain," he recommends. The Boutards grow a white variety called 'Amish Butter', among others, and they promise that its dual purpose — served whole, or ground into cornmeal for polenta — make it both delicious and beginner friendly.

BARLEY

Botanical name: ***Hordeum vulgare***
Season: Cool
Yield: 5–24 pounds per 100 square feet
Site: Full sun to light shade; neutral pH
Days to harvest: 60–70
Contains gluten: Yes
Special considerations: More soluble fiber than oats

Barley is a cool-season crop that thrives in northern climates. It has a greater yield, matures earlier, and tolerates drought better than wheat. Best of all, barley is a rich source of beta-glucan soluble fiber, a type of fiber known to reduce cholesterol and blood glucose levels.

The properties that make barley one of man's most widely adapted grains also make it relatively easy to grow in your backyard. As recently as the late 1950s, barley fields were tended by hand, which means that barley is indeed well suited to be a garden crop. At least 300 varieties exist, so you may decide that the most difficult part of growing barley is deciding which one to plant.

TYPES OF BARLEY

Barley varieties fall into several groups: two-row and six-row; bearded, beardless, and hooded; and hulled and hull-less.

Two- and Six-Row Barley

Two- and *six-row* refer to the number of rows of grain in each head. Two-row barley is the older form, although both are several thousand years old. It is grown especially in the Pacific Northwest and northern Great Plains. Six-row barley is more common than two-row and is grown most often in the Upper Midwest and the East.

The number of rows on the head has no bearing on how the grain is used; that is decided mainly by regional preference. For example, in the United States, six-row barley is more often used for malting than two-row varieties, but either of them is fine to malt. And, in fact, in other countries, the two-row varieties are used more often. The main difference between two-row and six-row barley is the amount of protein in the grain. Six-row barley has more, so it is more nutritious.

Barley grains are arranged in two-row or six-row seedheads.

Two- and six-row barleys may be bearded or beardless and hulled or hull-less.

Bearded or Beardless

Bearded barley grains have a 3-inch-long *awn* — or bristle — projecting from the grain; beardless ones do not. In between these two types are hooded barleys, which have a short awn.

The long beard can be irritating and itchy to work around. And if you plan to feed the barley to animals, be aware that they sometimes have trouble with the long awns poking them in the eye. One benefit of bearded barley, though: it seems to repel deer.

Hulled or Hull-less

Most barleys have a hard, inedible hull. Commercial millers remove the hull in a process called pearling, which takes much of the grain's nutritional value with it. Even processing the grain to remove the hull at home removes some nutrients.

For home as well as commercial barley growers, then, the best development has been the introduction of hull-less varieties. The term hull-less is somewhat of a misnomer, though. The grain has hulls, but the hulls are loosely attached and fall off during harvest and threshing. Although sometimes called naked barley, hull-less grains may actually be hooded and have short awns.

There are plain hull-less barleys and then there are *waxy* hull-less barleys. Waxy hull-less varieties contain the highest amounts of the beta-glucan soluble fiber that makes this grain such a nutritional feast.

Barley varieties are either bearded (with a long awn), beardless, or hooded.

Which One Is Best?

The standard mode of operation for choosing a barley variety is to select from among the most common grown in a particular area. Local farmers, Cooperative Extension

Barley around the World

Believed to be the oldest cultivated grain, barley has adapted to virtually every climate and location in the world. In some countries it's a staple. The Japanese grow it in small fields, often following a rice crop, planting the rice in furrows and the barley on the ridges of the furrows. In the United States, about half of all barley grown is used for animal feed (particularly cows and pigs), and another 30 percent is used for malting.

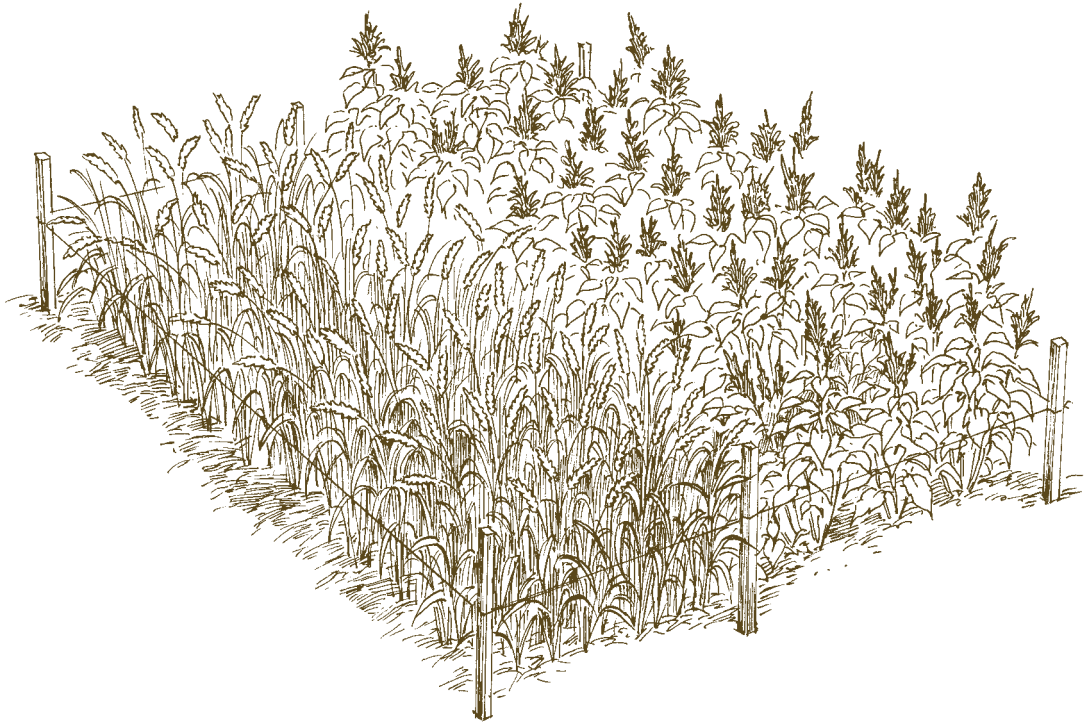
agents, and farm store sales staff can advise you which ones these are. As for which hull-less varieties do best where you live, check with your local Cooperative Extension Service.

GROWING BARLEY

Grow barley in full sun and weed-free, fertile soil that you have worked into good tilth. It will tolerate some shade, so if you are also growing amaranth or another tall crop, barley will be a good companion.

Barley thrives in alkaline soil and is sensitive to low pH (below 6.0). A pH of 7.0 to 8.0 is about right. If you are in doubt about the pH of your soil, send a sample to your Cooperative Extension office for testing. Follow its recommendations for adding lime and other amendments.

If you don't have the soil tested, be wary of mixing nitrogen into the soil. Excess nitrogen encourages plants to grow foliage at the expense of the amount of grain they produce. Just as too much nitrogen results in beautiful tomato plants bearing few fruits and huge carrot tops with tiny roots, it reduces the yield of grain crops.



Barley is best planted in blocks, to choke out competing weeds.

How Much to Plant?

A 1,000-square-foot plot planted with about 2¾ pounds of barley seed will yield 1 bushel of barley. If 1 bushel doesn't sound like much, consider that 1 cup of raw barley cooks up to generously serve 6 people, and that most soup recipes — even ones making big pots of soup — call for only about ⅓ cup of raw barley.

In most areas, barley is planted in spring. It's a cool-season crop and does best in cool climates; however, in Zone 7 and warmer areas, you can sow barley in fall, let it overwinter, then harvest early the next summer. Sow fall plantings three to four weeks before the first frost, giving plants time to put on some growth before cold weather arrives. No matter what time of year you plant, seeds sprout and begin to show green in as few as three or four days if moisture and warmth are adequate.

You can sow the seed in solid blocks, wide rows, or standard rows. Both row and block methods yield about the same, but in blocks the barley will do a better job of choking out weeds. Make the blocks 14 inches wide and space them far enough apart that you can get in to cultivate. Broadcast the seed over the block, either by hand or with a hand-cranked seeder.

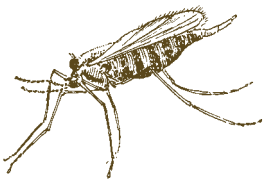
After sowing, go over the area with a rake to scratch the seed into the ground. Avoid covering the seed with more than a skinny inch of soil. Thin the seedlings to 5 inches apart after they're a few inches tall.

Some growers recommend starting the seeds indoors to get a head start on the season. Sow the seed 1 inch deep in flats of potting soil about 10 days before the last frost. Transplant them into your garden when they're 2 to 3 inches tall.

After planting, you shouldn't have to do much to your barley crop except pull weeds and water deeply during dry periods. Stop watering when about 85 percent of the grain is golden, so that it has time to dry before harvest.

Potential Problems

Hessian fly. These long-legged flies, which look a little like mosquitoes, lay their eggs in the veins of barley and wheat leaves. The larvae feed on the leaves and disrupt water and nutrient flow through the plant. If Hessian flies are common in your area, be sure to plant a resistant variety.



Hessian fly

Barley stripe rust. Leaves with barley stripe rust develop yellow stripes dotted with orange pustules. The disease is caused by a fungus that thrives in cool, moist weather. One of the best ways to ward off problems is to plant barley as late in fall or as early in spring as possible. Resistant varieties are also available.

barley stripe rust

Barley yellows. This is a virus that's spread by aphids. Affected plants suffer from stunted growth, yellowed foliage, and decreased yield. Infection tends to be localized to a few plants within the flying range of an aphid, and can be avoided by planting barley as late in the season as possible to avoid early spring damage to young foliage, which is especially harmful to the plant. Regions that are warm enough for aphids to overwinter suffer the most from barley yellows.

Fusarium head blight. Barley and wheat are both susceptible to fusarium head blight, a fungal disease marked by bleached barley spikelets and decreased yield. The disease spreads by spores, and is especially problematic during moist weather. As with most diseases of grains, fusarium head blight can be limited or avoided with proper crop rotation practices.

HARVEST

Winter barley ripens about 60 days after growth begins to show in spring. Spring barley ripens about 70 days after sowing. You'll know barley is ready to harvest when the plant has dried, the seed has gone from light tan to golden, and the grain separates easily from the head.

Test a kernel by denting it with your thumbnail. If the dent remains, the grain is past the milky stage and ready to harvest. Supplement your judgment by consulting with the local Cooperative Extension Service. Or watch to see when local farmers (if there are any) begin their harvests. After your first harvest, you'll be able to devise your own test for readiness.

Ripe barley plants are brown, with grains that are relatively easy to free from their hulls.

Assuming you've planted only a small amount of barley, the easiest — indeed the only — way to harvest is by hand, with a sickle or scythe (see page 24). Cut the grain, bundle it into sheaves, and pile the sheaves into shocks. Leave the shocks in the field for a few days to dry. The grain must be thoroughly dry before threshing.

Threshing

If you are threshing only a small amount of barley, the easiest method is to hold a bundle upside down over a barrel and bang

Testing Readiness

A long-time farmer describes her seat-of-the-pants test for determining when it's time to harvest barley (or any other grain): "I wait till it looks brown, then I break a head off the stalk and rub it around in my hands. If the grain rubs out easily, I bite it. If it bites hard, it's ready."

it against the sides. This is a slow process, however. For handling large quantities, use a flail or a spool thresher. Winnow the grain after threshing.

Removing the Hull

In commercial operations, the hull is removed in a series of steps called *pearling.* The pearler consists of a perforated cylinder containing abrasive revolving disks that grind the hulls, germ, and bran from the kernel. The design of the cylinder keeps the barley turning so the hulls come off uniformly. Millers pearl the barley for a few minutes, transfer it to a screen to sift off the hulls, then repeat the process. After three pearlings, the entire hull and most of the bran will have been removed, leaving what is called pot barley. (It is also sometimes called hulled barley.)

Pearling continues another two or three times to remove all the bran, hull, and most of the embryo or germ. The resulting grain is called pearled barley. Barley flour is collected from the residue of the fourth, fifth, and sixth pearlings; it can also be made by milling the pearled grains.

At home, all you really need is a way to remove enough of the barley hull that the grain will soften after a reasonable amount of cooking. If you don't need more than a few cups at a time, whirling the barley in a blender and then doing a small-scale winnowing with an electric fan or hair dryer is adequate and simple. Roasting the barley beforehand helps loosen the hulls.

The tough, indigestible hull surrounding barley must be removed before the grain can be eaten.

You can also place the barley on a tarp and beat it with a flail. Or run it through a hammer mill with the screen removed, and set at half the normal grinding speed. Store raw hulled barley in an airtight container in the refrigerator for up to six months.

BUYING BARLEY

If you're buying barley instead of growing it, you're likely to come across two types: pot barley and pearled barley.

Pot Barley

Sometimes called hulled barley, pot barley has been processed only enough to remove the inedible hull. It contains the entire germ and endosperm and thus all of the nutrients and fiber of the grain. The grains are tan to light brown and take one to two hours to cook. Soaking them beforehand helps speed up the cooking time.

Pot barley is available at many natural-food stores and some supermarkets, as well as from mail-order catalogs and Internet suppliers. Check with the store manager before buying bulk barley. Some stores don't label bins, and it may be pearled rather than pot barley.

Pearled Barley

Highly refined pearled barley has been scrubbed of its outer layers, leaving only the white endosperm. It is the most readily available form and comes in regular, medium, and fine pearl; regular has been processed the least, fine the most. Pearled barley is the least nutritious form, but it still contains soluble fiber, as the fiber is distributed throughout the kernel and not just in the bran. Other names for pearled barley are "scotch" and "blocked" barley.

If you're hoping to get whole-grain barley in your cereal or other product, you'll need to read the label to make sure that's what you're getting. All barleys, including pearled, may be further processed into kernels or berries, flakes, grits (also called cuts or bits), and flour. Barley grits are cracked barley, more like groats, and not the southern delicacy. Pearled barley may also be made into quick-cooking kernels or flakes.

As you check to see what's available, you'll discover that not all barley looks alike. Its color varies in shades of brown, depending on how completely it's been refined, and it varies considerably in grain size. If pot barley is not available, choose the brownest of the barleys you can find. The browner the grain, the less pearling or hulling it has gone through.

Better than Bread

The most common commercial use for barley is malting. Malted barley may be brewed into scotch, gin, or beer. Commercial beer brewers use specific varieties for malting, but any barley can be malted: it's simply a process of soaking, sprouting, and drying the grain to produce the malt. Malting barley at home is a tricky process, but many resources are available, offering advice, tools, and materials to get you started (see Resources, page 158).

BARLEY IN THE KITCHEN

Barley has a pleasant taste that combines well with stronger flavors. Perhaps the most familiar use for barley is in soups, but it's good in hot casseroles and cold salads, too. Used alone, it makes a nice substitute for potatoes, noodles, and rice. Mixed with other grains and served with a vegetable topping, it's a substantial meal.

Barley flour is often made into flat breads. Or you can substitute it for up to 15 percent of the wheat flour when making yeast breads. The loaf will not rise as high, but it will be more nutritious. People with wheat allergies sometimes use barley flour as a wheat substitute; barley contains gluten, however — the substance that gives wheat flour its stretchy elasticity and causes the allergic reactions. If you have a flour mill, you can grind your own flour. Unless you are buying the mill to grind other grains as well, however, you may be better off buying the flour, as you are not apt to use it in large enough quantities to pay for the mill.

Hungarian Barley-Bean Stew

This is one of the most delicious of barley dishes I've come across. The idea for it came from a recipe Margaret and Ancel Keys included in their cookbook, The Benevolent Bean. *In its original form, it turned out too gooey for my tastes, so I fooled around to get something more to my liking.*

- 2 cups cooked (tender, but not falling apart) great northern beans (about 1 cup dry)
- 3 cups liquid from cooking beans or water
- ½ cup pearled barley
- 1 carrot, chopped
- 1 small tomato, chopped
- 1 turnip, peeled and chopped
- ½ green pepper, chopped
- 1 heaping teaspoon paprika
- ½ teaspoon salt
- 1 small kielbasa sausage
- Extra water as needed

Put the cooked beans into a kettle with the bean liquid. Bring to a boil and gradually stir in the barley. Lower the heat and simmer gently while you add the carrot, tomato, turnip, and pepper. Add the paprika and salt, cover the pan, and continue simmering until the barley is nearly tender, adding water if necessary to keep the mixture soupy. The total cooking time for the barley should be no more than 45 minutes. It probably won't be completely tender by then, but that's all right.

Preheat the oven to 350°F. Cut the kielbasa into chunks, slitting the casing lengthwise as well. Lightly brown the sausage in a skillet and drain off all fat. Pour the barley-bean mixture into a baking dish, top with the browned sausage, and bake, covered, in the preheated oven for 30 minutes.

About 10 minutes before the baking time is up, check the casserole to see if you want more liquid. This depends on how moist you like your casseroles, but both barley and beans have an astonishing ability to absorb water long after you'd expect them to. Add water if necessary.

Yield: 6 generous servings

Scotch Broth

If you're looking for "the authentic recipe," there's no such thing as Scotch broth. As with borscht, there are nearly as many recipes as there are pots of soup. The only ingredients standard in Scotch broth are lamb and barley, so adjust the ingredients to suit your idiosyncrasies and invent yet another recipe for scotch broth.

- 2 pounds or more lamb shanks or neck bones
- 1 tablespoon oil
- 8 to 10 cups water
- 2 carrots, diced
- 2 turnips, diced
- 1 large onion, chopped
- ¼ cup pearled barley
- 1 tablespoon tomato paste
- 1 teaspoon salt

Remove any visible fat from the lamb, then brown the meat in the oil in a deep kettle. If the shanks or neck bones don't seem to have a lot of meat on them, feel free to use more than 2 pounds. After browning the meat, pour off the oil and add enough hot water to cover the meat. Bring to a boil, lower heat, and cover the pot. Simmer 2 to 3 hours, or until the meat is very tender. Cool, then refrigerate until the fat rises to the top and is firm enough to lift off.

Pick the meat from the bones and cut any large pieces into bite-size ones. Return to the heat, bring to a simmer again, and add the carrots, turnips, onion, barley, tomato paste, and salt. Simmer gently for about an hour, until the barley is done.

If you prefer crisp soup vegetables, don't add them until about 20 minutes before the barley should be tender. If the soup seems too thick, add water; if it seems too soupy, simmer with the lid off for a while.

Yield: 6–8 servings

Barley-Vegetable Soup with Beef

This is a good, stick-to-your-ribs soup that can be made early in the day, or even early in the week, and reheated later. It's one of the few recipes that work in a slow cooker as well as on top of the stove without producing a gooey mass of barley.

- **1 pound beef chuck cut into chunks**
- **1 tablespoon butter**
- **1 onion, chopped**
- **2 carrots, chopped**
- **2 celery ribs, chopped**
- **1 bay leaf**
- **½ teaspoon salt**
- **6 cups stock (beef, chicken, or vegetable)**
- **¼ cup tomato puree**
- **⅓ cup raw barley**

Remove as much fat as you can from the beef. Brown the beef in the butter and remove from the pan. Lightly sauté the onion, carrots, and celery in the same fat. Return the meat to the pan and add the bay leaf, salt, stock, and tomato puree. Bring the soup to a boil, gradually stir in the barley, and reduce the heat to low. Tightly cover the pan and cook until the meat and barley are very tender — about 2 hours. (In a slow cooker, cooking time will be 6 to 8 hours on low, and you have to add the barley without bringing all the ingredients to a boil. It helps to use boiling stock if you use this method.)

If the beef seems too fatty to cut away most of it, brown and simmer the meat a day ahead. Refrigerate and then remove the solidified fat. If you proceed this way, pick up the recipe instructions again by sautéing the vegetables in a small amount of butter and simmer everything for only about 1 hour.

Yield: 6–8 servings

Simple Barley Pilaf

This is a simple recipe that can be adapted in a number of different ways to accompany the other dishes you're preparing.

- 1 cup raw barley
- 2 to 3 tablespoons butter or oil
- 2½ to 3 cups hot liquid (water or stock)

Sauté the barley briefly in the butter, stirring until each grain of barley is coated and shows faint signs of browning. Add the hot liquid slowly, bring to a boil, then lower the heat, cover the pan and simmer for about 45 minutes, or until the barley is tender and the moisture is absorbed. If the barley is tender before all the liquid has been used, lift the lid and simmer off the excess moisture before serving.

Yield: 3 cups

Pine Nut–Barley Casserole

This recipe is delicious as is, but feel free to improvise with whatever ingredients you happen to have on hand.

- ½ cup pine nuts
- 6 tablespoons butter
- 1 cup raw barley
- 1 medium onion, chopped
- ⅓ cup chopped parsley
- ¼ cup chopped green onion
- 3½ to 4 cups hot chicken or vegetable stock
- ¼ teaspoon salt

In a heavy skillet, sauté the pine nuts in the butter. Remove them from the pan as soon as they're lightly browned, leaving the butter in the pan to sauté the barley, onion, parsley, and green onion. Mix all the sautéed ingredients in a baking dish and pour 3 cups of the hot stock over the mixture. Add the salt if needed; if you used canned broth you probably won't need it. Bake, uncovered, in a 375°F. oven for about 1 hour and 10 minutes, or until the barley is tender, adding additional stock as necessary.

Yield: 6–8 servings

BUCKWHEAT

Botanical name: ***Fagopyrum esculentum***
Season: Warm
Grain yield: 4–16 pounds per 100 square feet
Site: Full sun; well-drained soil
Days to harvest: 65–90, depending on planting date
Contains gluten: No
Special considerations: Not a cereal grain, but a broadleaf plant, good cover crop

With buckwheat there's no in-between — either you love it or you hate it. Its flavor is the strongest of any of the grains and its color the darkest. Unless you're a fanatic who eats buckwheat cakes regularly, you may not be interested in growing buckwheat for the little flour you'll use. The plant is such a wonderful green manure crop, however, that you might see the grain as a secondary benefit that comes with improved soil.

Unlike other cereal grains, which are members of the grass family (Poaceae), buckwheat is actually more closely related to rhubarb, and is a member of (wouldn't you know it?) the buckwheat family (Polygonaceae). Not all members of this family are upstanding garden citizens, though, including wild buckwheat (see page 52).

Fortunately, buckwheat grows quickly, choking out weeds. Its roots scavenge phosphorus from the soil, increasing the availability of this soil nutrient for the crops that follow. The roots also help improve soil tilth, loosening clay soil and creating better growing conditions.

The seeds contain about as much protein as other grains, but unlike other grains, the protein is high quality and contains all the amino acids. Seeds are a good source of lysine, B vitamins, phosphorus, magnesium, iron, copper, manganese, zinc, and linoleic acid. Buckwheat is also a source of rutin, which is said to keep blood vessels and capillaries healthy and flexible.

The flowers are wind- and insect-pollinated. Plants begin to bloom about three weeks after planting and continue to bloom for at least 30 days. Beekeepers, especially, appreciate the long bloom period. The resulting honey is dark and as strongly flavored as the flour, not to everyone's taste.

GROWING BUCKWHEAT

Buckwheat grows best in warm weather, full sun, and light — sandy or loamy — well-drained soil. The site needs to be only moderately fertile, and, in fact, it can be relatively infertile. Bypass spots where drainage is poor and water puddles. Buckwheat plants do better in acid soil than do other grain crops, tolerating a pH as low as 5.5. They'll also take some drought.

Because buckwheat tolerates poor soil, farmers often sow it where nothing else will grow, with the hope of getting at least some return from their land. Agronomists, however, say this is a bad practice. As do all other plants, buckwheat takes nutrients from the soil as it grows. If you harvest a crop without tilling the residue back in afterward, you deplete the soil even further.

Timing Planting

If you're growing buckwheat as a green manure, plant it anytime from spring to late summer. As a grain crop, though, knowing when to plant is a little tricky. The plants are not frost tolerant, so you have to take care not to plant too early or too late in the season. Soil must be warm for seed to germinate, and plants grow and develop best in warm weather. Best flowering and seed set, on the other hand, occur during cool periods or when at least nights are cool, such as in late summer. In hot weather, flowers wither and fall off without setting seed.

The goal, then, is to plant buckwheat late enough that the period when its flowers mature and form seeds doesn't occur during the hottest part of the summer but early enough for the plants to set seed to mature before the first frost kills them. As a general rule, sow seed two to three months before the average fall frost date. The later you plant, the faster the crop produces and matures.

In the North, buckwheat is typically planted in early summer and takes 11 to 12 weeks to mature. Farther south, you can plant it following wheat or spring vegetables in midsummer; there, it needs only 9 to 10 weeks to mature. In regions where days are hot and nights are cool, such as the High Plains and low mountain valleys, planting dates are more flexible.

Planting

Prepare a firm, moist seedbed as you would for any other garden crop. Work the soil just before planting, incorporating any amendments called for in the soil test (see page 13). The bed must be weed-free before planting because even though buckwheat crowds out germinating weeds, it doesn't compete well with already established weeds.

Sow the seed at the rate of about a quarter-pound per 100 square feet, and rake it in ¾ to 2 inches deep afterward. Plants rapidly grow 2 to 3 feet tall, depending on when you plant and soil fertility. Plants are shorter when sown late or are growing in poor soil. Individual plants are pretty scrawny, but as a group they cover the ground. In full bloom, they're quite a sight.

Buckwheat should not be planted in rich soil, because it will lodge (fall over).

Water as deeply as needed. Plants will wilt in the heat of the day, but usually recover overnight, so wait until plants are wilted in the morning before you water. Buckwheat has few insect or disease problems, so no worries there. If soil is overly rich, the plants may lodge (fall over), which will make harvest more difficult.

HARVEST

To check on the ripeness of the seeds, strip them off the stalk with your hands. The three-sided, beechnut-shaped seeds are brown to black when ripe and will readily drop into your hands when it's time to harvest.

Buckwheat has indeterminate flowers, which means they continue to develop and bloom at the same time that seeds at the bottom of the inflorescence are setting and ripening. That can make it tricky to know just when you should harvest. One rule of thumb is to harvest when 75 percent of the seeds are ripe. The seeds are considered ripe when they are brown.

Buckwheat Varieties

Just a few varieties of buckwheat exist. Two are found in the consumer market: Mancan and Manor. Seed catalogs rarely list buckwheat by variety name, however. Rather, they sell common buckwheat or Japanese buckwheat.

Beware of wild buckwheat (*Polygonum convolvulus*), an annual twining vine that can be as problematic as is bindweed. Although a distant relative of common buckwheat, it offers none of the family's good traits.

Buckwheat is ready to harvest when three-quarters of the seeds are ripe.

If birds and strong winds aren't bothering your crop too much, you can leave the harvest until a week or so before the usual first-frost date in your area without worrying about how much of the seed is ripe. Don't wait until after the first frost, though. Frost kills the plants, causing them to lodge and seed heads to shatter (dropping the seed to the ground before you have a chance to thresh it).

Figure on harvesting about 33 pounds per 1,000 square feet in a good year; the first year, as you are learning how to grow buckwheat, you may harvest only half that amount. Use a sickle or scythe to cut the plants. Because the seed heads shatter easily, try to harvest on a damp day or in the early morning, when dew is still on the stalks. Tie the harvested stalks into bundles and pile them in shocks to dry. Leave them in the field until the foliage is brown and has lost most of its moisture. Then gently put the bundles into a cart or wagon to haul them in for threshing. Don't bring grain inside right after cutting because the stalks will be green and moist. The piles could heat up and cause spontaneous combustion.

Threshing

Grains fall freely from the heads as you thresh buckwheat. Hold the bundles upside down over a large barrel and bang the heads against the sides of the barrel. Later, you can dump the straw back on the garden for mulch; it rots faster than oat or wheat straw, and chickens delight in hunting through the straw for seeds.

Winnow the seeds to remove bits of chaff and dirt. Because you'll probably use only small quantities at a time, you can winnow by pouring the grain from one container to another in a stiff wind or in front of an electric fan. Hand-pick any bits of chaff that remain.

Store the grain in a clean, airtight container in a cool, dry area. The oil in the grain will become rancid if it's stored in warm spots or exposed to air.

USES

The most common use for buckwheat is as flour. You can make pancakes, biscuits, crêpes, soba noodles, and many other baked delicacies with the flour. For yeast breads, substitute buckwheat flour for up to 20 percent of the wheat flour. Buckwheat contains no gluten, so using more than that results in a flat loaf.

Whole buckwheat seeds (called groats) can be sprouted and eaten fresh. Or simmer the groats in broth to make an Eastern European porridge called kasha, add them to soups, or steam them as you would rice. Toasting the seeds in oil before cooking with them moderates the flavor, making them a bit milder and nuttier.

Buckwheat seeds are covered with an inedible hull. If you plan to cook with the whole seeds, you'll need to remove the hull beforehand. You can accomplish this by cracking the grain in a blender or food processor and picking out the bitter hulls, or run them through a huller (see the plans on page 99).

For flour, the seeds need not be hulled before grinding, but the flour will be very dark and full flavored. And you'll have to sift the flour afterward to remove large pieces of hull. If standard sifters aren't fine enough to remove as much of the hull as you want, try working the flour through a fine-mesh sieve with a wooden spoon. This is tedious, but if you need only a cup or two at a time, it will go quickly. Grind flour shortly before using it or store small amounts in an airtight container in the refrigerator.

One note of caution: Some people are allergic to buckwheat. If you've never tried buckwheat, start with just a sample to see if you react negatively to it.

Although buckwheat groats need to be hulled before they're cooked whole, the hull can be left on for grinding into flour.

BUYING BUCKWHEAT

Whole-grain buckwheat is difficult to find unless you know someone who grows it, but groats and flour are readily available. Most natural-food stores, as well as many supermarkets, carry a variety of good-quality buckwheat products. As with any grain, buy from markets that rapidly turn over stock and keep the flour in a cool place.

As you shop around, you'll find that the flour varies from a grayish white to almost black, depending on how much of the hull has been left in. The darker the color, the more roughage will be in the flour and the stronger the flour's flavor.

Commercial groats may be chopped fine, medium, or coarse. About the only difference among the different grinds is cooking time.

BUCKWHEAT IN THE KITCHEN

Buckwheat is often used in pancakes, and the flour can be included in other bread recipes, to which it adds a distinctive flavor. Buckwheat pancakes, along with lots of maple syrup and breakfast sausage, were a favorite food of early Americans. Many people still think that's the best way to enjoy buckwheat. Another major use is as groats or kasha, common in Middle Eastern, Jewish, and Russian cooking.

Simple Buckwheat Pancakes

These take breakfast to another level of flavor!

- 1 cup buckwheat flour
- 1 cup unbleached white flour
- 1 tablespoon baking powder
- 1 teaspoon salt
- ¼ cup honey
- 2 cups milk
- 2 eggs
- ⅓ cup oil

Sift together the buckwheat, white flour, baking powder, and salt. In a separate bowl, beat together the honey, milk, eggs, and oil. Pour the liquid mixture into the dry ingredients and stir gently just until everything is mixed, but do not try to beat out all the lumps.

Bake the pancakes on a lightly greased, medium-hot griddle, turning once when bubbles begin to appear on the unbaked side.

Yield: 4–6 servings

Kasha

This is the traditional method for cooking buckwheat groats.

- 1 tablespoon oil
- 1½ cups buckwheat groats
- 1 egg, beaten
- 2½ cups boiling water
- 1 teaspoon salt

Use just enough of the oil to skim a fine layer on the bottom of the pan. Mix the groats and egg in the pan over low heat until the grains are all separate and coated with egg. Add the water and salt, cover, and simmer over low heat for 15 minutes. If all the water has not been absorbed, remove the lid for a few minutes longer.

Yield: 6–8 servings

Buckwheat Pretzels

These pretzels passed the toughest taste test you can devise — the "teenage approval" test. The batch makes between 8 and 12 pretzels, depending on how large you make them. Two teenage girls can finish them off before the pretzels have had a chance to cool.

- 1 package active dry yeast
- 1 teaspoon sugar
- 1¼ cups warm water (90°–105°F)
- 4 cups unbleached white flour
- ½ cup buckwheat flour
- 1 egg
- 2 tablespoons cold water
- Coarse salt

Dissolve the yeast and sugar in the warm water and allow the mixture to stand until it begins to bubble, about 20 minutes. Beat in 2½ cups of the unbleached white flour and continue beating until the batter becomes stretchy and shiny. Then beat in the buckwheat flour. When well mixed, knead in as much of the remaining white flour as it takes to make a dough you can handle. Cover it with a damp cloth for 15 minutes, then knead the dough until it is smooth and elastic. Place the kneaded dough in a greased bowl, cover with a damp cloth, and allow to stand in a warm spot until doubled in bulk.

Lightly grease a baking sheet. Punch down the dough and cut it into 10 equal pieces. Cover them and allow them to rest for about 10 minutes, to make them easier to handle, then roll each piece into a long rope. Shape each into a pretzel form on a lightly greased baking sheet.

Beat together the egg and cold water and use it to brush each pretzel before the next rise. Sprinkle coarse salt onto the moist egg wash. Kosher salt works well, as does "margarita salt," sold in the gourmet section of some supermarkets. The egg wash makes the salt stick to the pretzels.

Allow the pretzels to rise again on the baking sheet until double in bulk. In a warm room this will take about as long as it takes to preheat the oven to 475°F. Bake for about 10 minutes, until the pretzels are lightly brown but still slightly soft.

Buckwheat pretzels are best served warm, and they taste especially good with a squirt of mild mustard.

Yield: 10 pretzels

Buckwheat Pilaf

This pilaf makes a nice bed for a piece of baked salmon or chicken.

- 2 tablespoons oil or butter
- ½ cup buckwheat groats
- ¼ cup chopped celery
- ¼ cup chopped onion
- 2 tablespoons chopped green pepper
- 1⅓ cup hot chicken stock
- 1 to 2 tablespoons soy sauce

In a large skillet, heat the oil over high heat. Stir in the groats and continue stirring rapidly until they begin to brown slightly. Add the celery, onion, and green pepper and keep stirring until all the vegetables are soft.

Lower the heat if necessary to prevent burning. Slowly add the hot stock, reduce the heat, cover the pan, and simmer for 15 minutes. If all the moisture has not been absorbed, finish the cooking with the lid off. Season with soy sauce to taste.

Groats prepared this way are good with vegetables sautéed Chinese style.

Yield: 4 servings

Buckwheat Bread with Whole Wheat

The flavor of this bread is unusual and pleasing; try it even if you're not fond of buckwheat in other ways. It's delicious served with a spread of cream cheese and chopped dates.

- 1 package active dry yeast
- ¼ cup warm water (90°–105°F)
- 1 tablespoon honey
- 2 cups warm water
- 3 tablespoons oil
- 6 tablespoons honey
- 2 teaspoons salt
- 4 cups whole-wheat flour
- ½ cup nonfat powdered milk
- 1 cup buckwheat flour

Dissolve the yeast in the ¼ cup of water with the 1 tablespoon of honey. Allow to stand until frothy, then add the rest of the water, the oil, and the rest of the of honey. Stir in the salt. Add the whole-wheat flour, about a cup at a time, beating with a wooden spoon. Keep beating until the batter comes away from the side of the bowl in long strings and is shiny and elastic. (This happens faster if you allow the batter to stand for about 10 minutes after the initial mixing.)

Beat in the powdered milk and the buckwheat flour and continue beating until all the ingredients are thoroughly combined. (It sounds like a lot of beating, but because you don't knead this bread, you're still ahead in time.)

Spread the batter into two well-greased loaf pans, 9×5-inch or even a little smaller. This batter will not rise as much as dough made from mostly white flour, and if you use too big a pan, the loaves will come out flat.

Cover the pans and allow to stand in a warm place for about an hour, or until the loaves have nearly doubled in bulk.

Preheat the oven to 400°F, then bake for 45 minutes. Buckwheat burns easily, so if, near the end of the baking time, the tops of the loaves seem to be getting too dark, lay a piece of aluminum foil loosely over them.

Cool the bread uncovered on wire racks for the crunchiest crust.

Yield: 2 loaves

Glenn Roberts
Anson Mills
Columbia, South Carolina

Glenn Roberts' obsession with grains began with a search for the perfect, creamy bowl of freshly ground grits his mother remembered from her childhood in South Carolina. Neither mother nor son knew if the mineral-rich variety of mill corn once used to make those flavorful grits even existed anymore. If it could still be found, he reasoned, it seemed unacceptable not to try to taste it for himself, share it with others, and save it from obscurity — or worse, extinction.

This quest transformed Roberts from an architect specializing in historic restoration to a champion of sustainable heirloom grain horticulture. He spent the mid-1990s delving into local archives, recipe collections, and church registries, not to mention engaging in plenty of back-road meanderings in his car, hunting for heirloom grains on country lots. Eventually, his efforts paid off. A single family of one-time bootleggers had been growing Roberts' corn — 'Carolina Gourdseed White' — since the 1800s. The discovery, followed by the acquisition of a warehouse, storage freezers, and four granite mills, birthed Roberts' creation of Anson Mills. Today, Anson Mills sells similarly revived varieties of heirloom grits, cornmeal, polenta, wheat flour, rice, farro, oats, buckwheat, and peas — all cold-milled, which

is an important step in preserving the flavor of the grain. The recipes provided on the company's web site (see Resources, page 158) are culled from Roberts' legion of historic cookbooks.

His encyclopedic knowledge of antebellum food practices, offered with enthusiasm, leaves listeners both fascinated and hungry. He speaks with admiration of the Native Americans, and their ability to cultivate nutrient-rich soil, partially through crop rotation, to enhance the land that supported them. ("Native Americans," he says, "didn't carry around mushroom compost saying, 'Look, we're organic'.") They also knew how to make the most of difficult sites, planting the grains in widely spaced crop clusters to mitigate the wind's affect on the tall shafts of the plants.

What's his motivation for tirelessly advocating cooking with heirloom grains? "It's easy — I love to eat!"

For those who are just getting started, Roberts has a few words of advice. "If you have to grow corn," says Roberts, who himself just *has* to grow corn, even though it requires more water and nutrients than other grains do, "think about how to make the land support that. Grow peas or buckwheat first to prepare the soil," he urges, pointing out that these plants are able to fix nitrogen in the soil. Though crops fail even for skilled farmers, he encourages all grain growers to learn from each success and to use sustainable growing methods.

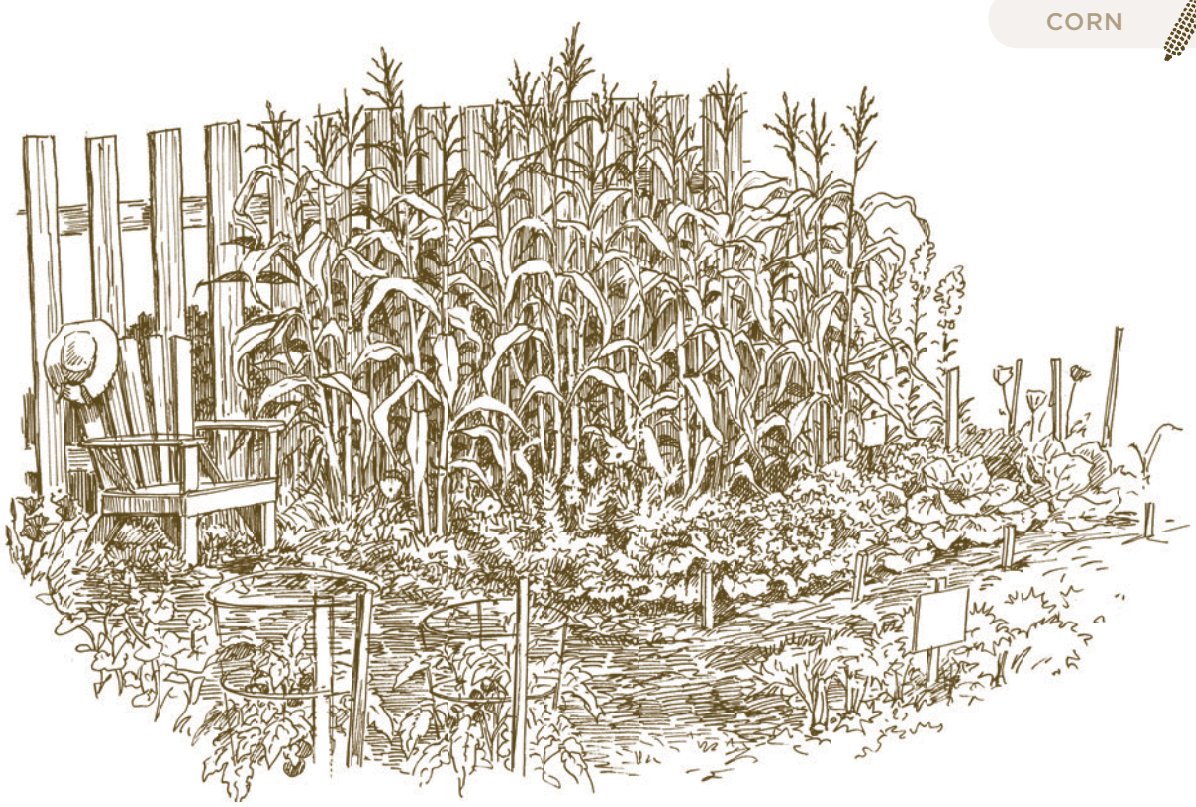
For Roberts, sustainability is key. He now works with dozens of local farmers in the Southeast who strive to preserve America's heritage through its cereal crops, and with geneticists who work to classify and archive rediscovered varieties of grain. Part of this work led him to co-found the Carolina Gold Rice Foundation, a nonprofit organization that's devoted to furthering the sustainable production of Carolina Gold Rice and raising public awareness about historic rice lands and heirloom agriculture.

What's his motivation for tirelessly advocating cooking with heirloom grains? "It's easy — I love to eat!" confesses Glenn Roberts. "And I've eaten better than anyone else the whole time I've been doing this." Protect it, Roberts encourages — by contacting seed exchanges to begin growing yourself, supporting local farmers who want to bring new tastes to your table, or by starting your own obsessive hunts for the forgotten (and fantastic) ingredients of your forefathers' best meals.

"It's great food. It's good for the soul."

CHAPTER FOUR

CORN



Botanical name: *Zea mays*

Yield: approximately 10 dozen ears per 100 foot row

Site: Full sun; warm, fertile soil

Days to harvest: 75–110, depending on variety and use

Special considerations: Corn is a heavy feeder; it requires rich soil and a high-nitrogen fertilizer.

Some people have a vegetable garden just so they can eat the freshest, sweetest ears of corn. Even though supermarkets now sell extra-sweet varieties that keep their flavor for days in the fridge, there's still nothing like the sweet, corny taste of homegrown corn.

You can experience that same rush of flavor in winter by drying and storing kernels from your homegrown ears, then grinding them into cornmeal just before baking. Cornmeal will not only send your taste buds over the moon, but will also feed your body with all the nutrients and fiber of the whole kernel, the stuff commercial processors remove so their product can stand on store shelves for months.

Corn is one of the easiest crops for a backyard gardener to grow. It's as simple as letting the corn you grow for fresh eating dry on the plant. Its long history in home vegetable gardens means you'll find plenty of advice on growing and harvesting your crop, even when the people offering their help have not used it as a grain.

TYPES OF CORN

Several kinds of corn are available, among them flint, dent or field, flour, and sweet. Which one is best for your backyard depends on how you plan to use the corn.

Sweet

Only sweet corn is suitable for eating fresh off the cob. Its kernels consist of a thin, tender seed coat over a soft, starchy interior that contains as much as 10 percent sugar. Although most of the focus for sweet corn is on fresh eating, you can dry the ears and grind them into meal.

The sugar in sweet corn starts to break down into starch as soon as you harvest the ears. For the best flavor, you must eat the corn within a few hours of picking. Because of this limitation, corn breeders have developed sugar-enhanced varieties, which are very sweet and tender, and super-sweet varieties, which are sweeter still. They stay sweeter longer, but their sugars eventually turn to starch, just as with regular sweet corn. And some people dismiss them, saying their flavor isn't corny enough.

Sweet-corn kernels may be white, yellow, or mixed white and yellow. The plants grow tall but are shorter than the other types of corn, and so need less room to grow.

Shoepeg. The kernels of this old-fashioned sweet corn are irregularly arranged rather than lined up in rows.

Most of the sweet-corn varieties on the market are hybrids, and every year new ones come out. However, you can find open-pollinated sweet corn as well as standard varieties (see Hybrids vs. Open-Pollinated, below). The designation (*su*) is often used to denote a standard sweet corn. You see (*se*) for sugary enhanced varieties and (*sh2*) for super-sweet varieties; both types are

Hybrids vs. Open-Pollinated

- **Hybrids are created by crossing and recrossing two or more varieties of corn. It's a well-controlled process that results in plants with specific qualities. For example, breeders may aim to create varieties that yield a specified amount, stand up to diseases and insects, ripen at a certain time, or have strong stalks that resist lodging.**
- **Open-pollinated varieties occur naturally, without human intervention.**
- **Generally, hybrids are sweeter, yield better, and resist disease and pests (except for raccoons) better. The ears are more uniform in size and they mature at the same time. Open-pollinated corn will have more of a corn flavor.**
- **Hybrids are a poor choice when you want to save some kernels to sow for next year's crop. Because they have so many parents, there's no telling what, if anything, will sprout from saved-over hybrid seed. For sure, it won't be anything like the corn that produced the saved seed.**

Corn types are generally classified according to how they'll be used. From left to right are: sweet corn, blue flour, shoepeg (a type of sweet corn), flint, and dent.

hybrids. Other hybrids may be noted as *F1* or *F2*, or the word *hybrid* may be buried in the description.

Flour

Like sweet corn, the kernels of flour corn have a thin outer covering over a soft-starch interior, but they offer no hint of sweetness. Grind the kernels into a fine flour for baking. There are blue and white varieties; most are open pollinated.

Dent

Also called field corn, yellow dent is the type of corn grown on most farms today, destined for use as animal feed; for processing into industrial products, such as ethanol, biodegradable plastic, and absorbent materials used in disposable diapers; and to make high-fructose corn syrup.

The kernels, which may be yellow or white, are only 4 percent sugar so it's unlikely that you'll detect any hint of sweetness. They

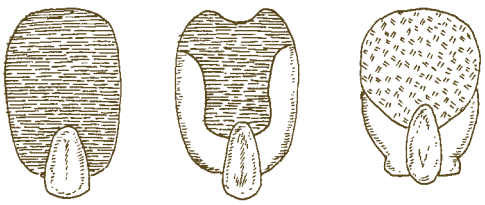
have a hard, flinty outside and a soft, starchy interior. Because the two starches dry at different rates, a groove forms at the top of the seed, hence the name dent.

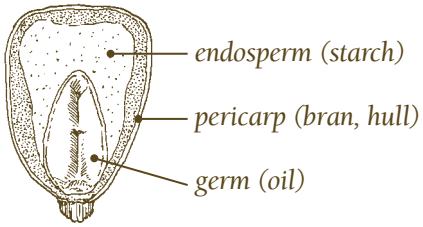
Industrial uses aside, dent corn nourished native populations from North to Central America for thousands of years; it is still an important dietary crop around the world. Grind the kernels into cornmeal and grits, roast the ears, or soak them in lye to make hominy. Most of the corn varieties planted on farms today are hybrids; old-fashioned, open-pollinated varieties are easy to find for your backyard garden.

Flint

This ancient corn is rock-hard inside and out. Its colorful ears may be red, black, brown, russet, blue, orange, white, or yellow or a combination of these colors. Most people are familiar with flint corn through its decorative ears, which are sold as "Indian corn." The dried kernels of flint corn store better than other types and have greater insect resistance while in storage.

Although flint corn is grown for industrial uses and animal feed, like dent it is an original food of the Americas. It grinds into a gritty flour, which is used to make tortillas and polenta.





A cross section of different kernels shows the differences among the three main types of corn (flour, dent, and sweet) and how much starch they contain.

Local growers may sell flint corn as "grinding corn," which you can use as seed for your crop or to grind. Chances are it will grow well in your geographic area. You can save the best ears you harvest to sow for next year's crop, as it is not a hybrid corn.

Popcorn. Popcorn is a type of flint corn. As the kernels are heated, steam builds, held in by the hard outer coating, until the kernels burst open. You can also grind popcorn into a meal.

How to Choose?

If you are interested mostly in growing corn for fresh eating and want to try grinding a few ears, grow sweet corn and allow a few ears to dry on the plant. If you strictly want grain to grind, try dent, flint, or flour corn.

Numerous varieties of each type of corn are on the market. You'll have the best luck with ones that thrive in the growing conditions where you live. Your local Cooperative Extension Service will advise you as to which ones these are, as can local corn growers. Also talk with seed suppliers who deal mainly in heirloom and native seeds; they are passionate about their crops and offer firsthand knowledge of the plants.

GROWING CORN

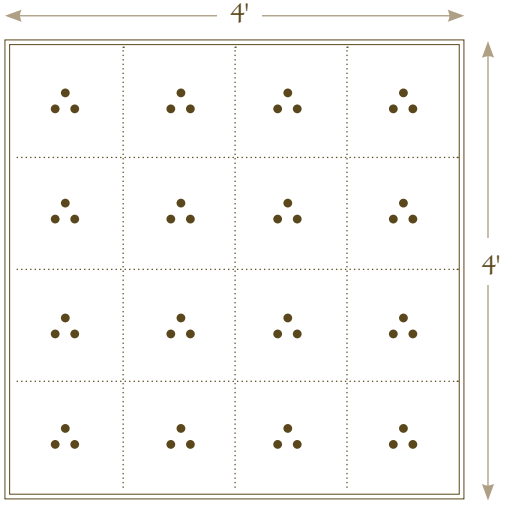
Plant corn in a spot with full sun and rich, fertile soil with a pH around 6.0; corn will tolerate a pH between 5.5 and 7.0. Because corn is a heavy feeder, mix organic matter into the soil before planting. As the organic matter breaks down, it releases nitrogen to the plants. More important, it improves the soil's tilth. Both help increase yield.

Before going to work on the soil, however, have your soil tested to find out just what it needs to support corn. Test results will tell you which nutrients are lacking and suggest amendments to mix in to improve fertility and bring the soil pH into line.

Corn seeds need warmth to germinate, so wait until all danger of frost is past and soil temperatures are at least 60°F before you plant. Corn seed germinates best when soil temperatures are between 60° and 95°F. Planting earlier in hopes of getting an early harvest wastes energy and seed; corn seed rots in cold soil, and even if the seed lasts until the ground is warm enough, germination will be spotty.

Sow the seeds 1 to 2 inches deep in rows or in blocks. In rows, place 3 seeds every 12 inches. The rows can be as long as you want, but you'll need to plant 4 rows for hybrid varieties and 5 or 6 rows for open-pollinated corn. If planted in one long row, not all of the kernels will be pollinated, so the ears will have gaps. When sowing, say, 100 feet of corn, plant it in four 25-foot-long rows. If you plan to weed and cultivate by hand or with a push-type cultivator, space the rows 24 to 30 inches apart. If you plan to cultivate the rows with a garden tractor or rotary tiller, space the rows according to the size of your machine.

Block planting accomplishes the same goal, but squeezes plants closer together so that you get the same yield from a smaller area. Mark a 4-foot by 4-foot square into 1-foot-square blocks, then sow three or four seeds in each square. For 100 feet of corn, you'll need twelve or thirteen 4-foot squares spaced 24 to 30 inches apart, or as far apart as needed to fit your tractor or tiller. You can butt the ends of each square together to make two wide rows or leave space around all sides of each square.



Planting corn in a block often increases overall yield; when individual plants grow and mature in close proximity, they can pollinate each other easily.

Whichever planting option you choose, walk the length of the row to tamp the kernels firmly into the soil after sowing. Thin the seedlings to one plant per foot when they are 4 to 6 inches tall.

Keep Down Weeds

Once the corn is up and growing, your next job is weed control. If you started with a clean plot, this should take only a little hoeing, tilling, or hand-weeding. Clean up the bed even if weeds aren't actually threatening to choke out the young plants, as weeds deplete the soil of nutrients and moisture. With some crops — lettuce and tomatoes, for instance — a few weeds don't matter as long as they don't actually overpower the crop, but because corn is such a greedy feeder, it resents any competition.

Corn has *buttress roots* (also called prop roots) that grow near the soil surface and help keep the plant upright, so cultivate shallowly if using a hoe or tiller. Work the soil no more than 1 inch deep to avoid disturbing the roots.

Wind Pollination

Corn is pollinated by the wind, and the different types and varieties readily cross-pollinate. This can result in poor-quality ears with dull flavor. If you plan to grow more than one kind of corn, select varieties that mature at least 14 days apart. These bloom at different times, so they have little chance of crossing with each other. You can also separate the different varieties, keeping them at least 250 feet apart.

The pollen from male flowers, at the top of the plant, falls and pollinates the female flowers, where the ear itself will begin to grow. Each strand of corn silk in an ear will form a kernel of corn if it's pollinated.

Instead of cultivating to control weeds, you can mulch with spoiled hay, straw, or other organic matter. Plant the corn as usual, then lightly scatter an inch of mulch over the row. After the seeds germinate and the corn is at least 6 inches tall, add 3 or 4 more inches of mulch.

Some gardeners sow annual rye between the rows to control weeds and enrich the soil. Another option is to place a 5- or 6-inch layer of mulch along the rows at planting.

Fertilize

Because corn is such a heavy feeder, it requires plenty of nitrogen to yield well. If you tested the soil before planting, the results will have given you recommendations about what and how much to use. If you didn't test, a general recommendation is to apply 4½ pounds of 5-10-5 fertilizer per 100 square feet of corn. Mix the fertilizer with compost and scatter it across the rows.

Do not plant corn in the same spot every year. Its heavy appetite takes a lot out of the soil. Farmers often rotate corn with alfalfa, which adds nitrogen to the soil as it grows. You can get a similar effect in your garden by planting peas or beans where corn grew the year before. Like alfalfa, the peas and beans replenish the soil, so you can sow corn the following year.

Water

For best results, corn must grow steadily from the time the seeds sprout till the ears mature. Drought will interrupt this consistent growth. If you routinely need to water your flower gardens, be prepared to do the same for the corn. Water deeply, applying 1 to 2 inches per week. Mulching and good organic content keep soil moist longer, so you may need to water only every two weeks or so.

In areas where watering is not usually necessary, a short dry spell probably won't hurt your corn, especially if you've conditioned the soil with lots of organic matter. If the weather is unusually dry, the most critical time to water is when the ears are filling out.

Something's Fishy

Every elementary school child has heard the story of Indians teaching colonists to fertilize by burying a fish in each planting hole. One account estimates that adding fish increased the yield about threefold. If you live near a good fishing hole, try planting a few rows this way and see why the system worked so well. If you do try this method, be sure to keep your dog out of the planting until the fish has decayed. Manure will do pretty much the same fertilizing job for you with fewer complications.

Dealing with Pests

Corn has several pests to keep you on your toes, including corn earworms, corn borers, wireworms, smut, birds, deer, and raccoons.

Corn Earworms

Corn earworms, the larvae of a moth, feed on ears, tassels, and leaves. *Frass*, a sawdustlike material, at the tip of an ear is a clue to their presence. Apply *Bacillus thuringiensis* (Bt) to help control them. Although their feeding is disfiguring, it doesn't destroy the ear. Cut off damaged areas.

Corn Borers

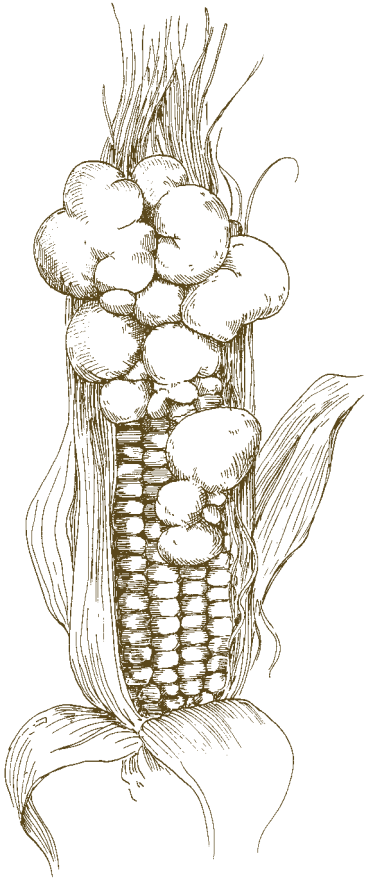
Corn borers, larvae from another caterpillar, tunnel inside the cornstalk to feed. They plug the plant's vascular system and reduce the strength of the stalk. After harvest, clean up the garden to eliminate places where the borers hide out over winter: the old stalks and weeds. Chop up the debris with the lawn mower, then till it into the soil. Corn borer–resistant varieties are available.

Wireworms

Wireworms can be a problem in new gardens carved out of grassy areas and where the soil has a high organic content. They feed on germinating seeds and small seedlings and bore into roots, stunting a plant's growth. Because they are especially attracted to carrots, you can use those as a trap. Bury carrots every 2 to 3 feet along the rows. Check the carrots every two or three days, knock off and smash the wireworms, then rebury or replace the carrot.

Blight or Delight?

In Iowa, it's a blight. In Mexico, it's a delicacy. Corn smut, also known by the more elegant Spanish term *huitlacoche,* is a fungus that colonizes individual kernels of corn and in their place produces large mushroomlike galls. To enjoy *huitlacoche,* harvest galls before they're fully mature (while they're still tender and before spores have begun to develop) and cook them as you would any mushroom. To prevent the spread of corn smut, collect and destroy any infected ears before they develop spores. Blight or delight — the choice is yours.



In the United States, corn smut is an undesirable fungus that affects corn crops. In Mexico, however, it's considered a delicacy.

Corn Smut

Corn smut forms large galls on corn plants. It's a disease caused by a fungus (*Ustilago maydis*) that enters through wounds on a plant. Hail, nicks with the hoe, and insect feeding give the fungus the opening it needs. The galls can occur anywhere on a plant but grow particularly large on the ears. Remove and destroy any affected plants; the fungal spores can survive in soil for many years, so don't just throw the plants on the compost pile.

A small electric fence is the best way to keep critters like raccoons out of the corn patch.

Animal Pests

Birds, deer, and raccoons think corn is as tasty as you do. The only way to prevent their damage is to keep them out of the garden. Birds hit early, pulling up seedlings. To prevent this, run two strings the length of each row, a few inches apart and a few inches above the ground. Put the string in place right after you have planted the corn. Birds also will eat kernels as they ripen; at this stage, about the only way to keep them out is to cover the rows with netting, which is not practical.

Use an electric fence to keep raccoons out of the corn patch. For deer, an 8-foot-tall fence around the garden should work. The fence should be at least 3 feet from the crop so the deer can't simply reach in to eat.

HARVEST

The corn you plan to grind must be dry when you store it; otherwise it will mold. You can do as farmers do and leave the corn standing where it was planted until the stalks are dead and the kernels have dried and shrunk on the cobs. You'll know when the corn is dry enough because the kernels will shell easily, and as they come off the cob, small flakes from the cob will drop into your hand. Although when storage space is short, farmers sometimes leave corn in the field on their stalks until well into the winter, you probably don't want to follow their lead. The snow and freezing won't harm the corn, but blackbirds, squirrels, and blue jays steal the grain.

To harvest corn, simply snap the ears off the stalks. Husk the ears as you go along, leaving the husks in the garden to till into the soil later, or toss the ears into a container to husk later. Dried husks are sharp and hard on your hands, so wearing gloves is a good idea. Some seed houses and farm stores sell husking pegs. These tools fit into the palm of the hand; they have a sharp protruding point for cutting and opening the husk. Husking pegs speed the job, but they are a nasty weapon that should be kept away from children and used cautiously.

Where the climate is rainy and humid, it's better to harvest the corn and bring it inside

How to Tell When Sweet Corn Is Ripe

For fresh eating, sweet corn will be ready to harvest 70 to 110 days after planting. Estimates on days to maturity found in the seed catalogs are just that — estimates. Because moisture, heat, and soil conditions can speed up or delay the corn's development, make sure it's ready before picking. When the silk is brown and dry, pull down a strip of the husk to see whether the kernels are filled out and plump. Press a kernel with your thumbnail. If a milky fluid flows out, the corn is ripe. Watery liquid means the corn is not ready. The corn has passed its prime if you see little moisture. Let these ears continue to dry to harvest for grain.

to dry. Start harvesting when the kernels are past the milky stage and the husks have turned from green to tan. Shuck the ears and bring them inside to dry in a warm, airy spot spread out in a single layer.

If you grew up reciting John Whitcomb Riley's "when the frost is on the punkin and the fodder's in the shock," you may want to try the old method of bundling cut cornstalks into shocks tied with baling twine to leave standing in the fields until you want the corn. Although some Amish farmers still use this method and it sounds romantic and looks pretty, there's not a lot more to be said for it. Cutting the stalks is backbreaking. You use a corn knife — a heavy, sharp knife much like a machete or a cane knife — and you have to bend with each cutting stroke to chop the stalks close to the ground. This strains your back in one of the most vulnerable positions. If that movement doesn't get you, bending again to lift the stalks into bundles probably will.

Storing the Harvest

Start by getting the storage area ready. Clean it as thoroughly as possible, especially if you have stored grain in the same spot before. Some old-timers insist that weevil infestations in stored corn come more from the residue of previous years' grain than from the new crop. Once you've picked, husked, and brought in the corn, you can store it on the ear or shelled.

On the Ear

For small amounts of corn, the most simple and decorative way to store it is to string the ears whole. Remove a few husks, strip back the rest from the ear, and then braid them. Hang the braid in a dry spot where rodents can't get to the ears.

Drying Corn for Storage

Pick fully mature sweet corn. After husking, immerse the ears in boiling water for 3 minutes. Drain, then plunge them into ice water for 3 minutes. This process sets the milk in the kernels and keeps the corn from fermenting or smelling as it dries.

Cut the corn from the cobs and spread it onto large flat pans or baking sheets. Place these in an oven at the lowest setting, or in a food dehydrator, or in a protected spot in the sun. Stir occasionally as the corn dries. In the oven, it will be a matter of hours (don't let the kernels become overly brown from the heat). If you're using the dehydrator, follow the times given in the instructions. If you dry the corn outside, place it under a tin roof and bring all the trays inside every afternoon before the sun goes down so the evening dew won't dampen the kernels.

You'll know the corn is dried when it has become very hard and has turned orange-brown color. When the corn is dried and cool, store it in an airtight container in a cool, dry place. It will keep almost indefinitely.

If you have the room, you can store larger amounts of whole ears in net slings hung from the rafters in the attic. You'll probably have to make the slings yourself, unless you're lucky enough to find net bags used for storing onions. To make the slings, buy strong nylon trellis, which is sold in most garden shops and seed catalogs, and cut and sew it into bags. With strong nylon twine, sew the seams. Make the slings small enough that the weight of the corn doesn't strain them to the breaking point.

Store shelled corn in an airtight container, such as a galvanized metal garbage can or a new, clean, food-grade 5-gallon plastic can. Choose a size that you can still move when it is full; the larger they get, the more strenuous it is to move them when they're full.

If you're storing where the corn will be exposed to temperature changes, don't use plastic containers. Plastic cracks in very cold weather, especially if it has gone through many temperature changes. You may not notice the cracks right away, but the bugs will.

Shelled Kernels

When dealing with large amounts of corn, save space by shelling it before you store it. Several gadgets are available to do the job. One is a toothed metal cylinder you push over and down the ear to cut off the kernels. The other is a crank sheller, which has a hopper in which you place the ear.

Milling

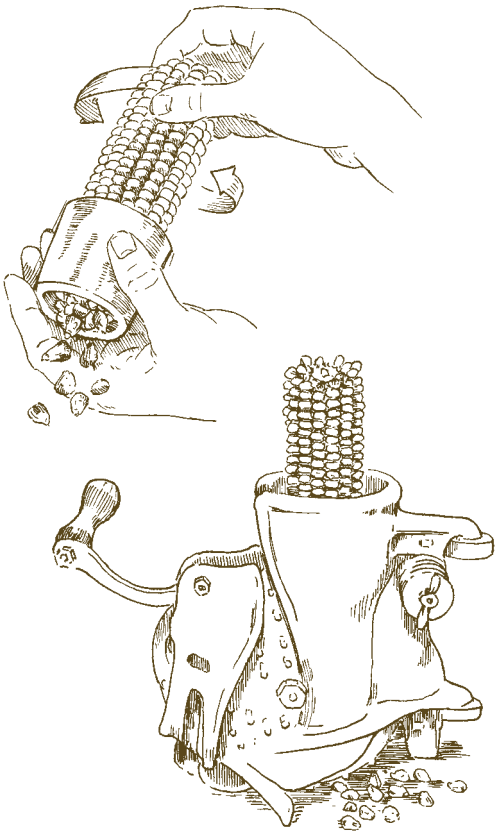
Grind corn into meal just before you plan to use it. Like any other grain, corn keeps better in its whole state and is highly perishable after grinding. Once ground, the fat in the

Harvesting Popcorn

Handle popcorn as you would any other corn. Some varieties take nearly four months to mature, so pay close attention to the seeds' number of days to maturity when you buy it.

Harvest popcorn when the kernels are hard and dry. Shell and store them in airtight containers in a cold place, such as the refrigerator or freezer. Some people store popcorn on the ear until they're ready to use it. This is not a good idea because the corn almost inevitably gets too dry. Dry corn doesn't pop well, as it's moisture expanding in the kernel that makes the corn pop.

When you find lots of *widows* (unpopped kernels) in your popped corn, the corn is probably too dry. Add a tablespoon of water to a quart jar of popcorn and let it sit for a few days to



Although they can also be removed by hand, kernels of dried corn are easiest to remove from the cob using a hand sheller or a crank sheller.

germ starts to go rancid. How fast that happens depends on the temperature at which you store the meal. Cornmeal will keep for several months in an airtight package in the freezer. Stored in a cupboard at 85°F in midsummer, it may last less than two weeks.

If you have a home flour mill, the best way to get good flavor and nutrition is to grind small batches at a time, keeping only a few cupfuls in storage in the refrigerator for quick use.

BUYING CORN

If you're not able to grow corn, you can still grind your own. Whole dried corn is available from many catalog and Internet sources. And if they know you're coming, local truck farmers will pick corn at the right stage to dry.

You should also be able to find freshly ground cornmeal at natural-food stores. Talk to the manager about what the store buys and how quickly it sells. Consider it a good sign if you find the cornmeal refrigerated.

Non-chain groceries sometimes buy cornmeal from local millers. If you find some early in the season, it should be fresh. But don't buy bags in May that look as though they've been on the shelf since November; they probably have.

The best test of quality of the meal is to taste a bit. If it's fresh, it will taste raw and definitely corny but not strong; if it's stale, it will taste bitter and sometimes even rancid.

CORN IN THE KITCHEN

Native Americans knew how to make the most of fresh corn. The women built fires at the edge of the cornfields, set kettles of water to boil, and then picked the corn, which they husked and tossed into the boiling water at

Varieties of Corn

Type	Description	Days to Maturity	Uses
Dent			
Oxacan Green	Emerald green kernels	95	Decoration, grinding
Earth Tones	Muted earth colors: gold, green, orange, pink, blue	100	Decoration, grinding
Nothstine	Yellow kernels with white tips, dries early	100	Sweet, flavorful cornmeal
Flour			
Painted Mountain	Yellow, black, orange, red	85	Decoration, grinding, fresh eating, roasting/ parching, hominy
Mandan Bride	Red, yellow, black, white	92	Flour or hominy
Flint			
Blue Hopi	Smooth blue kernels; blue cornmeal	70–110	Flour
Sweet			
Double Standard	Old-fashioned sweet bicolor, yellow and white	73	Fresh eating or drying
Whiteout	Tender, white, sweet kernels	74	Fresh eating or drying
Silver Queen	Late, white sweet kernels on long, tapered ears	91	Fresh eating or drying
Sugar Buns	Early, yellow, sweet; remains tender on the stalk for up to two weeks	70	Fresh eating or drying
Popcorn			
Miniature Blue	Dark, slate blue	105	Popping or decoration
Japanese Hull-less	White, tender	85–110	Popping
Strawberry	Small, red kernels	100	Popping
Robust	Orange	112	Popping

once. They knew from experience that as much as 90 percent of the sugar in older varieties of sweet corn changes to starch in the first few hours after picking. Although the newer varieties of super-sweets retain their fresh flavor longer, it's still a good idea to cook and eat corn as quickly as possible after it's been harvested.

Cooks differ on whether it's better to steam the corn in a small amount of water or to boil it in a large kettleful. We don't expect to settle the argument, but do prefer the full pot of water because the corn cooks more quickly and evenly.

Roasting Ears

Although roasting corn in its husks over hot coals sounds neat when you read about the Camp Fire kids doing it, in reality the results are often disappointing, producing ears that are burnt on one side and raw on the other. Done right, it's delicious. The following method works well:

Open the husks enough to remove most of the silk from the ears, then pull the husks back up around the ears and soak them in cold water for about an hour before putting them on a grate close to the coals. Roast for about an hour, turning frequently. The water that has accumulated in and under the husks will steam the kernels and help the corn cook evenly. If the corn you're using has a bit of age on it, soak it in milk rather than water before roasting.

Using Fresh Cornmeal

The number of dishes you can create with cornmeal boggles the mind. If you've been indifferent to it until now, it's probably because you've had only the store-bought degermed kind, which has a texture like beach sand and not much more taste. When you grind your own cornmeal, or buy it fresh and still containing the germ, it has a fluffy consistency and a sweet-corny taste utterly unlike anything you've tasted before.

Use your home flour mill to grind corn. Although you sometimes hear that a blender will do the job, the resulting meal is coarse and irregular.

To double the variety of cornmeal recipes, try toasting the meal lightly by stirring it over low heat in a heavy skillet or heating it on the lowest setting on a baking sheet in the oven, stirring often, just until it begins to turn color. All recipes taste quite different made with toasted cornmeal. Because toasting removes moisture from the meal, you often have to increase the wet

Parched Corn

Try something different with dried corn: parch it. Parching softens the hard dried kernel, turning it into a sweet, nutty-tasting, nutritious snack.

Dried flour corn is the best for parching — especially varieties with red or purple kernels. Flint corn varieties will be too hard to eat even after parching.

To parch, put a handful of shelled, dried corn in a lightly greased skillet over low heat. Stir occasionally until the kernels turn uniformly brown, about 5 minutes. Moisture in the kernels will make them swell and occasionally pop. Take care not to overcook or burn the kernels.

ingredients in recipes. Just relax and add a little milk or water until you have your usual consistency.

Corn Bread

This recipe is based on one once used at the Moosewood Restaurant in New York, whose cooking and recipes have probably done more to spread enthusiasm for whole foods than any other single effort. The difference is that this one uses whole-wheat flour and cornmeal; Moosewood's uses unbleached white flour. The whole-wheat flour produces a darker corn bread. White whole-wheat flour will make a lighter, more delicate cornbread. If you'd prefer yours to be pale, substitute an equal amount of unbleached white flour for the whole-wheat.

- 1 cup cornmeal
- 1 cup whole-wheat flour
- 2 teaspoons baking powder
- ½ teaspoon baking soda
- ½ teaspoon salt
- ¼ cup honey
- 1 cup buttermilk
- 1 egg
- 3 tablespoons melted butter

Sift together the cornmeal, flour, baking powder, baking soda, and salt. In a separate bowl, beat the honey, buttermilk, egg, and butter. Be thorough but don't overmix or the corn bread will be tough.

Preheat the oven to 425°F.

Spread the batter in a greased 8-inch square pan and bake for about 20 minutes.

Yield: 8 generous servings

Polenta

You could call polenta "Italian mush." The recipe looks much like that for mush, except that you use more water in proportion to the amount of cornmeal and you cook polenta for up to an hour, rather than the short time it takes

Popping Corn

Old-time recipes often say "Wet the popcorn" as the first step to popping it. If your corn isn't popping into full, tender puffs, it's probably too dry. To add moisture to the kernels, spread the corn on a wet towel, roll up the towel, and let it stand for several hours.

A hot-air popper is ideal for popping corn without fat, but you can make popcorn in any heavy skillet with a lid.

For the best results, skim the bottom of the pan with oil and let it heat. When the oil is almost smoking, add the popcorn in a layer about one kernel deep. It's better to make two batches than to overcrowd the pan. Shake the covered pan over high heat, occasionally tilting the lid to let out steam. About ¼ cup raw popcorn makes about 4 cups of popped corn.

for mush. The result is fine and creamy, quite different from ordinary mush.

- 5 cups water
- 1 teaspoon salt
- 1 cup coarse cornmeal

Bring the water to a rolling boil, then add the salt. Begin stirring the water with a whisk while with your other hand you gradually sprinkle in the cornmeal. As soon as all the meal is incorporated, lower the heat; keep stirring. When you have the heat adjusted so that the polenta is simmering gently, switch to a wooden spoon for stirring. Plan other chores close to the stove so you can reach over to stir the polenta often. Ideally, you'd stir constantly, but who would even attempt a recipe instructing you to stir anything constantly for an hour? So stir often, for about an hour, or until the polenta is very thick.

Italians traditionally pour polenta onto a large wood slab, make indentations with a big spoon, and pour marinara sauce over the indentations. Then the family gathers around the table and eats from the common board. If this is a bit folksy for your taste, pour the polenta into a greased pie plate, pour some sauce over the top, and cut wedges for everyone. Serve with cheese and more sauce from a side dish.

Leftover polenta can be fried like mush and served with syrup or jam for breakfast. This is so good that it's worth making extra polenta at dinner, especially if you just happen to have a jar of homemade strawberry preserves.

Yield: 6 servings

Corn Fritters

These fritters are baked on a griddle like hotcakes and are a good way to use leftover cooked corn.

- 12 ears corn, cooked (or about 2 cups leftover corn)
- 1 cup milk
- ¼ cup nonfat dry milk, unreconstituted
- 1 tablespoon melted butter
- ½ teaspoon salt
- Dash freshly ground black pepper
- Flour
- 2 teaspoons baking powder
- 1 teaspoon sugar
- 3 eggs, beaten

If you are using fresh corn, cut down the center of each row with a sharp knife, then scrape out the kernels with the back of a table knife. If you are using leftover corn, buzz it briefly in the blender or put it through the coarse setting on a food grinder.

Preheat your griddle.

Mix the corn with the milk and the dry milk, stirring until no lumps remain. Stir in the butter, salt, and pepper. Sprinkle a tablespoon of flour over the top and stir it in.

Continue adding flour, a tablespoon at a time, until you have a batter that is thin but will hold up when poured onto a griddle. Mix together the baking powder, sugar, and eggs, then add to the batter and mix in well.

Drop by large spoonfuls onto a hot, lightly greased griddle. Brown first on one side, then the other.

If you find your batter too thin, stir in a little more flour; if it's too thick, add a spoonful or two of milk.

These fritters are very filling served with molasses or maple syrup.

Yield: 4–6 servings

Cornmeal Dumplings

Try these tasty dumplings with chicken stew for a comforting midwinter treat.

- ¾ cup unbleached white flour
- ½ cup cornmeal
- 1½ teaspoons baking powder
- ½ teaspoon salt
- ½ cup milk
- 2 tablespoons melted butter

When the stew with which you intend to serve these dumplings is about done, sift together the flour, cornmeal, baking powder, and salt. Lightly stir in the milk and butter, mixing just until the dry ingredients are moistened. Drop the batter by spoonfuls onto the top of the bubbling stew. Cover and steam (without lifting the lid) over medium heat for 15 minutes.

Note: When prepared this way, the broth of the stew will take on some of the flour and meal from the dumplings, which will make it cloudy. If you prefer, you can steam the dumplings separately by dropping them into gently simmering water and then transferring them into the stew after cooking them for 15 minutes.

Johnnycakes

These johnnycakes are delicious — tested on a kitchen full of kids and received with rave reviews.

- 1½ cups cornmeal
- ⅓ cup whole-wheat flour
- 1 teaspoon baking powder
- 1 teaspoon baking soda
- ½ teaspoon salt
- 2 cups milk
- 2 eggs, beaten
- 2 tablespoons maple syrup
- 2 tablespoons melted butter

Preheat your griddle.

Sift together the cornmeal, whole-wheat flour, powder, baking soda, and salt. In a different bowl, mix the milk, eggs, syrup, and butter. Stir into the dry ingredients. Mix well, but don't beat hard.

Pour ¼ cup batter at a time onto a medium hot, lightly greased griddle and bake until the edges begin to dry and bubbles appear on the top, then turn to bake the other side. Watch these carefully, as the maple syrup in them burns easily.

Yield: 6 servings

Variation: Indian Cakes

Use the recipe for Johnnycakes but substitute 3 tablespoons of dark molasses for the maple syrup. These have a robust flavor that's welcoming on cold winter days.

Spoon Bread

We think of spoon bread as southern, and southerners traditionally make it with white cornmeal. However, it is even tastier made with yellow meal. Think of spoon bread as a cornmeal soufflé and you'll have no trouble understanding how to make it.

3 cups cold milk
1 cup cornmeal
3 eggs, separated
2 tablespoons melted butter
1 tablespoon baking powder
1 teaspoon salt

Mix together 2 cups of the milk and the cornmeal in a saucepan, and bring to a low simmer. Cook, stirring often, until the milk is absorbed. Cool the mixture slightly.

Preheat the oven to 350°F. Beat the egg yolks with the remaining milk, and the butter, baking powder, and salt. Beat the egg whites until stiff but not dry; set aside. Mix the liquid combination into the milk and cornmeal gradually, stirring with a whisk to prevent lumps. When all is smoothly combined, gently fold in the whipped egg whites and pour the batter into an ungreased, 2-quart casserole. Bake for 45 minutes, or until set but still slightly moist. Don't overbake and dry it out.

The protein value in this spoon bread is high because of the combination of milk, eggs, and corn. Served with a tomato salad, this makes a complete supper.

Yield: 6 servings

Dutch Corn Casserole

This is a Pennsylvania Dutch dish, so simple and so good that you automatically think of it for Sunday night supper.

4 cups cooked or canned tomatoes
1 cup corn, fresh or frozen
2 slices stale bread, torn into small pieces
1 tablespoon sugar
1 tablespoon butter
Salt and freshly ground black pepper
4 to 6 eggs

Heat the tomatoes to boiling and pour them into a 6-cup casserole. Mix in the corn, bread, and sugar. Dot the top with butter and sprinkle lightly with salt and pepper.

Preheat the oven to 350°F. Break 4 to 6 eggs, depending on how many people you want to feed, onto the top of the tomatoes and bake, uncovered, until the casserole is bubbling and the eggs are set. Serve at once.

Yield: 4–6 servings

Jennifer Greene
Windborne Farm CSA
Scotts Valley, California

HEIRLOOM GRAINS ARE APTLY NAMED — they're colorful, personal treasures, just like a beloved quilt made by an ancient relative and passed down through the generations, says Jennifer Greene. Through Windborne Farm, her community-supported agriculture (CSA) farm in northern California, Greene has attracted a local following of enthusiasts who are all too happy to invest in what she produces, especially because hers is one of the few CSAs in the country that focuses on grains.

After an apprenticeship with Live Power Farm in Mendocino County, Greene founded the farm that she still runs almost entirely on her own. Approximately 110 CSA members (who generally pay up front to help the farm defray the costs of operation) share the risk should crops fail. More importantly, they also share the bounty of a constantly evolving offering of fresh, stone-ground flours, hot cereal and pancake mixes, dried beans and corn, seeds, and whole grains. (Whenever she's able, Greene tucks a tried-and-true recipe or two into her monthly bundles.) Through trial

and error, Greene determined that this size community is about the most that she can sustain without requiring additional help. Preferring to work her own land and her own mill rather than manage hired employees, her intention is to take on only as much work as she can do herself. And the work is plentiful.

Aided only by a small tractor and her two draft horses, Odin and Thor (named after Norse gods), efficiency of labor is no small consideration: one significant reason why grains particularly attracted her. Unlike other crops, grains don't require frequent harvesting, and they store well once harvested. This leaves Greene the time she needs for milling her grains — some 15,000 pounds every year — before delivery to her CSA members. (When you have a mill, she notes, one crop can be processed in several different ways, adding exponential value to each yield.)

Sometimes her subscribers will bring in pages torn out of the Seed Savers Exchange catalog ("There's a lot of interest in non-wheats these days," she says), excitedly lobbying for her to grow a new heirloom variety that they're curious about. Greene constantly tests new varieties of beans and grains — generally whatever suits her whim.

Never one to choose the conventional route, Greene says that grains also seemed a "more creative choice than vegetables."

"You don't have to get too complicated when you're farming grains," she says. Take two or three trial years to grow a variety of grains, is her advice: "See what works best where you are!" (Buckwheat and grain amaranth, Greene says, tend to be very productive.) She and her CSA members dare each other to test new things. Even if they're initially wary, "pretty soon, they like it. And they want more of it." Greene says of her CSA's collective reception to new tastes.

Indeed, part of the challenge of developing such a specialized CSA is finding non-commercial subscribers who can make use of the 15 or so pounds of flour, beans and corn each month. (They are avid bakers, all.) So, in fact, is Greene, whose wood-fired oven frequently produces freshly baked artisanal loaves of bread. Never one to choose the conventional route, Greene says that grains also seemed "a more creative choice than vegetables." She also benefits from the added bonus of how beautiful the fields are as they grow out each season.

HEIRLOOM GRAINS

Emmer farro, spelt, einkorn, amaranth, and quinoa are some of the most nutritious grains ever grown. And they nearly disappeared before anyone really understood how great they are.

Amaranth and quinoa were wiped out when the Spanish conquered the New World. Some resources suggest these grains were targeted because the Aztecs, Maya, and Inca used them in religious ceremonies. Others say that the Spanish were unfamiliar with the grains and replaced them with more "civilized" crops such as barley and potatoes. The unfortunate result: The native population began to suffer from malnutrition and high infant mortality. Luckily, the plants also grew wild and some specimens managed to escape eradication.

Emmer farro, spelt, and einkorn are the ancestors of modern-day wheat, crossing naturally in the wild and deliberately by breeders. Farmers grew them through the early 1900s, but they fell out of favor as agricultural techniques became more industrialized. Modern wheat is higher yielding, more pest-resistant, and faster maturing; in addition, emmer, spelt, and einkorn are covered grains, meaning the kernels are encased in hulls, which makes them more difficult to clean.

All five grains are making a comeback as people discover their nutritional superiority. For example, quinoa has 60 percent more protein than wheat, barley, corn, and rice and is rich in B vitamins, vitamin E, iron, phosphorus, potassium, magnesium, copper, manganese, zinc, and calcium. The grain's protein is complete because it comprises all the amino acids; it is also higher in lysine than is wheat. Quinoa contains no gluten.

Amaranth has the highest lysine content of any other grain. Most of its other nutrient levels are on a par with quinoa, but it is higher in calcium, iron, magnesium, phosphorus, potassium, manganese, niacin, and vitamin B6. Like quinoa, it is gluten-free.

The nutritional values of emmer farro, spelt, and einkorn are similar to that of wheat. However, these grains are higher in protein, iron, phosphorus, zinc, and copper.

Although the grains are making a comeback, they're still minor crops in this age of industrial agriculture. You'll find them mixed into a few cereals on store shelves; some are sold separately in natural-food stores. The best way to ensure a reliable source for the grains is to grow them yourself.

AMARANTH

Botanical name: *Amaranthus hypochondriacus, A. cruentus,* or *A. caudatus*

Season: Warm

Grain yield: 10–15 pounds per 100 ft.²

Site: Moderately fertile, well-drained soil; full sun

Gluten: No

Special considerations: Very tall, but because they're so productive, you'll need only a few plants

Native to the Americas, amaranth is often as pretty as it is productive. Plants may have gold, red, maroon, or green foliage topped with large, feathery, colorful *inflorescences* (flowers).

Three species are grown for their grain. *Amaranthus hypochondriacus* is the most common. It originated with the Aztecs, who called it *huahtli* and used it in religious practices as well as for food. *A. cruentus,* which originated in Mexico, is the next most common. *A. caudatus,* from the Andean valleys, is better known in this country by its common name "love-lies-bleeding"; it was once a popular garden flower. You'll run across a third species in catalogs, *A. tricolor.* This amaranth is strictly ornamental, so if you're growing for grain, pass up this one.

Amaranth is a not a typical grain plant. Rather than a grass, it is a tall, 6- to 9-foot broadleaf plant. Its leaves can be steam-cooked, as you would spinach. (Leaves have a milder flavor and contain less oxalic acid, which keeps the body from using calcium efficiently, than spinach.) The seeds may be used whole, flaked, or ground into a high-protein flour. In South America, popped seeds are a popular street-vendor snack.

The tiny grains are about the size of celery seed and have a peppery taste. They tend to be gritty, and so while they can be used whole in porridge, the porridge is not all that

pleasant to eat. White-seeded cultivars have better flavor and texture than black-seeded cultivars.

Growing Amaranth

Amaranth is a warm-weather crop, flourishing in full sun and warm, humid climates. Although fertile, well-drained soil is best, amaranth is adaptable to nearly any type of soil and can tolerate a pH between 6.0 and 7.5.

Seeds need warmth to germinate so wait till soil temperatures are at least 65°F to sow them in the garden. Late May to early June is ideal in most regions. The seedlings have trouble breaking through crusted soil, so prepare the soil well to make a fine, moist seedbed.

In areas with short seasons, start the seeds indoors in flats under lights and transplant them to the garden when all danger of frost is past.

In the garden, plant the seeds ¼ to ½ inch deep and 1 to 2 inches apart in rows 30 inches apart. When seedlings reach 3 to 6 inches tall, thin them to 8 to 12 inches apart. At this spacing, the plants will shade the soil and reduce the need for weeding.

Keep soil moist until seeds germinate. Once seedlings have settled in, amaranth can get by on natural rainfall; the plants are quite drought tolerant. Fertilize lightly; too much nitrogen causes plants to grow overly tall, so they tend to lodge more. Weed regularly.

Harvest

Amaranth should be ready to harvest about three months after planting. You'll know the grain is ripe when seeds fall from the heads as you shake the plants or rub the flowers between your hands.

In addition to producing seeds, young amaranth plants also produce edible foliage. The leaves are best when harvested young.

Because the plant is continuously in bloom from June to frost, the grain doesn't ripen all at once. Start checking the plants when about two-thirds of the seed head is mature. If you wait till all of the seed is ripe, much of it will shatter before you get to it.

You can remove the seed right in the garden. Just hold the heads over a container and rub the seeds into it. In this way, you can leave the plant in the garden to be tilled under. Winnow as you would wheat, using a

screen and wind or air to blow off the chaff. Make sure the grain is completely dry before you store it to prevent mold from growing.

Amaranth in the Kitchen

Amaranth must be cooked before eating because the raw grain blocks the absorption of nutrients. You can substitute amaranth flour for up to 25 percent of the wheat flour to increase the nutrition in yeast breads. Because amaranth has no gluten, it does not make a high-quality bread on its own. However, you can use 100 percent amaranth flour for biscuits, muffins, and other quick breads.

QUINOA

Botanical name: *Chenopodium quinoa*

Season: Cool

Grain yield: 6–26 pounds per 100 square feet

Site: Moderately fertile, well-drained soil; full sun

Days to harvest: 90–120

Gluten: No

Special considerations: None

Quinoa — pronounced KEEN-wah — is hard to tell apart from amaranth. Both are tall, colorful, broadleaf South American plants with large inflorescences. Quinoa, however, comes in a broader array of colors — red, purple, green, rose, lavender, orange, and yellow — and varies in height from 1½ to 10 feet tall.

Plants originated in the Andes Mountains, where its name translates to "mother of grains," and are closely related to spinach, beets, and chard. Three general types have evolved. *Altiplano* types are native to high altitudes — above 12,000 feet — in Bolivia and Peru. They have a sweet-flavored, delicate, ivory seed. Although the seed is the

Quinoa seeds are ready to harvest when you can barely dent them with your fingernail. The plant itself will be dry, and the leaves will have dropped.

best, altiplano types are the most difficult to grow at lower altitudes, where temperatures are higher. Valley types developed at 7,000 to 10,000 feet in Peru, Ecuador, and Colombia. Although their yellow seed is not as flavorful as that of altiplano types, valley types are better adapted to lower levels. Sea-level quinoa has brown, bitter seeds.

Growing Quinoa

Quinoa grows best in dry, cool climates and level, well-drained, moderately fertile, sandy loam, but it tolerates a wide range of growing conditions. It will do well in soil that is poor and infertile with a pH between 4.8 and 8.5. It even tolerates saline soil.

Because quinoa prefers cool climates, it is ideal for growing in the Rockies and other mountainous areas. Plants can tolerate a frost as long as they're not in bloom; low temperatures during bloom reduces yield as do temperatures above 95°F.

Plant quinoa in early to mid-spring — mid-April to mid-May — when the soil temperature is still 40° to 45°F. Quinoa will not germinate in warm soil. Quinoa requires about 100 days to mature, so if your region has a short growing season, start seeds indoors and transplant them outdoors after seedlings have developed their second set of leaves.

Sow seed ½ to 1 inch deep in rows 15 inches apart. Thin seedlings to 8 inches apart when they are 2 to 3 inches tall.

Keep the soil moist until the seeds germinate, then cut back on watering. Quinoa does well with just 10 to 15 inches of water per year. Giving it much more than that results in tall, lanky plants. Weed regularly so that plants don't have to compete for nutrients.

Harvest

Quinoa is ready to harvest when you can push your thumbnail into the grain and it barely leaves a dent. By this time, the plants will have dried and their leaves dropped. As with amaranth, you can simple rub the seed heads to release the grain into a bucket.

However, because the ripe seed has no dormancy, it will germinate on the plant if it rains. Watch the weather and if rain threatens before you can harvest, cut the stalks 12 inches below the head and bring them indoors to continue drying. Thresh and winnow the grain and store it dry.

Quinoa in the Kitchen

Before cooking, you must rinse the grain several times to remove the powdery, soapy-tasting coating of saponin. Saponin is indigestible and may reduce the absorption of nutrients; it is actually used as a soap by native populations. Running water over the seed for 2 or 3 minutes should be enough to remove the saponin. Some people soak the grain for several hours, frequently changing the water.

After removing the saponin, grind quinoa into flour or use it whole as a substitute for rice or as a cereal. Whole grain quinoa cooks quickly — in 15 to 20 minutes — and has a mild flavor. As it cooks, the germ springs from the grain, giving it a corkscrew tail. The grain has a bland yet pleasant flavor and a texture like that of brown rice. Toasting the grain before grinding or cooking makes the flavor richer.

Use quinoa flour as you would rice flour. You can add up to 10 percent quinoa flour to bread and other baked goods to make them more elastic and nutritious. Any more than that, however, reduces quality.

As with amaranth, you can cook and eat the leaves like spinach.

EMMER FARRO, SPELT, AND EINKORN

Botanical name: *Triticum spp.*

Season: Cool

Grain yield: 4–26 pounds per 100 square feet

Site: Moderately fertile, well-drained soil; full sun

Days to harvest: 110–140

Gluten: Yes

Special considerations: Needs same growing conditions and treatment as wheat

Spelt (*Triticum spelta*) is probably the best known of the three. It shows up in many whole-grain cereals and breads, and research suggests that people with wheat allergies may be able to tolerate spelt. Altough it does contain less gluten than wheat and its gluten structure is different from that of common wheat, allergists are not so sure about the claims.

The grain is slender and ricelike, a bit longer and more pointed than wheat. For those who have no trouble with the grain, spelt contains more protein than wheat and is higher in fiber, complex carbohydrates, iron, vitamin K, and the B vitamins. Yeast breads made with spelt rise better than those

Comparison of Heirloom Wheat Seed Heads

made with wheat and require less water to mix up.

Spelt out-yields barley and oats, grows well in dry soil, and needs less nitrogen fertilizer than does wheat.

Emmer farro (*T. dicoccum*) has a plump grain that is longer than wheat grains. It is the main ancestor of durum wheat, and like durum, emmer is a hard wheat well suited to making pastas. In fact, it never lost popularity in Italy (where it is called faro). The grain is lower in gluten than wheat but higher in protein and fiber.

Emmer flour makes a tasty, bold-flavored bread that is heavier than wheat bread. The grains may also be cracked or used whole like wheat berries.

Einkorn (*T. monococcum*) is the ancestor of all the wheats. It is the least common of the three but is starting to get more notice because of its high protein content and for the fact that it grows readily on marginal land and in adverse conditions.

Bread baked from einkorn has a light, rich flavor, but it is inferior in texture and height to that made from emmer or spelt.

Growing Heirloom Wheat

Treat emmer farro, spelt, and einkorn as you would wheat. They are cool-season crops that you plant either in fall for harvest the following summer or in spring for same-season harvest. Sow them early enough to get 8 to 10 weeks of growth before winter sets in. Plant them in full sun and well-drained,

moderately fertile soil. Surprisingly, the worse the soil, the better the yield, so there's no need to fertilize.

Harvest

Harvest emmer farro, spelt, and einkorn as you do wheat by cutting the stalks at the base, bundling them into shocks, and letting them dry for a week to 10 days, then thresh. The yields are not as great as with mass-scale farming wheats, but that shouldn't matter too much for the home grower. That's the good news.

The bad is that once you've grown the grain, it's difficult to get it out of the hull for eating. If you're lucky enough to have a small-scale mill in town, contact the company to see whether it can do the job for you. Or try the huller profiled on page 99.

HEIRLOOMS IN THE KITCHEN

Basic Cooked Amaranth

1 cup dry amaranth
1½ cups water

Stir the amaranth into the water, bring to a simmer, cover the pot, and cook on low heat for about 25 minutes. All the water should be absorbed, as the amaranth becomes fairly stiff. In this form, you can use it as a side dish to be sauced.

To make porridge, increase the water to 3 cups. Some people like this for breakfast, sweetened with honey. Unfortunately, others don't like it at all.

Cooked amaranth keeps well. You can boil it up one day, refrigerate, and proceed on another.

Yield: 10 to 12 small patties

Amaranth Patties

This idea is adapted from Mollie Katzen's *Sunlight Café,* and is the essence of simplicity: Shape cooked amaranth into small, thin patties and fry them in a very hot pan filmed with an oil that has a high smoke point, such as grapeseed. The results are crisp on the outside and creamy on the inside.

If you're trying one of the variations below, add only small amounts of ingredients to the cooked amaranth, or the patties tend to fall apart. Cook them until the outside is almost black for the best crunch and flavor.

Because these patties are tasty warm or at room temperature, they're good for people who tend to eat breakfast on the run.

Variations:

Asian Amaranth Patties

Add sautéed sweet pepper and onion to the cooked amaranth, then season with a shot of soy sauce. Drizzle the fried patties with dark sesame seed oil and serve with sautéed vegetables.

Indian Amaranth Patties

Quinoa

Cooked quinoa can be used much as you would use cooked rice, with the advantage that quinoa cooks much more quickly. Before using quinoa, you must wash the grain, which is coated in a bitter-tasting substance called saponin, a natural insecticide for the plant. It takes repeated rinsing to remove the saponin; some people soak the grain first, then rinse. Either way, you shouldn't eat quinoa until the rinse water runs clear. If you buy commercially prepared quinoa, it will probably already have been rinsed and be ready to cook. The package should tell you.

To cook quinoa, mix 1 part dry quinoa with 2 parts water or stock and simmer, covered, like rice, until all the water is absorbed (about 10 to 12 minutes). You'll know it's done when the small white germs of the seeds soften and protrude in little spirals.

Work a generous amount of curry powder (hot or mild, your choice) into the cooked amaranth. Serve the fried patties with cooked spinach and potatoes.

Mexican Amaranth Patties

Season cooked amaranth with chili powder to taste and work in chopped raw onion and green or freshly ground black pepper. Serve the fried patties with refried beans and guacamole.

Fruity Nut Amaranth Patties

Mix finely chopped pecans and dates or dried cranberries into cooked amaranth. Add a dash of cinnamon and a small amount of molasses or maple syrup. Serve the fried patties with a spoonful of ice cream or whipped cream.

Popped Amaranth

No use getting out the air popper; these tiny grains would run right through. Instead, heat a heavy skillet with fairly high sides to medium-high, pour in some amaranth, and shake and stir as the grains pop. Not all of them will, but that's all right. Cool and set aside to use as a seasoning or to give texture to everything from cottage cheese to

Spanish Quinoa

Quinoa lends itself well to the addition of flavorful ingredients such as onion and peppers. This recipe is quite similar to Spanish rice.

- **3 cups cooked quinoa**
- **1 large onion, chopped and sautéed**
- **1 green pepper, chopped and sautéed**
- **1 cup canned tomatoes, chopped with juice**
- **Salt and freshly ground black pepper**
- **⅓ cup chopped ripe olives**
- **½ cup grated cheddar cheese**

Preheat the oven to 350°F.

Mix the quinoa with the onion, green pepper, and tomatoes. Season with salt and pepper. Stir in the chopped olives and turn the mixture into a greased baking dish. Sprinkle with cheese. Bake, uncovered, until everything is heated through and the cheese has melted, adding more water or tomato juice if needed.

Yield: 4-6 servings

Peppers Stuffed with Quinoa and Black Beans

Although the recipe calls for whole green peppers, you can make a beautiful presentation by using red and yellow peppers as well. Peppers that have been frozen whole when they're in full supply from the garden work perfectly.

- 3 cups cooked quinoa
- 1 cup cooked black beans
- 1 cup canned diced tomatoes
- ½ cup chopped green onion
- 1 to 3 teaspoons chili powder
- Cayenne pepper, to taste
- 4 to 6 whole green peppers, depending on size
- Fresh lime juice

Preheat the oven to 350°F.

Combine the quinoa, black beans, tomatoes, onion, chili powder, and cayenne. Add a few spoonfuls of water if the mixture seems very dry. Cut the peppers in half if they are large and fill lightly with the quinoa mixture. Arrange in a shallow baking dish, skim the bottom with water, and cover with foil.

Bake for about 30 minutes, remove the foil, then continue baking until the peppers are soft and the filling is hot. Squeeze fresh lime juice over each one before serving.

Yield: 4-6 servings

Quinoa and Vegetable Salad

This could be a light lunch or supper served with good bread.

- 3 cups cooked quinoa
- 1 cup cooked corn
- 1 cup cut cup green beans, crisp cooked and chilled
- 1 cup diced cheddar cheese
- ½ cup diced celery
- ½ cup chopped green onion
- 1 small jar artichoke hearts, drained and quartered
- 1 small jar pimentos, drained
- Raspberry Dressing (see below)
- Salad field greens or shredded romaine
- Quinoa sprouts (optional)

Mix together the quinoa, corn, green beans, cheese, celery, green onion, artichokes, and pimentos. Drizzle with Raspberry Dressing and refrigerate as you arrange the greens to serve as a bed for the salad. Serve topped with the sprouts if using.

Raspberry Dressing

- ½ cup walnut or olive oil
- 1 to 2 tablespoons raspberry vinegar
- Salt and freshly ground black pepper

Mix together the oil and vinegar. Season with the salt and pepper to taste.

Yield: 6 servings

MILLET

Botanical name: ***Pennisetum glaucum, Panicum miliaceum, Setaria italica,*** and ***Eleusine coracana***

Yield: 4–8 pounds per 100 square feet

Site: Full sun; warm, fertile soil

Days to harvest: 60–120, depending on species and growing conditions

Special consideration: Thrives where other crops fail

One of the most important grains in the world, millet is rich in nutrients, providing high-quality protein, B vitamins, and minerals. It thrives in poor soil and hot, dry weather, where wheat and rice have trouble, and is easy to grow in backyards across North America. You can steam millet and serve it like rice as a side dish or mix it in a pilaf or casserole; its delicate flavor takes on the taste of its companion ingredients. Or stir the raw seeds into a salad or bread dough for a crunchy texture and added nutrition and fiber.

Botanical Names

Every plant has a botanical Latin name, comprising the genus and the species. When talking about grains and other food crops, you often can get by without using those names, because everyone generally knows which plants you're talking about when you mention "wheat" and "tomato." With millet, however, the common names mean different things to different people. If you don't know the botanical name, you may bring home the wrong seed. Figure out which millet you want and learn its botanical name. You don't have to pronounce it; simply write it down and point. Then you'll be sure of getting what you want.

TYPES OF MILLET

Millet is actually a general term applied to several grain-producing grass species. Although many of the species are used as forage crops for livestock and poultry, others are an important source of grain in developing countries, because of their ease of cultivation. In the United States, the four most important commercial species are pearl, proso, foxtail, and finger millet, which are grown for grain rather than forage. The grain is as likely to be sold as birdseed as for human consumption.

The different types are fairly equal nutritionally, but they vary in their needs for warm weather and days to harvest. As you select seeds, match them to your growing conditions. Also, take care to select a variety that was bred specifically for grain production. Because so much of the millet crop in North America is grown for forage, you may end up with more grass than grain if you're not careful.

Pearl Millet

Making up 40 percent of the U.S. millet crop, pearl millet (*Pennisetum glaucum*) has the largest seeds of the bunch and is the one most often sold here for human consump-

pearl millet

proso millet

tion. Plants grow well in poor, dry soil. Their deep roots help plants tolerate drought.

You'll have the best luck with pearl millet in the Southeast, because soil temperatures must be at least 70 to 95°F for seeds to germinate, and plants need a long growing season. The crop is ready for harvest about 120 days after planting. In regions with a short growing season, you probably won't be able to harvest grain. But if you raise poultry or livestock, you'll at least get a forage crop for them.

Standard pearl millet can reach 6 to 15 feet tall. Newer hybrids have been bred to be shorter and better yielding.

Most pearls have tan seeds. Recently, though, breeders have developed several ornamental cultivars with colorful foliage and seed heads that are as decorative as they are productive. Among them is 'Purple Majesty'. Massed in a flower garden, its dark purple leaves and seed heads are a standout. You'll find plants at garden centers and seeds from garden-seed suppliers.

Proso Millet

Also called broomcorn, hog millet, and strap millet, proso (*Panicum miliaceum*) is a good choice for a wide swath of the country. It can get by with warm weather (as opposed to

foxtail millet

finger millet

hot weather) and is ready for harvest 60 to 90 days after planting, so even short-season gardeners can bring in a crop. Plants grow 1 to 4 feet tall, depending on the variety, making them well suited to the home garden. Like pearl millet, proso does well in poor soil and needs little water to produce grain. However, because it's shallow rooted, it won't stand up to drought. Plants do not do well in coarse, sandy soil; a sandy loam is okay. Unhulled seeds may be white, cream, brown, red, black, yellow, or orange.

Foxtail Millet

With its tall, upright seed head, foxtail millet (*Setaria italica*) resembles pearl millet. Plants grow 1 to 6 feet tall and are ready to harvest in just 75 to 90 days. Foxtail plants yield well — instead of the 80,000 seeds per pound that proso millet yields, you'll get 500,000 with foxtail — but the seeds are tiny.

Foxtail millet is a warm-weather grass that thrives at high elevations as well as on the plains. Its main limitation is in the Midwest and other places where wheat is king; foxtail millet plants are susceptible to

attack from wheat curl mites, which carry the wheat streak mosaic virus. Although the disease doesn't seriously harm foxtail millet, it can be spread to nearby wheat plants and carry over to affect the winter wheat crops you plant following millet in fall.

Finger Millet

This tropical grass thrives in warm, moist conditions. You can grow it anywhere rice will grow, although it doesn't like to be flooded in paddies. Finger millet (*Eleusine coracana*) is especially popular in India, where it is called *ragi* and is made into the flat bread *roti* as well as many other dishes. It's even popped and eaten as a snack.

A New Millet

Teff (*Eragrostis tef*) is a relatively new millet — to the United States, that is — making waves among health-conscious foodies. The grain is tiny; a packet of 1,000 seeds weighs less than 1/400th of a pound. Or as one source puts it, it takes 150 teff grains to equal the weight of one wheat grain. Despite its size, teff is a powerhouse of nutrients. It's a good source of dietary fiber, calcium, iron, magnesium, phosphorus, potassium, and much more. Grow it as you would the other millets. It'll be ready to harvest in about 130 days.

GROWING MILLET

No matter which type of millet you grow, choose a level site with fertile, friable soil with a pH above 5.5. Even though millet thrives in poor, infertile, dry soil, it yields much better if you can grow it in good soil and water and fertilize occasionally. The soil must be well drained; any spot that puddles after a rain will be death to your plants. Because many species of millet can grow to be quite tall, plant your crop in a spot where it won't shade nearby plants.

Prepare the seedbed as you would for any garden vegetable crop. The most important criterion is that the soil be weed-free. Because millet seedlings grow so slowly the first few weeks after germinating, they can't compete with weeds. Cultivate the soil regularly with a scuffle hoe to disrupt the growth of weeds until the millet establishes itself.

Wait until the soil has warmed to at least 60°F to sow seed. Plant millet in solid blocks or in rows, sowing the seed at a rate of 1 pound per 1,000 square feet for pearl, proso, and finger millet. Plant the seed ½ to 1 inch deep.

If sowing in blocks, broadcast the seed, then till or rake it in to the right depth. For rows, try this method from India, where manual labor figures heavily in producing crops: Open furrows with a hand cultivator or hoe, then drop the seed into the furrows at the rate of about four seeds per inch. (The seeds are small, so you won't be counting, but it will give you an idea of how thinly to scatter the seeds in a furrow.) Rows should be 14 to 30 inches apart.

Firm the soil after sowing and keep it moist until seeds sprout. As the seedlings fill out, thin them so the plants are 6 to 8 inches apart.

Water deeply during dry periods. Fertilize lightly; too much fertilizer can cause plants to lodge (fall over). Because millet needs so little fertilizer, it is especially well suited to growing organically with a sidedressing of well-rotted manure or other organic fertilizer.

Millet is ready to harvest 60 to 120 days after sowing, depending on the variety. Expect a yield of about 5–10 pounds per 100 square feet, more than enough for your cooking needs. Good thing: wild birds love this grain, and because the seed heads are strong, they can sit and eat all day. If you're a bird-watcher, be on the lookout for doves, quail, and songbirds.

Problems

The type of problems you're apt to run in to depend on which millet you grow and where you live. For example, in New Mexico, pearl millet is not bothered by insects or diseases, wheras the other millets can suffer from mildew, leaf spots, head smut, and bacterial stripe disease. In Georgia, pearl millet must fight off chinch bugs, stink bugs, rusts, leaf spots, and grain molds.

None of the pests is especially serious for a home crop. You can pick off the insects, plant early to avoid rust, look the other way when you see leaf spots, and harvest as soon as the seed is ready to avoid grain molds. If you have had lots of trouble with insects and diseases or just want to be prepared, check with the local cooperative extension service to learn what to expect and how to deal with it.

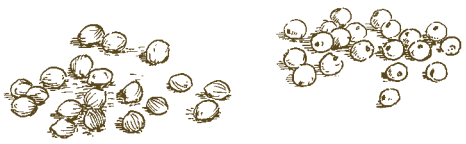
HARVEST

Millet blooms from the top down, and the seeds ripen in the same manner. In the case of proso millet, there's a big difference in ripeness between the top and the bottom of the grain stalk. Harvest when the lower seeds are still green or you'll lose much of the crop to shattering.

Foxtail, pearl, and finger millet ripen more uniformly. The plants are ready to harvest before they turn brown, so keep an eye on the plants. You'll have fewer clues telling when to get out there with the sickle.

Cut off the seed heads, leaving a foot or so of stem. Bundle the stalks into small shocks so that the green straw can dry rapidly. Or if you have the space, take the shocks under cover and spread them out to dry; otherwise, you'll lose a lot of grain to birds and to shattering. As the heads dry, the seeds start to open, making it easier to separate the grains from the hulls.

Thresh the grain by banging the bundles against the inside of a large barrel; the grain separates easily from the straw. Be careful about threshing with a flail or beating the millet — the seeds of some varieties crack easily.



Millet must be hulled before it can be eaten. Fortunately, the hulls are easily removed by rubbing the grains between your hands.

Winnow by pouring the grain from one container to another in a brisk wind or before an electric fan, either before storage (better) or before using. Store whole-grain millet in airtight metal or plastic cans.

Before using the millet, you must remove the hulls, which are indigestible. The good news is that hulling has little effect on millet's nutrition, because the germ remains intact even after the hull is gone. If you're using only a small amount of millet, remove the hulls by rubbing them off between your hands, one handful at a time. For larger amounts, consider converting your flour mill into a huller, using the directions below.

BUYING MILLET

Millet is sold in natural-food stores and often in supermarkets. Internet and catalog sources also offer millet. It's inexpensive enough that you can make a meal for pocket change.

Millet flour is also available but is harder to find; you may have to ask your natural-food store to order it. Grind whole millet in a flourmill for the freshest flour.

Make Your Own Huller

A simple way to hull grains like millet is to alter a hand-powered grain grinder or flour mill so that it rubs the grains vigorously instead of grinding them. The original plans for this were developed by Allen Dong and Roger J. Edberg, and the process was expanded on by the folks at Southern Exposure Seed Exchange (see Resources, page 158). Dong and Edberg's version involves gluing a soft rubber disk to a large steel washer that fits a grinder. Because such washers aren't that easy to come by, I've altered the plans to use the parts actually made for your mill.

You'll need an extra stationary disk for your grain grinder. Cut a piece of soft rubber to fit the disk and super-glue the two together. This is the huller disk. Remove the auger and rotating disk from the body of the mill, then detach the stationary disk from the mill. Replace it with the huller, rubber side facing out. Reinstall the auger and the rotating disk.

As you turn the crank, the seeds are pressed against the rubber disk. Instead of being crushed, though, they roll against it and then out, losing their hulls along the way. Start with a small batch, adjusting the distance between plates until you can crack the hulls without cracking the grain. You'll need to send some grains through the huller several times to ensure that all are cracked. Winnow the seed afterwards.

When you're ready to grind flour, you can turn the huller back into a mill by simply swapping out the disks.

Doing Double Duty

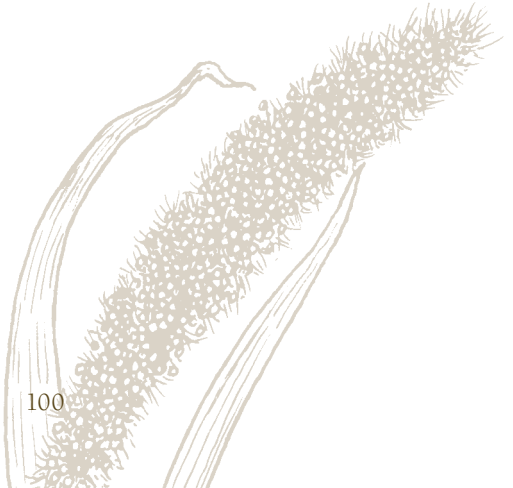
Some plants that produce edible (and delicious) grains also have great ornamental presence. 'Red Dragon' rice is one, and 'Purple Majesty' millet is another that's especially easy to grow. 'Purple Majesty' grows up to five feet tall, with broad, shiny, deep purple foliage that adds a dramatic touch to containers or in the garden. In late summer, it develops flower spikes that look like cattails and produce seeds that can be harvested in fall.

MILLET IN THE KITCHEN

Toasting millet before cooking or grinding brings out its flavor. For a side dish, cook millet as you would rice, using 3 cups of water to 1 cup of millet. You can also substitute it for some of the rice in casseroles and soups. Millet makes tasty sprouts to add to breads, sandwiches, and salads. Or mix the raw seeds with other grains and simmer them for a nutritious breakfast cereal.

Grind small amounts of millet into flour. Because it has no gluten, use the flour for flat breads such as chapatti. Or add as much as 25 percent millet flour to wheat flour for raised breads. Millet flour will deteriorate after grinding, so grind only as much as you think you'll use in a few days and refrigerate any leftovers.

Because of its bland taste, millet is tremendously versatile. You can substitute it in almost any recipe calling for rice, and use it in some unique ways as well. Most recipes begin with a basic cooked millet — the extra ingredients are added later.



Basic Cooked Millet

1 tablespoon butter

1 cup millet

3 cups water

Melt the butter and skim it across the bottom of a deep saucepan. Pour in the millet grains and stir over medium-high heat, until each grain is coated. Stir for a minute or two longer to cook the starch on the outside, but don't let the grains brown more than a little. Pour in the water, bring to a boil, cover the pan, reduce the heat, and simmer for 45 minutes, or until the grains

have burst open and are tender. During the last 5 or 10 minutes of cooking, remove the lid to evaporate any extra moisture and fluff the grains. Stir just once, and then use a fork rather than a spoon to fluff, to avoid making the millet gooey.

No salt is included in the basic recipe because with many vegetable recipes you don't need extra salt, but you can add ½ teaspoon salt to the cooking water if you like.

Yield: 3½ cups

Skillet Millet

This recipe produces a dish that is tasty and good to serve with almost anything. If more people tasted millet prepared this way, it would be more popular than it is.

- ¼ cup butter
- 1 large onion, chopped coarsely
- 3 to 4 cups basic cooked millet, cooled or left over

A large iron skillet is the ideal pan for this. Over medium heat, melt the butter and sauté the onion until it's soft and just barely beginning to brown along the edges. Add the millet and mix it well with the onion and butter. (Please use real butter — margarine is not a successful substitute.) Lower the heat to the point at which the millet is cooking slowly. Stir with a fork once or twice, and let cook for at least 15 minutes. Do not cover the pan. When ready to serve, the onions should have browned somewhat more and the millet should be a rich golden color. If you must, shake a little salt into the skillet before serving the grain, but taste it first because the salt in the butter may be all you need. Too much salt masks the perfect blend of brown onion, butter, and grain.

Broiled pork chops must have been invented to serve with millet prepared this way.

Yield: 4–6 servings

Millet-Broccoli Soufflé

In this soufflé, millet complements the fluffiness of the whipped egg whites and produces a mellow dish.

- 1 large onion, chopped
- 1 tablespoon butter
- 4 eggs, separated
- ¼ cup butter
- ¼ cup flour
- 1 cup milk
- 1 cup cooked and chopped broccoli
- 1 cup cooked millet
- 1 teaspoon salt

Sauté the onion in the tablespoon of butter until tender, then set aside. Beat the egg yolks and set aside. Melt the ¼ cup of butter, stir in the flour, and cook over low heat until the mixture becomes light brown. Gradually stir in the milk, beating with a whisk, to make a thick cream sauce. Cook, stirring constantly, over low to medium heat, until the sauce is very thick, then add a little of the sauce to the egg yolks, stir in to temper the yolks, and mix the yolks into the sauce in the pan.

Beat the egg whites, which should be at room temperature, until they are stiff but not dry, and set aside.

Preheat the oven to 350°F. Combine the broccoli and the sautéed onion, being sure to drain off any water that may remain in the broccoli pan. Mix in the millet, then the cream sauce. Combine these ingredients thoroughly. Season with the salt. Gently fold in the stiffly beaten egg whites. Do not over-mix. Pour this mixture into a 6-cup, ungreased baking dish and bake for 40 to 50 minutes, or until the soufflé is set. Serve at once.

Yield: 6 servings

Millet Pudding

Using maple syrup here produces a wonderfully rich flavor, but if it's not available where you live, don't hesitate to try a strong-flavored honey instead.

- 4 cups milk
- ⅓ cup maple syrup
- ⅓ cup millet
- ⅓ cup raisins
- 1 teaspoon vanilla
- ¼ cup soft bread or cake crumbs

Mix together the milk, maple syrup, millet, and raisins in a 6-cup baking dish. Bake, uncovered, at 250°F, stirring occasionally, until the pudding is thickened and the millet is tender. This will take about 3 hours. During the baking, a brown skin will form on top of the pudding. Mix it back in each time you stir.

When the pudding seems nearly thick enough, remove it from the oven and stir in the vanilla. Stir in the crims, which will alleviate any curdled appearance. Serve warm.

Yield: 6 servings

Wheat-Millet Bread

This makes a light-textured, pale loaf, good for people who don't like 100 percent whole-wheat bread or other heavy breads.

- 2 packages active dry yeast
- ½ cup warm water (90°–105°F)
- 2 teaspoons sugar
- 4 cups milk
- ¼ cup honey
- 2 tablespoons butter
- 1 tablespoon salt
- 12 to 13 cups unbleached white flour
- ¾ cup millet flour

Dissolve the yeast in the warm water. Add the sugar to start the yeast growing and allow the mixture to stand for 15 minutes. Meanwhile, scald the milk. Add to it the honey, butter, and salt, and cool to lukewarm. When the milk is lukewarm, add it to the yeast mixture and stir in about half the unbleached white flour. Beat until the mixture is smooth and shiny and makes long strings around the bowl, then beat in the millet flour.

Work in as much unbleached white flour as it takes to make a dough you can handle. Cover the dough with a cloth and allow to stand for 15 minutes before you start kneading. (This makes kneading much easier.)

Knead the dough until you have a smooth, springy ball. Place it in a lightly greased bowl, turn once to grease the surface of the dough, and cover with a damp towel. Set to rise in a warm place.

When the dough has doubled in bulk, punch it down and allow it to rise again. (It's easy to tell when the dough has doubled if you start it in a bowl that it half fills. When the dough rises to the top of the bowl, you know it has doubled.) After the second rising, shape the dough into loaves that fill four greased pans by about half.

Preheat the oven to 400°F. Allow the loaves to rise again until double, then bake for 35 minutes.

This recipe makes four loaves if you use 8×5-inch pans. If the pans are different sizes, you may have to increase or decrease the baking time a bit. The important thing is to have the dough fill whatever pans you use by about half.

Yield: 4 loaves

Chickpea and Millet Paella

This hearty and delicious paella is adapted from Deborah Madison's Vegetarian Cooking for Everyone.

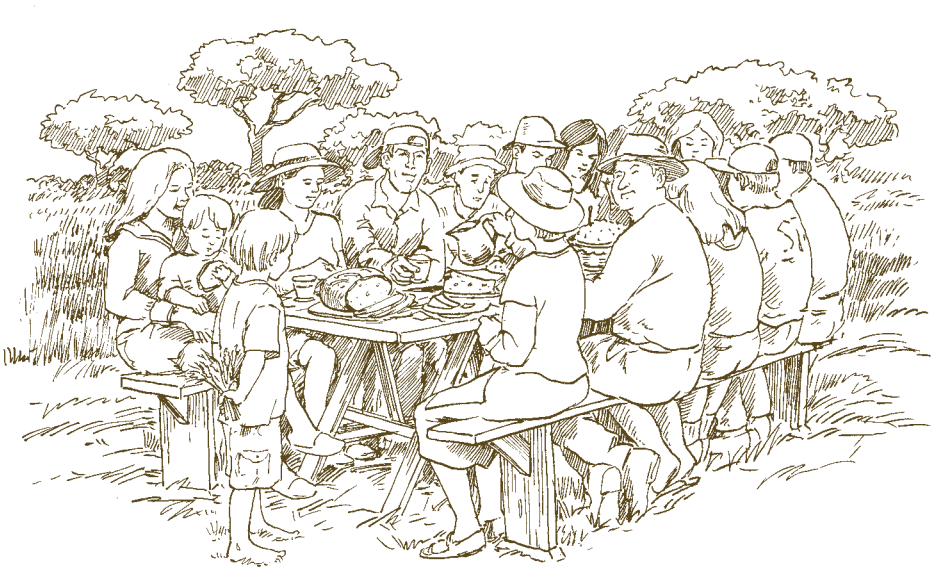
- 1 large pinch of saffron
- 2½ tablespoons of olive oil
- 1 cup of millet, rinsed in a sieve, and well-drained
- 1 onion, peeled and finely chopped
- 1 clove of garlic, peeled and finely chopped
- 1 can of chickpeas, drained and rinsed
- 1 can of whole tomatoes, rinsed and chopped
- 1 tablespoon smoked paprika
- 5 green Spanish olives, chopped
- Sea salt
- 1 teaspoon of soy sauce
- 2½ cups of boiling water
- 1 teaspoon lemon juice
- ¼ cup chopped parsley
- shredded parmesan cheese

In a small bowl, steep the saffron in 1 tablespoon of boiling water.

Heat 1½ tablespoons of the olive oil in a large skillet over medium heat. Add the millet, stir to coat, and toast for about 5 minutes, until the grains start to brown. Reduce the heat to medium-low and pour the millet into a bowl. Return the skillet to the heat and add the last tablespooon of oil. Sauté the onion and garlic until they begin to color.

Reduce the heat to low and add the chickpeas, tomatoes, paprika, olives, soy sauce, fried millet, steeped saffron, and boiling water. Cover the pan and simmer until the liquid is absorbed and the millet is tender. Test for doneness after half an hour and add up to another ¼ cup of boiling water if the grains are not fully softened. Add salt, pepper, and lemon juice to taste. Sprinkle with chopped parsley and parmesan cheese.

Yield: 4 servings



Slow Food Ark of Taste

CHAPALOTE CORN. Anishinaabeg manoomin (wild rice). Tuscarora white corn. Roy's Calais flint corn. Chicos. Carolina gold rice. These aren't varieties of grain you're likely to find at your local supermarket. But, if the members of Slow Food USA have anything to do with it, once you've tried them, you might be encouraged to grow some for yourself.

The Slow Food movement promotes the culinary benefits of sustainable agriculture — not the least of which is the scrumptious tastes we can savor when we work to save endangered crops. Founded in Europe in 1989, as a reaction to McDonald's opening its first restaurant in Italy, Slow Food has since spread around the globe. There are more than 850 *convivia* worldwide — local chapters of gastronomically savvy members who express a shared commitment to preserving and promoting the culinary traditions, products, and growing practices in our own backyards, one delicious, locally grown, freshly prepared dish at a time. Some 16,000 Americans are among these, working at the grassroots level to influence agricultural policy and to educate consumers about the risks of monoculture, factory farming, and pesticide use.

Since 1996, Slow Food has been working to identify and preserve regional, rare food products in categories ranging from animal breeds, cured meats, and cheeses to cakes and confectionary, pastas, fruits, vegetables, and grains. To date, the worldwide list representing over 50 countries exceeds 800 products. Slow Food USA's contribution, via its own U.S. Ark

of Taste, includes over 200 products; 25 of these are pulses (peas, beans, and lentils), and 6 are grains.

Products are evaluated on a rolling basis throughout the year by subgroups appointed by the U.S. Ark of Taste committee — a motley, multifaceted crew of food-lovers ranging from historians to chefs, gardeners to grocers, biodiversity lobbyists and beyond. Currently, turkey wheat — a Kansas-based winter wheat with vigorous tall stalks, whose seeds from Southern Russia were brought over by Mennonites — is being considered. Like any Ark nominee, it must show that it's not part of the conventional food distribution system. Grains in particular are evaluated in both their unmilled and milled forms; committee members have been known to provide their favorite local bakers with sample nomination flour, and conduct a taste test of the ovens' telling transformations.

Slow Food expresses a shared commitment to preserving and promoting the culinary traditions, products, and growing practices in

Once accepted to the Ark of Taste, a grain has a friend in the Slow Food community, which will begin work towards cultivating consumer demand, essential for agricultural conservation. Slow Food organizes promotional events, pursues media attention, introduces growers to their local Slow Food convivium, partners with local restaurateurs, and more.

The Internet is, of course, not to be underestimated as a means for getting the word out. Each nominee for the Ark of Taste has its own link on Slow Food USA's Web site. Mouthwatering information about each product's history awaits discovery. Did you know, for instance, that Roy's Calais flint corn was the only variety to grow to maturity during Vermont's infamous "year without a summer" in 1816? It's also the second-shortest-season corn variety in the world. The Web site also lists sources for each of the Ark members.

Do you know of a grain that might be worthy of the Ark's notice? A two-page form initiates each process of nomination. Among the details requested are its known history and current producers (and production location). Each food must also meet these four qualifications: It must be of cultural or historic importance to its locality or to an ethnicity; it must be produced sustainably and in limited quantities; its existence must be under threat; and — perhaps most importantly — it must be delicious. Look for the Ark's products that represent your area, and see for yourself.

OATS

Botanical name: ***Avena sativa, A. byzantina,*** and ***A. nuda***

Season: Cool

Grain yield: 3–11 pounds per 100 square feet

Site: Full sun; moist, moderately fertile soil

Days to harvest: 90–120

Gluten: No

Special considerations: None

There are so many reasons to grow oats! First of all, they are easy to grow; they thrive in cool climates and have few pests. They also germinate quickly and outcompete weeds. Second, oats are good for you. Like barley, they are a good source of beta-glucan soluble fiber. They supply good-quality protein as well as several B vitamins.

And if that weren't enough, the straw that's left after threshing makes a wonderful garden mulch, as well as bedding and feed for rabbits and horses. Even if you decide to buy rather than grow oats for eating, consider putting in a small plot just for the straw.

What's the downside, then? Most oats are difficult to hull, which is why they've traditionally been grown for animal feed rather than for human consumption. This also explains the prevalence of rolled oats in North American cuisine; in an industrial processing plant, the groats can be hulled and rolled in one swift step.

Because you're not likely to have an industrial oat-processing plant in your backyard, the best option is to grow *hull-less* or "naked" oats, so you don't have to worry about hulling at all.

TYPES OF OATS

Three main types of oats exist: white, red, and hull-less.

White Oats

Also called spring oats, white oats (*Avena sativa*) are the most common. They are grown in cool northern regions, where they are sown in spring and harvested in late summer. The grain is hulled and is more yellow or tan than white.

Red Oats

Also known as winter oats, red oats (*A. byzantina*) are grown in the South. They are sown in fall and harvested early the following summer. They are winter hardy only to Zone 7, or to 10°F. Rather than being red, as its name would imply, the grain is gray. It also must be hulled before you eat it.

Hull-less

These are the best choice for home growers. Naked or hull-less oats (*A. nuda*) lack the hard, bitter-tasting hulls of other varieties, though groats of hull-less varieties are covered in short hairs that can make you itch as you process them. Also, be aware that the lack of hull makes the groats prone to being damaged.

GROWING OATS

Oats will produce a pretty good crop almost anywhere on any soil. They yield best, however, in moderately fertile, well-drained, moisture-retentive soil. They need more water than do other grains, and planting them in sandy or clay loams ensures that roots have the right amount of moisture.

Don't plant where grains grew the previous year. Although few pests bother oats, their populations can build up when oats follow wheat or other grains. Because of this, grain crops should not be planted in the same spot year after year. Most grains are grasses and are susceptible to the same kinds of diseases and insects. Therefore all pests will naturally build up over time if crops are not rotated.

Before planting, work the soil to eliminate weeds and incorporate organic matter, then rake it smooth. Keep in mind that, like many other grains, when oats are grown in soil that's too fertile, plants will be dark green and will lack strength, and readily lodge (fall over). They'll also grow more stalk than grain. The organic matter you add to the soil should be enough to keep oat plants healthy and well fed.

You can't plant oats too early in spring. Sow the seed as soon as the soil is dry enough to work, even if some snow is still hanging around. Plant fall crops 6 to 10 weeks before winter sets in, to give the oats plenty of time to establish before cold weather arrives. Use a seeding rate of 0.3 pound per 100 square feet for hull-less oats and 0.4 pound for regular oats.

Plant oats in broad bands or rows, a foot or so wide, leaving enough space between the rows for you and the cultivator, hoe, or tiller to pass through. Rake or till in the seed to a depth of ½ to 2 inches. Then lay a plank over the row and walk along it to increase the contact between soil and seed and ensure better germination.

Watering and weeding is about all you'll need to do until harvest. During the early part of the growing season, pull any weeds that threaten to take over the row. You don't have to cultivate within the row; just keeping the spaces between rows clean will cut down considerably on weeds.

HARVEST

Oats are ready to harvest when the grain changes from green to cream. Or you can use the rub-and-bite test to see if the grain is ripe: rub the head between your hands. If the grain comes out easily, bite on a piece of grain. When the grain is hard against your teeth, it's ready to harvest. If you're growing oats just for the straw, harvest them while some of the stalks are still green and the grain is in what is called the milk stage; it will be runny if you pick some and bite down on it.

On a small scale, harvesting with a sickle or scythe is the simplest approach. Cut and windrow them, letting them dry for a few days. Some growers cure cut oats as they do hay, raking them into rows on the ground to dry and turning them once or twice so that

all sides dry, then they haul them in. You lose some of the grain this way, but probably not enough to matter.

Hulling

Hull-less oats are the best choice for growing at home, because getting oats with hulls into a form where you can enjoy eating them is extremely difficult. The hulls cling tenaciously, caught in the grain's crease. Commercial millers heat and flatten the grain with elaborate machinery to get it out of the hull. Even so, you've probably run across hulls in your oatmeal; it's like biting down on a fingernail.

If you planted oats with hulls and have no local granaries near your home, try the following technique. Spread the grain on a baking sheet and roast it for 90 minutes at 180°F to make the hulls brittle. Run the roasted grain through a roller mill or a meat grinder to crack the hulls; winnow in front of a fan.

young oats

oats, ready to harvest

Volunteer Oats

Oat straw carries seed, so if you've ever mulched with oat straw, you've already grown oats. The seeds inevitably sprout, and unless you pull the sprouts, they quickly grow into full-scale plants. In fact, if you've used much oat straw around your property, you may be convinced that oats will germinate anywhere. The plants never seem to hurt the garden, and they attract birds.

BUYING OATS

Supermarkets, natural-food stores, catalogs, and the Internet sell oats in any of five forms: whole grain, groats, steel-cut, rolled, and flour.

Whole Oats

Whole oats are the complete grain, hulls and all. You'll find them for sale in seed stores and sometimes from farmers. Use them for sprouting.

Oat Groats

Groats are whole oat grains with their hulls removed. Use them whole, flake or grind them, or sprout them. Look for oat groats at natural-food stores.

Steel-Cut Oats

Slicing groats into pieces with steel blades results in steel-cut oats. These are sold in natural-food stores and, occasionally, in regular supermarkets, where they're sometimes called Scottish oats.

Rolled Oats

When you think of oatmeal, you're thinking rolled oats. Produced by steaming groats, then running the steamed grain through rollers to flatten them, rolled oats are readily available from all food stores. They come in three versions: regular, quick-cooking, and instant.

Quick-cooking rolled oats: Cutting the groats into pieces before rolling them creates a thinner grain that cooks faster than regular rolled oats.

Instant rolled oats: Partially cooking groat pieces, then rolling them, creates rolled oats that are even thinner than quick oats. As their name implies, they cook in just a few minutes. Compared with regular and quick-cooking rolled oats, they are expensive and have much less nutritional value.

Oat Flour

Grinding the groats produces oat flour. It's usually sold in natural-food stores; buy only as much as you can use in a short time and store it in the refrigerator or freezer.

OATS IN THE KITCHEN

Oats can be prepared in many different ways, each with its own special taste. Out of respect for every grandmother who ever cooked up a pot of oatmeal, I have to start with oatmeal. Recipes here are for steel-cut or regular rolled oats, not the quick-cooking kinds.

Basic Oatmeal

- **4 cups water**
- **¼ teaspoon salt**
- **2 cups rolled oats**

Bring the water to a rolling boil, add the salt, stir in the oats, then lower the heat. Cook about 5 minutes, but do not stir more than once or twice. Remove the pan from the heat, cover it, and let stand for as long as 20 minutes before serving. The longer it stands, the creamier the oatmeal will be. If you like it very creamy, start the oats in cold water; if you like a coarser texture, shorten the cooking and standing times.

Yield: 6–8 servings

Variation: Steel-cut Oatmeal

Mix 1 cup of steel-cut oats, 4 cups of water, and ¼ teaspoon of salt, and let stand overnight in the refrigerator. Next morning, bring to a boil, lower the heat, and cover the pot. Cook gently until the moisture is absorbed and the oats are tender, usually about 1 hour.

Oatmeal Muffins

- **1 cup rolled oats**
- **1 cup buttermilk**
- **1 egg**
- **½ cup honey**
- **1 cup flour**
- **½ teaspoon salt**
- **1 teaspoon baking powder**
- **½ teaspoon baking soda**
- **¼ cup melted butter**

Soak the oats in the buttermilk for 2 hours, then add the egg and beat well. Stir in the honey.

Preheat the oven to 400°F.

In a separate bowl, sift together the flour, salt, baking powder, and baking soda. Stir the mixture into the oats and buttermilk. Mix in the melted butter. Pour the batter into greased muffin pans and bake for 15 to 20 minutes, until golden.

Yield: 12 muffins

Granola

This is a Pitzer favorite and is offered here mainly to suggest a base for your improvisation.

- **9 cups rolled oats**
- **1 cup raw sesame seeds**
- **1 cup raw sunflower seeds**
- **1 cup raw peanuts**
- **1 cup raisins or dried apple bits**
- **½ cup oil**
- **½ cup honey**
- **1 tablespoon vanilla**

Preheat the oven to 400°F. Pour the oats into a large, flat pan. Bake for about 5 minutes, stirring several times. Remove from the oven and add the sesame seeds, hulled sunflower seeds, and peanuts. Toast about five minutes more, stirring often. Remove from the oven. Mix together the raisins, oil, honey, and vanilla. Pour this over the granola mixture and stir thoroughly until all the flakes are coated. Return to the oven and toast again, for about two minutes, or just long enough to bake in the honey.

Remove from the oven and cool very thoroughly before storing in a large jar or can.

Yield: 14 cups

Note: For a change, use rolled wheat flakes, rye flakes, or triticale flakes for part of the oatmeal.

Oatmeal Cookies

Some things in this world are so traditional and so fine as they are that they should not be changed. This old favorite from Quaker Oats is a case in point, although you can cut down a little on the sugar if you like.

- ¾ cup vegetable shortening
- 1 cup firmly packed brown sugar
- ½ cup granulated sugar
- 1 egg
- ¼ cup water
- 1 teaspoon vanilla
- 3 cups rolled oats
- 1 cup unbleached white flour
- 1 teaspoon salt
- ½ teaspoon soda

Preheat the oven to 350°F.

Cream together the shortening, brown sugar, and granulated sugar until creamy; beat in the egg, water, and vanilla and mix very well. In a separate bowl, combine the oats, flour, salt, and baking soda, and stir them into the sugar-shortening mixture. Drop by rounded teaspoonful onto a greased baking sheet and bake for 12 to 15 minutes. Cool completely on racks before storing.

Yield: 5 dozen cookies

Steel-Cut Oat Bread

This makes a coarser-textured bread that has such a good taste, you don't even have to butter it!

- 1 cup steel-cut oats
- ¼ cup dark molasses
- 1 tablespoon butter
- ½ teaspoon salt
- 2 cups boiling water
- 1 package active dry yeast
- ¼ cup warm water (90°–105°F)
- 1 teaspoon sugar
- ¼ cup wheat germ
- 2 cups unbleached white flour, approximately

Mix the oats, molasses, butter, and salt in a large bowl. Pour in the boiling water and allow the mixture to stand until it has reached room temperature.

Dissolve the yeast in the warm water with the sugar and let it stand until frothy. Pour the yeast mixture into the cooled oat mixture, then stir in the wheat germ and the

unbleached flour. Use enough flour to make a dough you can handle. This could be a little more or less than 2 cups.

Turn the dough onto a floured surface, form it into a ball, cover it with a damp cloth, and allow it to stand for 15 minutes. Knead until the dough is very springy and elastic. The standing period makes the kneading easier and faster.

Put the dough into a greased mixing bowl, cover with a damp cloth, and allow it to rise in a warm place until double in bulk.

Punch down the dough and shape into one large loaf (about 5×9 inches) or two miniature loaves. Allow to stand, again covered with a damp cloth, until double in bulk.

Preheat the oven to 375°F. Bake about 40 minutes for one loaf; shorten the baking time if you make two smaller ones.

Yield: 1 large loaf or 2 mini loaves

Wheat-Oat Bread

This bread is delicious, one of the best ever, and so easy it's almost embarrassing. It's especially good with cheese and, if you're careful not to burn the edges, makes marvelous toast. With a little peanut butter, it's nearly a meal.

- **1 package active dry yeast**
- **¼ cup warm water (90°–105°F.)**
- **1 teaspoon sugar**
- **2 cups warm water**
- **1 teaspoon salt**
- **3 tablespoons oil**
- **¼ cup honey**
- **4 cups whole-wheat flour, approximately**
- **½ cup unbleached white flour**
- **½ cup oat flour (or rolled oats ground in the blender)**
- **¼ cup nonfat powdered milk**

Dissolve the yeast in the ¼ cup of warm water and stir in the sugar. Allow the mixture to stand until it is frothy. Mix it in a large bowl with the 2 cups of warm water, salt, oil, and honey. Gradually beat in about 3 cups of the whole wheat flour. Continue beating until the mixture is shiny and elastic and pulls away from the sides of the bowl in long strings. Beat in the white flour, the oat flour, and the powdered milk. Beat very well, until all the ingredients are thoroughly combined. At this point you really can't overbeat.

Beat in as much more of the whole wheat flour as you need to make a stiff batter. You won't be kneading it, so you don't have to make a dough you can handle — just one that will stand up fairly well in the pans.

Turn the batter into well-greased pans 5×9 inches or a little smaller. If the pans are too big, the loaves will be flat. The batter should at least half fill them.

Allow the pans to stand in a warm place, covered by a damp cloth, until the batter comes to the top of the pans or is about doubled in bulk.

Preheat the oven to 400°F. Bake for 45 minutes.

Yield: 2 loaves

The Wheat Patch Project
Northampton, Massachusetts

"Solving for pattern." Champion of agrarian life Wendell Berry coined this phrase nearly three decades ago, to describe the process of seeking streamlined solutions that solve multiple problems without causing new ones. In the charming western Massachusetts town of Northampton — known as an intellectual, cultural, and enviro-friendly hub — Hungry Ghost Bread strives for one such simple solution that they can act upon.

Hungry Ghost is owned and operated by Cheryl Maffei and Jonathan Stevens. Fans have long huddled around the orange wood-fired oven tucked into the bakery's cozy brick structure, awaiting the emergence of golden, chewy, old-world artisan breads. The bakery's name is inspired by the Japanese Buddhist concept of the hungry ghost, a spirit with insatiable appetite, for whom an extra plate is set at every meal. The practice is meant to discourage greed and to foster a sense of awareness of where the ingredients of a meal have come from.

But Maffei and Stevens had concerns about the origins of their ingredients. The organic flour they had been using to bake their lauded loaves was grown in the Dakotas, then trucked to North Carolina for milling before it was finally delivered to them in New England. In other words, it had a huge (and possibly unnecessary) carbon footprint. According to many records,

America's first-ever wheat harvest was in 1602 in Massachusetts. Was it really folly to think that wheat could be grown locally again? Inspired by Wendell Berry and others, Maffei and Stevens sought their own "radical approach to food production, economic participation and agricultural re-integration."

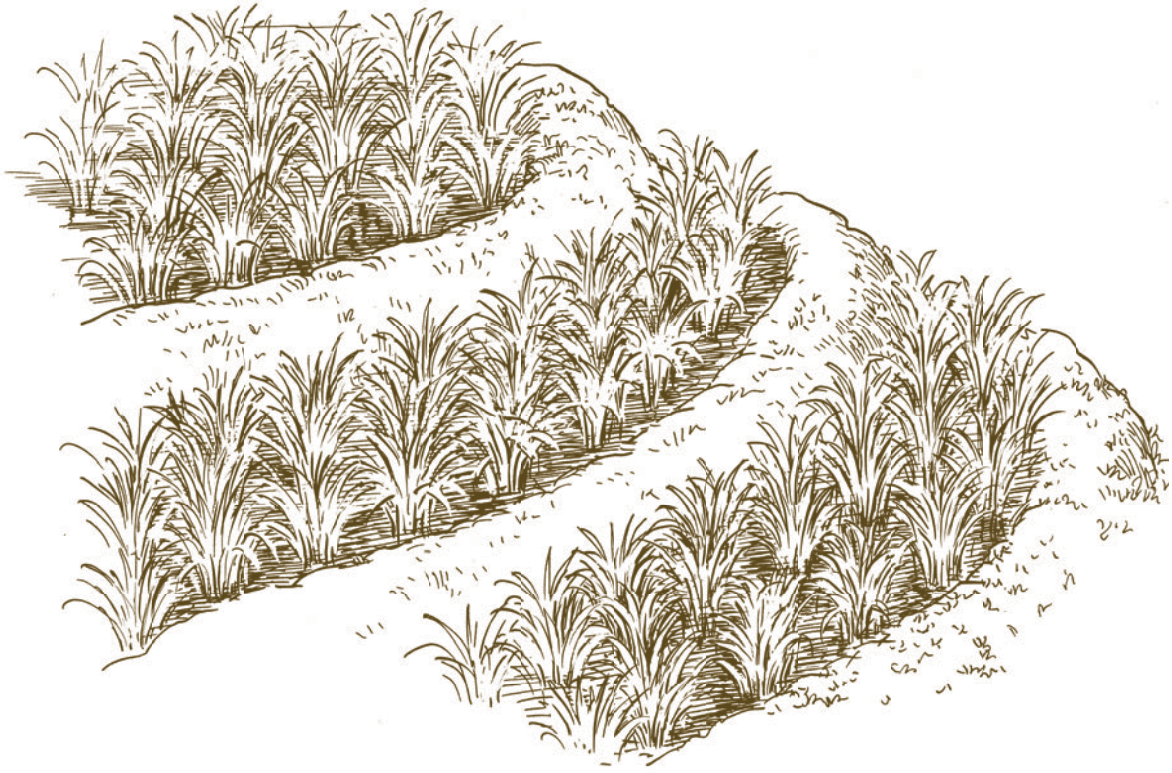
Their eureka idea harnessed the strength of its loyal community. "Imagine," encourages Hungry Ghost Bread in its Wheat Patch Project mission statement, "receiving a handful of wheat berries along with your loaf of bread and going home to plant them in the backyard — or front yard or side yard!" Since 2007, more than 100 customers have done just that, each donating square-foot test patches of their property, for the good of their bread.

Volunteers are testing several different types of wheat (from among the tens of thousands of known varieties) in the soil of the Pioneer Valley, to determine what best flourishes in that climate over time (the cultivar 'Red Fife' has been an early front-runner). Hampshire College, in nearby Amherst, has committed students affiliated with its farm center to collect all pertinent data regarding the survival and applicable growing conditions of each variety. The community farmers, who were all given extensively researched instructions by the accessible and supportive Hungry Ghost crew, may not have harvested wheat before, but they won't have to figure it out it alone. A local band of cyclists called the Pedal People will arrive with scythes when each growing season is through, to collect the handsome stalks.

What's next? Larger-scale planting of the strongest wheat candidate, provided more local farmers can be persuaded. Spelt and rye crops are being reintroduced to the area. Step by step, more is accomplished, with the next problem being how to efficiently mill what's eventually grown. For now, the small volunteer plots will, over time, provide all of the information necessary to go forward — and (significantly) this is all done with little financial risk to the farmers, the student scientists, or the bakers.

The plan is to name that hardiest wheat variety — the one which outsurvives and out-pleases the others — after Daniel Shay, an eighteenth-century farmer from Pelham, Massachusetts, who incited rebellion among 3,000 local farmers against the rapacious banking practices, grave taxes, and subsequent debtors' prisons of their day. It's a fitting name for a whole grain that promises to bring together members of the community and utilize disparate strengths towards one common purpose. It takes a village to raise a perfect loaf.

RICE



Botanical name: *Oryza sativa*

Season: Warm

Grain yield: 10 pounds per 100 square feet

Site: Full sun; warm temperatures; fertile, poorly drained soil

Days to harvest: 90–180

Gluten: No

Special consideration: Needs at least 40 continuous days with temperatures above 70°F

Undoubtedly, rice is the most important grain in the world; billions of people depend on it for sustenance. Growing it in the backyard, though, is challenging — but not impossible. You'll have the best luck with it if you live in the South — Texas, Louisiana, Arkansas, Mississippi, South Carolina, Florida, or southern Missouri — or in California, areas where you can count on a long, warm growing season.

You can try your hand with rice no matter where you live by planting small amounts in plastic buckets and setting them in a sunny spot outside or indoors under lights. You won't harvest enough rice to make a meal unless you plant many, many buckets, but this is a terrific way to learn and understand the steps that go into producing a rice crop. Have your children join in, and in the end, you'll both understand why Asian cultures avoid dishonoring the farmer by never wasting a single grain of rice.

TYPES OF RICE

Rice originated in dry areas, and over the years it has adapted to differing ecosystems.

Paddy or irrigated rice

Paddy rice grows where the farmer is able to control the water, pumping it in and out as needed over the growing season. Usually levees or *berms* (mounds of soil) are built around the growing area, which is kept flooded.

Deep-water rice

This type grows near rivers and other bodies of water. The farmer takes advantage of the natural rising and falling water levels but has no control over them. The rice must be able to tolerate periods of drought as well as flood.

Rain-fed lowland rice

In monsoonal regions, lowland farmers build levees around their fields to capture and hold the rain.

Upland rice

Upland rice will grow without flooding as long as the soil is kept moist. Typically, it is planted in areas with frequent rains. It may be grown in low-lying areas, on slopes, and even in drought-prone regions where irrigation water is readily available. Upland rice will be the best type for most people's backyard crop.

Most kinds of rice are grown in flooded fields, or "paddies."

In addition to ecological types of rice, there are varieties that have a long, medium, or short grain and ones with different textures and flavors, including sweet (also called glutinous), aromatic, and arborio rices. You can use any of these types pretty much interchangeably in recipes, but you may be surprised at the differences in taste and texture among them.

Long-grain

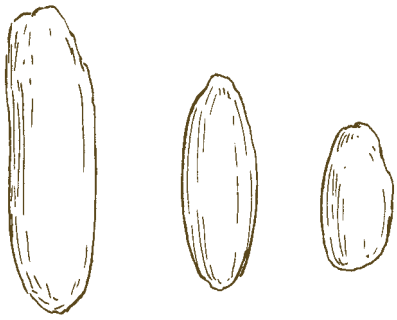
Kernels of long-grain rice are long and slender, four or five times longer than wide. When cooked, they're light and fluffy, and remain separate from each other. Long-grain rice tends to be a little drier than the others.

Medium-grain

Rice with medium grains are short and fat, two or three times longer than wide. They have the flavor of short-grained rice and the texture of the long-grained. Medium-grain rice cooks up moist, tender, and slightly sticky with a creamy consistency.

Short-grain

Short-grain rice is nearly round and cooks into soft, sticky grains. The flavor of short-



long-grain *short-grain* *Arborio*

grain rice is somewhat more sweet and pronounced than that of long-grain rice. This is the rice to use when making sushi.

Sweet

Sometimes called sticky rice, sweet rice is gooey when cooked. It's often used in frozen products.

Aromatic

Aromatic rices have more flavor and fragrance than regular rice. Among the aromatic rices are:

- Basmati, a long-grain rice
- Jasmine, qualities similar to medium-grain rice — soft, moist, and clingy
- Red, deep red bran, savory flavor, and slightly chewy when cooked
- Black japonica, black bran and sweet, spicy flavor

Arborio

A large, medium-grain rice, arborio becomes creamy with a chewy center after cooking. It's used primarily for risotto and other Italian dishes.

GROWING RICE

To grow rice, your garden must be in full sun and offer a three- to six-month growing season with average temperatures above 70°F, water-retentive soil, a reliable source of water for irrigation, and a way to drain the water when you're ready to harvest.

A level spot where water naturally stands after a rain is ideal. If your yard doesn't have such a spot and the soil is well drained, mixing copious amounts of organic matter, which holds moisture, into the soil combined with frequent watering will help.

It's not necessary to keep the area flooded — just wet. (Some references suggest that flooding is used mainly to control weeds and to supply to the roots nutrients dissolved in the water.)

Steady warm temperatures are almost more important than water supply. Rice is native to tropical and semitropical climates. Fluctuating temperatures below 70°F can reduce the plants' ability to resist disease. Night temperatures below 60°F stunt their growth.

Preparing the Plot

It will be easier to flood several small areas than one large one, so prepare several seed beds around the yard. Till or spade the beds, concentrating on getting rid of weeds, leveling the soil, and working in plenty of organic matter. Level ground ensures that if you decide to flood, the water depth will be the same over the entire bed.

In a home garden, you can simulate the conditions of a commercial paddy by blocking the ends of rows and flooding them with water.

You can prepare the soil in either fall or early spring. If you do so in fall, lightly go over it again in spring to hit any new weed growth. It's especially important to eliminate weeds, to remove competition for nutrients.

Plant the rice in rows rather than blocks so you can easily get in to weed. One approach is to dig trenches several inches apart, blocking or damming them at each end if you plan to flood the rows. The Japanese once used a similar technique, growing rice in the troughs and barley on the ridges. You could also build berms around the planting area to hold in water. Again, it's not necessary to flood the growing area; just keep the soil wet.

Planting

The traditional planting method is to sow rice in a nursery bed, then move the seedlings to the garden after a month of growth. In recent years, though, farmers have begun seeding directly into the planting bed.

The advantage of direct seeding is that you handle everything just once. Yields are larger because the plants don't have to go through transplant shock, and it takes less seed to sow the bed. The advantage to nursery beds is that the beds' smaller size makes it easier to keep weeds under control during the critical periods when seeds are germinating and seedlings are just getting started.

If your growing season is short, you can get a head start by sowing seeds indoors in flats under lights. Whatever method you use, wait until soil and air temperatures are in the neighborhood of 75°F to plant outdoors.

You'll need 1 to 2 ounces of seed per 100 square feet. Use the lesser amount if you're direct sowing the seed and the greater amount when transplanting. Before you

plant, prime the seed by soaking it in water for 12 to 36 hours.

Sow the primed seed in the garden, carefully tamping it down to ensure good contact with the soil. Cover with mulch. Water frequently and gently to keep soil moist. Young shoots should begin to appear in about a week. Thin the seedlings to 3 to 4 inches apart in rows 9 to 12 inches apart when they are 5 to 7 inches tall.

Transplanting. If you sowed the rice in a nursery bed, let the seedlings grow for about a month, or until they reach a height of 5 to 7 inches. Before transplanting them, thoroughly water the planting bed until it's muddy. Gently pull up the seedlings and immediately transplant them, pushing them into the mud in rows about a foot apart.

Rice is sometimes transplanted in bunches with two or three seedlings in a "hill" and hills about 5 inches apart in the row. There are no rules, however; all you really need to do is give the plants enough space to grow fully and provide access for you to get in to weed.

Flooding. If you decided to try growing rice submerged in paddies, begin flooding the area when the seedlings are obviously up and growing or transplants have settled in. Commercial operations keep the rice continuously submerged under 8 inches of water, and as plants grow they increase the water level. At home you can flood the area with as little as 1 inch of water.

To help hold in the water, build 2- to 6-inch-tall berms around the planting area. Lining the sides of the berms with plastic

Growing Rice in Buckets

If all you have is a sunny patio, you can still grow rice — in buckets. Granted, you won't reap a huge harvest, but it's a good activity to do with children and, if you choose an ornamental variety (like the purple-leaved cultivar 'Red Dragon') and an attractive container, it can even be decorative.

You will need one or more plastic buckets or other containers that have no drainage holes, water-retentive potting mix, and rice seeds that you have soaked for at least 12 hours.

Fill a bucket with a 4- to 6-inch-deep layer of potting soil. Submerge the soil in 4 to 6 inches of water. Sprinkle the seeds on the water; they'll sink to the bottom.

Move the bucket to a warm, sunny spot. Top off the water as often as necessary.

After three to four months, when the rice begins to nod, drain the water. Let the rice continue to ripen. In two weeks, or when the heads are golden, harvest the rice by cutting just under the heads.

Bake the heads at 180°F for an hour. After they've cooled, rub them to release the kernels from the hulls. Winnow, and the rice is ready to cook.

sheets will help prevent water from seeping out of the sides.

When the plants are about 15 inches tall, drain the paddy to cultivate, then flood it again. Some rice gardeners recommend draining the paddy each night and flooding it again in the morning to discourage mosquitoes and to give plants access to sunlight and oxygen.

How long the rice should be flooded and how long it should be drained depends on soil conditions and weather. Experiment with adding more or less water and try to judge how the plants are responding.

Irrigated beds. If you don't flood, water as often as necessary to keep the soil in the planting bed wet. Some ways to keep soil wet without breaking your budget are setting up a mister system and using a drip irrigation system or a soaker hose that runs continuously. Applying a deep layer of mulch after seedlings are up will help hold in soil moisture as well as keep weeds under control. Weed regularly so the rice plants don't have to compete for nutrients.

HARVEST

Rice is ready to harvest four to six months after planting, depending on the variety, and a month after it flowers. The seed supplier can give you a better estimate of the number of days to harvest.

If you've never seen mature rice growing, you may have a hard time recognizing when it's ready to harvest. Basically, rice that's ready to harvest looks like other

Rice is ready to harvest when the seed heads turn brownish gold and hang heavily on the plant.

grains; its heads will be brownish gold and heavy. Trust your eye. If you've been watching those plants since they were sprouts, following each stage, you'll almost certainly recognize ripeness even if you've never seen it before.

When the majority of heads have begun to nod — about two weeks before maturity — drain the water from the growing area or cut back on watering. This enables the grain to finish ripening and makes it a lot easier to work at harvest.

When it's ripe, harvest, thresh, and winnow rice as you would wheat or any other grain in the garden. Cut and bundle the stalks, then let them dry, either in shocks, on the ground if the weather is dry, or indoors in a spot with good air circulation where you

can spread out the rice. If you're harvesting only an experimental row or two, simply cut off the heads one at a time and leave the straw in the field.

Removing the Hulls

Freshly threshed and winnowed grain is known as *paddy* or rough rice. It will still be encased in an inedible tough, green-brown husk or hull. Even gardeners most lyrical about the joys of growing rice admit that hulling is nothing but pure chore.

Traditionally, rice was hulled by pounding the grain with a wooden mallet, working it with a large wooden mortar and pestle, or rolling it between stones. Using a huller like the one featured on page 99, makes the process much easier. You might also try baking the rice for 1 hour at 180°F to make the hulls easy to crack and rub off. After hulling, winnow the grain again to remove loose hulls and dirt. Store cleaned rice as you would any other grain.

BUYING RICE

It's a lot easier to buy rice than to grow and clean it. Rice is stocked in natural-food stores and supermarkets at low prices and in considerable variety. Organically grown rice is becoming more available in groceries, especially upscale ones. At one time, white rice was all you could find on most grocery shelves. These days, probably because of the growing interest in nutrition, most stores that carry white rice also carry brown rice and converted rice, as well as specialty varieties.

Brown rice. Any rice — long, medium, or short grain; sweet; aromatic; or arborio — that has been processed only enough to remove the hull is a brown rice. All parts of the brown rice kernel are intact: bran, germ, and endosperm. In fact, the bran gives the kernel its color.

Brown rice is rich in vitamins and minerals. It has a pleasant, mild, nutty flavor. Because of this, it is probably the easiest of all the whole grains to introduce to people accustomed only to refined foods.

It is slow cooking, requiring about 45 minutes to become tender. Cooked grains are slightly chewy — neither tough nor mushy. If you've had trouble cooking rice so that it doesn't turn out gummy, you'll be glad to know that brown rice almost never sticks together.

White rice. Further milling and polishing of brown rice removes the bran and results in white rice. White rice cooks much faster than brown rice, in about 20 minutes, but processing has removed most of its nutrients. To give you an idea of the scale of the loss: About 10 percent of the protein, 85 percent of the fat, and 70 percent of the minerals are removed. Most white rice is enriched to replace some of the losses.

Converted or parboiled rice. Converted rice is a little more nutritious than white rice because of the way it's processed. Before hulling, the kernels are steam-cooked, then dried. The steaming softens the kernels and enables the nutrients in the bran to migrate into the endosperm, so when the rice is hulled and polished, fewer nutrients are

lost. Converted rice is more expensive than either white rice or regular brown rice, and is about the same price as organic brown rice. It cooks up extra fluffy.

Precooked or instant rice. Instant rice is cooked, then dehydrated and packaged. The resulting product is akin to Styrofoam in flavor, but it cooks in just minutes.

Rice flour. Rice flour is commonly used by people who are allergic to wheat or have digestive problems. Both white and brown rice flour are available. White rice flour has about the same nutritional value as white rice and almost no taste. Brown rice flour is only a little darker than white flour. It's more nutritious and has a faint flavor. Both flours are usually sold in natural-food stores and some specialty and Asian shops.

Polishings. Rice polishings are the bran and other nutritious parts of the kernel that are milled from brown rice. About the only place you can buy them is in natural-food stores. The polishings are used mainly by people looking for natural sources of B vitamins; they add nothing to speak of in the way of taste or texture.

RICE IN THE KITCHEN

Recipes for rice are virtually limitless. Some of them begin with raw rice; some call for cooked rice. This section begins with recipes for the two basic ways of cooking rice: steamed and pilaf.

During a trip to Thailand, I found that just about every kitchen that had electricity had an electric rice cooker — even if the kitchen was outside. You don't need an electric rice cooker to make good rice, but using one is a pleasure. If you follow the directions that come with the unit, the results will be perfect, with no attention from you. Mix the ingredients, then go about your business. And using a rice cooker leaves a burner free for other uses.

Basic Steamed Rice

If you're not using an electric cooker, follow these directions.

- 1 cup raw brown rice
- 2½ cups water
- 2 teaspoons butter (optional)
- ½ teaspoon salt (optional)

If the rice looks dusty, run water over it in a colander or sieve. Brown rice sometimes has a little debris left when you buy it.

Mix the rice and water in a large, flat-bottomed saucepan with a tight lid. Leave the pan uncovered while you bring the rice to a boil over high heat. As soon as the water is

boiling, add the salt and butter, if using. Many recipes call for them, but neither is necessary and, in fact, if you taste rice cooked with and without these two ingredients, you probably won't notice the difference — brown rice, having a flavor of its own, doesn't need the boost.

As soon as the water and rice have come to a boil, cover the pan and turn the heat to low. Simmer for about 40 minutes, then lift the lid to see how much liquid is left. If there's still quite a bit of moisture in the pan, leave off the lid as the rice continues to cook for about 10 minutes.

You'll probably see some recipes instructing you to cook brown rice for up to an hour. Although it won't hurt, it usually isn't necessary to cook it that long. In any case, do the final few minutes of cooking with the lid off to dry out the grains a little and eliminate starchiness.

Yield: About 3½ cups

Basic Pilaf

1 cup raw brown rice
2 tablespoons butter or oil
2½ cups liquid (water or stock)
½ teaspoon salt

Wash and drain the rice, if necessary. Melt the butter in a heavy skillet, covered, over high heat, but take care not to let it burn. Pour in the rice and stir for a few minutes until each grain is coated and just beginning to brown slightly. Immediately but slowly pour in the water or stock and add the salt. As soon as the mixture has come to a boil, turn the heat to low, cover the pan, and simmer gently for about 40 minutes.

Notes: If you want to add chopped onion, celery, mushrooms, parsley, or other vegetables, sauté them along with the rice before adding the liquid.

If you use a stock or broth that already contains salt, don't add any salt in the cooking.

Substituting Rice Flour

For variety, substitute small amounts of rice flour for other flours in any recipe from bread to sponge cake. Recipes heavy in egg take especially well to such a substitution.

I don't recommend routinely substituting rice flour for all of the wheat flour in non-yeast recipes. The results tend to be crumbly and disappointing. But when cooking for someone who is allergic to wheat, rice flour is a good alternative.

Try replacing each cup of wheat flour with ¾ cup rice flour. Increase the leavening agent to 2½ teaspoons for each cup of rice flour in the bread.

Rice-Flour Pancakes

While these are a nice breakfast substitute for people who can't tolerate gluten in regular pancakes, they're also good served with a handful of sautéed vegetables and a dash of soy sauce.

- 1 cup rice flour
- 2 teaspoons baking powder
- ½ teaspoon baking soda
- ½ teaspoon salt
- 1¼ cups buttermilk
- 2 eggs, beaten
- ¼ cup melted butter

Sift together the flour, baking powder, baking soda, and salt. In a separate bowl, combine the buttermilk, eggs, and melted butter, then stir into the dry ingredients until just blended. Bake, turning once, on a lightly greased hot griddle.

Yield: 2 or 3 servings

Chinese Fried Rice

If the only fried rice you've ever tried has been white, you're in for a wonderful surprise when you taste it with brown rice. The ingredients here are suggestions, not rules; use what you have around the house and what you like. Make extra rice and use the leftovers for this recipe.

- 2 tablespoons oil
- 2 eggs
- 1 cup raw sliced vegetables (green pepper, scallions, celery, bean sprouts, peas, carrots, cabbage)
- 2 cups cooked brown rice
- Soy sauce
- ½ cup cooked, slivered chicken, pork, or fish
- ½ cup chopped spinach or Swiss chard
- Toasted sesame seed oil

Wipe the bottom of an iron skillet or wok with a bit of the oil. Beat the eggs with a fork and make a small, thin omelet. Remove from the skillet, shred, and set aside.

Put about 1 tablespoon of the oil into the skillet and stir-fry the chopped vegetables briefly over high heat. Don't overcook the vegetables; they should remain crisp. Remove from the pan and set aside.

Put the rest of the oil into the skillet, heat for a moment, and then add the cold rice. Stir it in the pan over medium-high heat, breaking up any lumps and making sure all the grains come in contact with the bottom of the pan from time to time. When all the rice is hot and beginning to look a little fried, season with soy sauce, stir again, then add the sautéed vegetables and shredded omelet. Stir together briefly, then add the slivered meat and the spinach, still stirring. Don't mix too thoroughly; you actually want to leave some of the vegetables and most of the meat on top. Sprinkle sesame oil on top and serve immediately.

Note: The sesame oil here is not cold-pressed salad oil, but instead oil made from toasted sesame seeds. You'll find it in small bottles in Asian shops, specialty stores, and the gourmet section of supermarkets. No other oil is an adequate substitute for flavor.

Yield: 4 servings

Sara's Fried Rice

This recipe is based vaguely on one from Julia Child, but she used white rice rather than brown.

- 2 tablespoons oil
- 2 cups cooked brown rice, cold
- 2 teaspoons sugar
- ½ teaspoon salt
- ¼ cup chopped onion or scallions
- ¼ cup thinly sliced celery
- ¼ cup pine nuts or cashews
- ½ cup cooked shrimp, chicken, pork, or turkey
- ¼ cup raisins
- 1 just-ripe banana, diced

Heat 1 tablespoon of the oil in the skillet until it is almost smoking. Add the rice and stir it rapidly, over medium-high heat, until all the grains are coated with a little oil and beginning to look fried. Sprinkle on the sugar and salt, stir a minute more, then turn the rice into a large warm serving dish and set aside.

Quickly heat the rest of the oil and add the celery, onion, and nuts. Stir for a minute, then remove the pan from the heat and stir in the shrimp, raisins, and (gently) the banana. With a spoon or spatula, make an indentation in the rice to hold everything, and pour in the mixture.

Variation: Modify the ingredients according to your taste. For instance, canned mandarin orange sections, diced apples, and bits of pineapple are a nice combination. In the vegetable line, you can include red sweet pepper or watercress.

Yield: 4 servings

Orange-Cashew Rice

Mandarin orange segments and cashews, which don't usually appear on the daily table, make this a nice party dish.

- 3 tablespoons butter
- ⅔ cup diced celery
- 2 tablespoons finely chopped onion
- 1½ cup water
- 1 cup orange juice, from drained mandarin oranges and enough other orange juice to make the measure
- 2 tablespoons grated orange rind
- ¼ teaspoon salt
- 1 cup raw white rice
- 1 cup cashew nuts
- 1 small can mandarin orange segments

Melt the butter and briefly sauté the celery and onion. Add the water, orange juice, orange rind, and salt. Bring to a boil, slowly stir in the rice, and bring back to a boil. Cover the pan, reduce the heat, and simmer for about 45 minutes or until the rice is just tender. Remove the lid during the last few minutes to cook off any excess moisture. When the rice is done, stir in the cashews and orange segments.

Yield: 6 servings

Rice and Shrimp Salad

It is better to cook rice fresh for this salad than to use leftover. Be sure you've cooked out all the excess moisture.

- 3 to 4 cups cooked brown rice (long-grain is best here)
- 3 tablespoons good salad oil
- 1 cup chopped tomato
- ½ cup chopped celery
- ½ cup chopped cucumber
- ½ cup raw green peas (fresh or frozen)
- ½ cup chopped green pepper
- ½ cup chopped mild onion
- 2 tablespoons chopped parsley
- ½ teaspoon dried dill
- ½ cup good salad oil
- 2 tablespoons lemon juice
- 1 tablespoon cider vinegar (more or less to taste)
- Salt and freshly ground black pepper
- 1 cup cooked, cleaned, and cut up shrimp
- Lettuce

Before the rice has cooled, pour the 3 tablespoons of oil over it and toss gently with two forks. This will keep the grains from sticking together. Cool the rice, then mix in all the vegetables. For the dressing, combine the ½ cup salad oil, lemon juice, cider vinegar, and salt and pepper. Mix in with the rice and vegetables.

Allow the rice to stand for at least an hour in a cool (but not refrigerated) place. (The standing period gives the dressing a chance to penetrate the rice and enables all the flavors to marry.) At the last moment, add the shrimp.

Serve with lots of lettuce leaves, such as Boston or Bibb.

Yield: 4 servings

Baked Rice Pudding

This is the rice pudding we have eaten in my family since I was a little girl. Mother made it with white rice and used brown sugar as a sweetener; I prefer brown rice and honey.

- ⅓ cup brown rice
- 4 cups whole milk
- ¼ to ⅓ cup honey
- 1 tablespoon butter
- ⅓ cup raisins
- 1 teaspoon vanilla
- Cinnamon

Wash the rice, if necessary. Mix the rice, milk, honey, and butter in a greased baking dish. Bake in a very slow oven, 225°–250°F, for about 6 hours, stirring occasionally. When the rice is tender but the pudding is the not quite the thickness you like, add the raisins and vanilla, sprinkle with cinnamon, and return to the oven for about 20 minutes longer.

Serve warm or cold.

Yield: 4 servings

RYE

Botanical name: *Secale cereale*

Season: Cool

Grain yield: 4–24 pounds per 100 square feet

Site: Full sun; well-drained, moderately fertile soil

Days to harvest: 120

Gluten: Yes

Special considerations: Cold hardy

Where would New York delis — or delis anywhere, for that matter — be without rye bread? Its assertive taste is a natural accompaniment to other strong flavors like those of corned beef and sour pickles.

It's no wonder these flavors came to be so well associated with each other. In northern Europe, where summer comes and goes in the blink of an eye, people had to be creative in finding ways to store enough food to last till the next spring. They preserved meats, fish, and vegetables such as cabbage by pickling, salting, and drying, methods that intensify the flavors of the food.

Rye became the most popular grain to grow in these areas because it is so cold-hardy, withstanding temperatures as low as –30°F. Its seeds will germinate in temperatures as low as 32°F; the plants grow at 40°F. Thus rye sown in fall puts on growth until frigid temperatures arrive, begins growing again in early spring, and is ready to harvest by midsummer. It's the perfect grain for cold regions with short, cool growing seasons.

Grain or Grass?

When looking for rye seed, you will most likely run across perennial and annual ryegrass. Ryegrass is a popular cool-season lawn and forage grass. However, it doesn't produce cereal grain. Before buying, check the botanical name. Ryegrass is *Lolium perenne* or *Lolium annua;* rye grain is *Secale cereale.* There are other ryes that form grain; all are in the genus *Secale.* Rye is also commonlly known as cereal rye or winter rye.

GROWING RYE

As a cool-season crop, rye is planted in either fall or in spring. Far more is planted in fall because spring-planted rye yields less and is of inferior quality. Timing is also trickier in spring. You have to get the planting sown early enough that it is ready to harvest before the hottest part of summer arrives.

Winter rye grows wherever winter wheat grows, as well as in areas where wheat wouldn't make it through the winter. Sow rye anytime from late summer to late fall. Although the seeds germinate at 32°F, optimum germination temperature is around 80°F. Like wheat, the plants need to grow for six to eight weeks before freezing weather sets in. However, because rye will grow at lower temperatures than wheat, you can sow it a couple of weeks later.

Site

Rye grows and yields best when growing in well-drained, fertile, loamy soil with a slightly acid to neutral pH (6.0 to 7.0); it is quite adaptable, however. You can grow it in poor, sandy soil; in clay; and at pH levels between 4.5 and 8.0. The one thing it won't tolerate is standing water, especially in winter. Wet soil greatly reduces hardiness, so don't plant where water puddles.

Prepare the soil by making sure it is free of weeds and balanced in nutrients. If you fertilized the plants previously growing in the bed, you probably don't need to add more fertilizer to the soil.

Sow the seed 1 to 2 inches deep, broadcasting it in wide rows at the rate of 0.4 to 0.6 pound per 100 square feet. Leave enough space between rows so you can get in to cultivate. The seed will germinate in dry soil, but it's better for the soil to have some moisture so the plants can get up and growing before winter. Rye is competitive with weeds, but keep after winter weeds — the ones that germinate in cool fall weather — until the rye crowds them out.

Rye is one of the most cold-hardy grains; its seeds will germinate in temperatures as low as 32°F.

Because of its wide-ranging root system, rye is quite drought tolerant. The most important time to water is in spring, when the flower stalk is beginning to grow, until the milk in the grain begins to mature and harden.

Problems

Rye has a few problems. The ones to watch for are the fungal diseases ergot, stem or stalk smut, rust, and anthracnose.

Ergot

Ergot is a disease caused by a fungus that infects grass plants while they are in bloom. You can recognize the disease by the small, black, grain-size growths developing in place of the individual grains. These are called *sclerotia*; they are the fruiting bodies of a fungus. Any ergot makes the grain unusable (see Ergot Danger, page 132).

The sclerotia overwinter in the field or on seed in storage. To avoid the disease, buy only certified disease-free seed. Till the bed deeply after harvest to bury any fruiting bodies, and wait one to two years before planting rye in the same spot. Keep grassy weeds mowed; ergot can infect them too, and the disease can then spread to your crop.

Smut

Infected plants develop long, narrow gray streaks on stems, sheaths, and leaf blades. Affected plants turn dark green and become dwarfed, their stems twisted and distorted. Flower heads fail to emerge. Look for varieties resistant to this fungal disease and rotate crops to control it.

Rust

Rust may be a problem on rye growing in the South. It causes reddish brown pustules on leaves and stems and reduces plant growth and grain yield. Clean up debris from the garden and pull up volunteer rye plants.

Anthracnose

During warm, wet weather in spring, rye plants may develop anthracnose. Infected plants show purple-brown stains on their sheaths; they may lodge or their roots rot. Grain kernels ripen prematurely and may be shriveled and light brown. The disease is most common on acid soil and when plants are deficient in phosphorus. Rotate rye with other garden plants — not other grains — to control the disease.

Ergot Danger

In most instances, you don't need to worry about diseases in grain crops. The chances for avoiding problems are excellent if you raise only small plots of grain. When it comes to ergot in rye, though, that's a whole different story. You need to be able to identify and avoid eating rye that has been infected with it. It is poisonous to you and to animals.

The sclerotia contain substances related to LSD; people who eat ergot-tainted grain have hallucinations. If they continue to eat the grain — as people did before they understood the disease — the symptoms become more serious, culminating in convulsions or gangrene. Some historians suggest that people who were accused of witchcraft were actually suffering from ergotism, or ergot poisoning.

You may never spot ergot in the rye you grow. But if you do, destroy that grain.

HARVEST

Rye ripens earlier than does wheat, 40 to 50 days after temperatures reach the 40s in spring. (Spring rye is ready 65 to 70 days after planting.) It's ready to harvest when the heads are full, almost dry, and have changed from green to golden. Test for ripeness by chewing on a few grains. When they're firm and crunchy, the rye is ready.

Swath the grain, leaving it in windrows or shocks to dry. Thresh and winnow the grain, then store it in sealed containers in cool, dry conditions.

Average yield is 8 to 10 pounds per 100 square feet. As you're starting out, you may harvest only 4 pounds from your 100-square-foot plot, but the more experienced you become at growing rye, the larger the harvest. In fact, you can eventually harvest as much as 24 pounds per 100 square feet. Cold, rainy weather when the grain is flowering will reduce yield.

Rye is ready to harvest when the heads are full, dry, and golden.

Although rye doesn't need to be hulled, it still must be threshed to separate the kernels from the rest of the seed head.

Uses

Because it has no hull, rye is ready to cook or grind as soon as you harvest it. It is easier to grind than some of the other grains. Most people grind rye into flour, but the berries can be eaten whole or flaked or rolled for cereal. The flour is dense and contains less gluten than does wheat. Used alone, it bakes into a heavy, black loaf. Mix rye with wheat flour if you prefer a lighter bread.

Nutritionally, rye berries and dark rye flour are rich in fiber, iron, magnesium, phosphorus, potassium, zinc, manganese, selenium, and niacin. Unlike most other grains, the fiber is found throughout the endosperm, not just in the bran.

Rye makes a terrific green manure crop. Its large, fibrous root system holds soil in erosion-prone areas, prevents compaction, and improves soil tilth. Use rye to improve the soil in the vegetable garden by planting it in a few off-season rows. Or sow rye between rows of late vegetable crops so you'll have a

green carpet instead of a muddy lane to walk on, as well as a harvest the next spring.

If you're growing grain to feed animals, be aware that rye is not a satisfactory animal feed unless it's mixed with other grains.

The straw is prized for its many uses. It is the favorite bedding straw around horse stalls. Crafters love it: Because of its length — 5 to 6 feet — and beautiful golden color, you can use it for weaving baskets and other decorative items, making hats, and braiding.

BUYING RYE

If you're not interested in growing rye for straw or green manure and just want to try it in a few recipes, you may decide to buy rye. Here's what to look for.

Whole berries

Berries are the individual whole grains that have not been cooked or processed in any way. You'll find whole berries in natural-food stores, some grocery stores, and many catalog and Internet sources.

Cracked berries

Berries that have been cut into pieces are called cracked. Cracked rye is less common than cracked wheat but is available in natural-food stores and natural-food sections at the grocery. You can also find cracked berries on the Internet and in catalogs.

Rye Straw for Crafts

German farmers growing rye for weaving harvested the straw when it was about 18 inches tall, tearing the plants out by the roots, then tying them into small bundles and letting them dry a day or so in the sun. The bundles were then hung in a shed or attic to continue drying for a year or even two. When the straw was ready, craftspeople opened and spread out the bundles outside, exposing the straw to two nights of dew and three days of sun on each side to bleach and soften the stalks. They then cut the heads and roots from the stalks and sorted the stalks into piles according to thickness.

Rolled and flaked

These are whole berries that have been processed like oatmeal or cereal flakes. Most natural-food stores stock rolled rye and rye flakes, which look much like oat or wheat flakes and are used the same way.

Flour and meal

One reason for buying flour rather than grinding your own is that the whole rye berries are comparatively soft and tend to clog a stone grinder. They can be ground easily in impact mills, however.

You'll notice that some rye flours are darker than others, depending on how much bran has been sifted out in processing and the variety of rye from which the flour was milled. It may be labeled light, medium, or dark. No matter the color, all rye flours taste

about the same and are fairly interchangeable in bread recipes. However, the darker the color, the more nutritious the flour.

Rye meal is a coarser grind of flour and works as well as finer flours in baking bread. You can find rye flour and rye meal at natural-food stores and many supermarkets.

RYE IN THE KITCHEN

Almost everybody likes the taste of rye in one form or another, although the authors of one cookbook said they deliberately omitted any recipes using whole rye berries because they take "hours to cook" and taste "just dreadful." Wrong on both counts. The only reason rye berries would taste dreadful is if they were cooked so long that they got gooey.

You've probably seen more than one recipe instructing you to cook a whole grain for as long as 3 hours, but the fact is, rye berries shouldn't be cooked much more than 30 minutes if you want them to retain their shape and texture.

You can make a porridge or gruel of rye as you would oatmeal. Simply simmer the whole, cracked, or rolled grain in water until tender and mushy. However, that seems to be wasting the potential of a grain that can be cooked in many more exotic and delicious ways.

Many of the recipes in this section begin with cooked rye berries, so even though you'll probably not serve just plain cooked rye very often, we'll begin with that basic recipe.

Cooked Rye Berries

2 cups whole rye berries

4 cups water

Wash the rye by running water over it in a pan and tilting the pan to run off the floating chaff and dust. Do this step carefully; rye can taste dirty if it hasn't been cleaned well.

Cover the rye berries with the water and quickly bring to a boil over high heat. Reduce heat, cover the pan, and simmer about 30 minutes, or just until a few of the grains have begun to burst open. Drain the grain in a colander or sieve; all the moisture probably will not have been absorbed.

Yield: About 4 cups cooked rye

Sourdough Rye

You can be overwhelmed by the number of recipes for sourdough rye. Some of them are quite complicated and must be started as much as four days ahead of baking time; some involve making two or even three sponges (a kind of starter). I still remember trying one such multistep recipe back in the days when I was new to the kitchen. The recipe required making two sponges and keeping everything warm and growing over a period of three days, which involved putting the mixing bowl under the furnace housing and checking on it every few hours. The finished loaves were supposed to be crusty. Crusty *turned out to be an understatement. Ultimately, after having chipped a bread knife and bent a carving knife, we had to get a hacksaw out of the toolbox to cut the bread. A neighbor said it was quite good, ". . . once you got in." This recipe is much simpler and should*

produce loaves you can cut with an ordinary bread knife.

For the starter

- 1 teaspoon dry yeast
- ¾ cup warm milk
- ¾ cup rye flour

Mix the yeast into the warm milk and stir in the rye flour. Cover with plastic wrap and allow to stand at room temperature for three days, stirring lightly once daily.

For the dough

- ½ cup water
- 1 egg
- 1½ tablespoons vegetable oil
- 1½ tablespoons light molasses
- 1½ teaspoons dried yeast proofed in 1 tablespoon warm water
- 1½ teaspoons salt
- 1 tablespoon fennel or caraway seed (optional)
- 2½ cups unbleached white bread flour
- ¾ cup rye flour

Mix the starter with the water, egg, oil, molasses, yeast, salt, and fennel, if using. Gradually work in the white and rye flours. Knead until elastic, cover lightly and allow to rise in a warm place until about double in bulk. Deflate the dough and shape into a round loaf.

Place in a well-buttered baking pan (a round ceramic dish is great) that the dough fills by about half. Preheat the oven to 350°F.

Allow the dough to rise until it has reached the top of the pan or even a tad higher. Bake for 40 to 50 minutes, or until the loaf is well browned and sounds hollow if you turn it out of the baking dish and thump it on the bottom.

Yield: 1 loaf

Mostly Rye Bread

This recipe will give you a rather dense loaf, not sweet, good for eating with cheese and cold cuts.

- 1 package active dry yeast
- 2 cups warm (90°–105°F) potato cooking water
- 1 tablespoon oil
- 1 tablespoon honey
- 2 teaspoons salt
- 2 cups unbleached white flour
- 1 cup mashed or riced potatoes
- 4 cups rye flour

Dissolve the yeast in the warm potato water. Add the oil, honey, and salt. Gradually beat in the white flour, being sure to continue beating until the mixture becomes shiny. Beat in the mashed potatoes and, a little at a time, the rye flour.

Continue beating in the rye flour until you have a dough you can handle, then dump it onto a floured surface, shape it into a ball, cover with a cloth, and allow it to rest 15 minutes before beginning to knead. Kneading this dough will be easier if you grease your hands first and keep extra flour available to work in as the dough gets sticky. Knead for

10 to 20 minutes — this dough will never get as stretchy and shiny as an all-wheat dough because there's less gluten in it.

Put the kneaded dough in a warm place to rise until doubled in bulk. Then punch it down and divide it into two 9×5-inch (or smaller) greased pans.

Preheat the oven to 375°F. Let the loaves rise again, in the pans, until about double, then bake for about 60 minutes.

Yield: 2 small loaves

Vegetable-Rye Casserole

Try serving this without telling anybody that the grain is rye, just to see if anybody can identify it.

- 4 cups broccoli, carrot, and cauliflower pieces, mixed (fresh or frozen)
- ½ cup water
- 1 large celery stalk
- 1 leek
- ¼ cup chopped parsley
- 2 tablespoons butter
- 2 cups cooked rye berries
- ¼ cup butter
- ¼ cup unbleached white flour
- 2 cups stock
- ¼ cup dry white wine
- ½ teaspoon salt
- ½ teaspoon white pepper
- ¼ to ½ cup wheat germ or dry bread crumbs

Cook the broccoli, carrots, and cauliflower together in the ½ cup water until the vegetables are barely tender. Remove with a slotted spoon and set them aside. Use any remaining cooking water to make up part of the 2 cups stock.

Chop the celery and leek fine and sauté, along with the parsley, in the 2 tablespoons butter.

Note: You may substitute onion for the leek, but the sweetness of the leek complements the taste of the rye in a way no onion can.

In a 2-quart baking dish, combine the steamed and sautéed vegetables with the cooked rye. Mix together well and set aside.

To make the sauce, melt the ¼ cup butter in a saucepan, stir in the flour, and stir over medium heat until the roux is golden. Gradually whisk in the stock, stirring to make a light sauce. When it is smooth and hot, season with the white wine and the salt and pepper. Cook a few minutes longer to evaporate the alcohol from the wine.

Preheat the oven to 350°F.

Pour the sauce over the vegetables in the baking dish, using a spoon to make sure the sauce gets well mixed in. Sprinkle enough wheat germ or bread crumbs over the top of the vegetables to cover the surface. Bake for 30 to 45 minutes, or until the top is browned and the contents of the dish are bubbling.

Yield: 8 servings

Rye Borscht

If you use vegetable stock rather than beef or chicken, this is a fine vegetarian soup-stew. Either way, it's a satisfying meal. One taster pronounced it "so good it hurts."

- 1 small head cabbage
- 2 stalks celery
- 1 large onion
- 4 cups canned or cooked tomatoes
- 2 cups canned or cooked beets, diced
- 3 cloves fresh garlic, peeled and minced
- ½ bay leaf
- Water or stock
- 2 cups cooked rye berries
- 1 cup cooked white beans
- 3 tablespoons cider vinegar
- 3 tablespoons brown sugar
- Salt and freshly ground black pepper
- Yogurt or sour cream

Chop the cabbage, celery, and onion coarsely and put them into a good-sized soup kettle with the tomatoes, beets, garlic, and bay leaf. Add water or stock to cover and simmer gently, covered, until all the vegetables are tender.

Add the rye and white beans and simmer a few minutes more over very low heat to allow the flavors to marry. During this simmering time, season with the vinegar, brown sugar, and salt and pepper. This should have a decided sweet-sour taste, so add a little more vinegar and brown sugar, in equal amounts, if it isn't pronounced enough.

Serve topped with lots of yogurt or sour cream.

Note: No matter how skeptical you feel about the garlic, don't omit it, use less, or substitute garlic powder. The flavor of fresh, long-cooked garlic is mild and delicious and an essential part of the flavors in borscht.

Yield: 12 generous servings

Rye and Parsnips

This combination is so good you could serve it at the most important dinner party you ever give — provided you're not entertaining someone who doesn't like parsnips. Even then it might be worth the risk; few tastes complement each other as perfectly as those of rye and parsnips.

- 3 cups peeled and diced parsnips, woody parts removed
- 1 cup water
- 2 cups cooked rye berries
- ¼ cup butter
- ¼ cup unbleached white flour
- Parsnip cooking water and enough milk to make 2 cups
- ½ cup grated sharp cheddar cheese
- ½ teaspoon salt
- Chopped chives

Cook the parsnips in the water until they are tender but not mushy. Remove the parsnips but retain the cooking liquid. Mix the parsnips and rye berries and set aside where you can keep them warm.

To make a thin-to-medium sauce, melt the butter and stir in the unbleached white

flour. Cook over medium heat until golden. Whisk in the milk and parsnip cooking liquid. Cook and stir over medium heat until mixture is hot and smooth, then stir in all but 2 tablespoons of the cheese and the salt. Stir until the cheese melts. If the sauce seems thick, thin it out with a little more milk; for this recipe, the sauce should not be too thick.

To serve, pour the hot sauce over the warm rye and parsnips and sprinkle with the remaining cheese and the chopped chives. Serve very hot.

Yield: 8 servings

Marinated Vegetable and Rye Salad

This was inspired by a salad served at the Millheim Hotel in Pennsylvania, but the only thing the two recipes have in common is that they both contain rye berries. Experiments in cooking often work that way; you taste something good, pick out one thing you like about it, and run off on a series of related-but-not-very experiments. In any case, the rye grains in something called Perfect Protein Salad triggered the experiments that led to this marinated vegetable salad.

Baby limas

Corn

Green beans in 1-inch pieces

Pearl onions

Sliced carrots

— — —

Steamed Brussels sprouts

Cooked rye berries

Sliced raw radish

Cooked chick peas

Diced raw cucumber

— — —

Wine vinegar

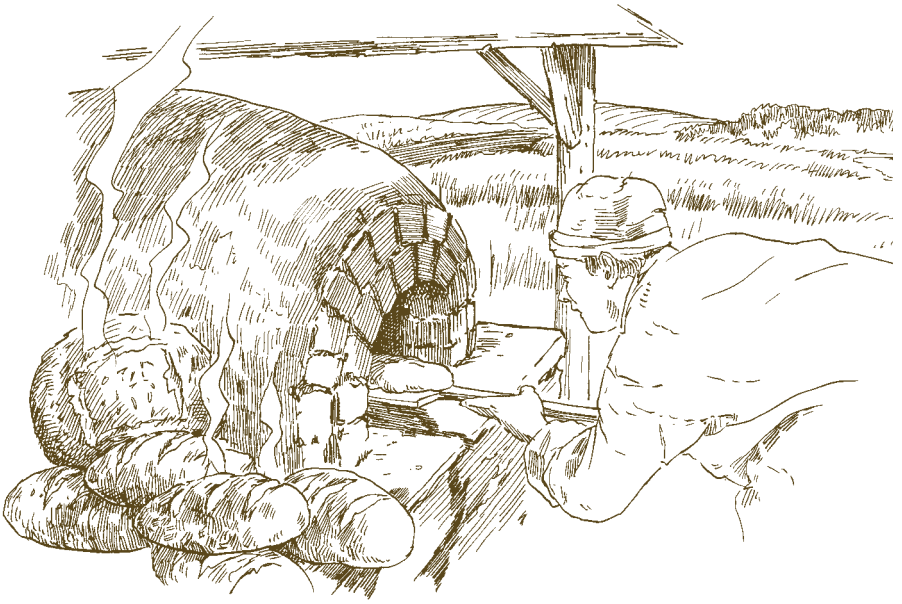
Salad oil seasoned with dill, garlic, and salt and freshly ground black pepper

In a large glass bowl or jar, layer the vegetables in the first group, cooked just to the crisp stage and cooled.

Next add layers of rye berries, radish, chick peas, Brussels sprouts, and raw cucumber.

Over the entire mixture, pour a marinade of ¼ cup wine vinegar for each cup salad oil (part olive is nice), which you have seasoned with dill, garlic, and salt and pepper. To get the right garlic flavor, soak a peeled garlic clove in the oil for an hour or two, then discard the clove.

Refrigerate until everything is thoroughly chilled. Serve in the glass container so that the layers show. At the Millheim Hotel, the cook studied this recipe and said, "I'll have to make two — one for people to look at and one for them to eat."



Yannig Tanguy
Crown Point Bread Company
Crown Point, New York

"Everything is about time," pledges impassioned baker Yannig Tanguy, owner of Crown Point Bread Company in upstate New York. "If you cheat time, you lose quality."

This is no minor assurance from someone whose aspiration has, from childhood, been to bake breads just as French settlers in his region did three centuries ago. It is an idea that encompasses Tanguy's lifestyle commitment to "doing good work that makes the world better," placing personal value on process above all.

"Give me flour, salt, and water," he says, "And in three days, I can bake you as much bread as you want." Tanguy is constantly starting new "starters," or "pre-ferments," which enhance the complexity of flavor and longevity of the bread.

"If I'm making a French baguette," he explains, "I do use a little commercial yeast because that's what the recipe calls for." His problem with modern yeast is simply that people use too much of it in lieu of allowing a small amount to grow over an extended period of time. "The many generations of yeast that happen over several days will adapt to the ingredients

present," he says. (He speaks with awe of a family he met in Florida that has maintained a starter for 300 years — their bread a direct connection to their ancestors).

Given his commitment to historical methods, it's no surprise that Tanguy has found avid fans among re-enactors of the Revolutionary and French-Indian Wars, both locally, at Fort Ticonderoga, as well as around the country. He's often invited to bake loaves of bread, pizzas, and pastries at battlefields and festivals. A trained ceramic artist, Tanguy has built his own clay and brick ovens over the years, but has recently imported from France both a portable one-ton oven kit to assemble and use off-site, as well as his shop's permanent 48,000-pound wood-fired oven. Its stone turntable has the capacity to bake 200 loaves at a time.

Tanguy's own ancestry is in France, and through the years he's had the opportunity to connect with his Gallic roots. "I spent a lot of time in underground bakeries in Paris," he says, conjuring these cavernous, shadowy spaces with side chambers and alcoves of varying temperatures, each harboring a vessel of living dough distinct from the others.

"Different flours have different fermenting characteristics," he says, necessitating different timing and temperatures for each starter to bring out its best flavor and texture. "This is the art of baking [as it was] before refrigeration." With modern refrigeration, he says, processes now exist on a human time scale. Tanguy's schedule, like the Old World artisans, is dictated by the dough's needs.

Tanguy acquires whole grains from area farmers, including Shoreham, Vermont's Ken Van Hazinger, who grows modern grain varieties with historic, sustainable methods ("his grains have more spirit in them"). Tanguy enjoys blending different grains to create his flours — he cleans them himself, mills them between 20-inch-wide millstones imported from Austria ("milling is its own art!"), and sifts. He is guided not by prescribed measurements, but rather by intuition and by feel.

"My bread is rustic," says Tanguy. It's also a representation of the life he's chosen for himself, and he laments the lifestyle that modern, industrially produced bread depicts. "All those preservatives and plastic packaging, all of that distance between the food and the person who eats it, all of that pollution, garbage, trucking, stress . . ." he says.

"We are conforming our lives to the production schedules of machines. It's cutting us off from a connection with the earth," he says. "If you put attention into a starter, and then bake that bread, it's a relationship."

WHEAT

Botanical name: ***Triticum aestivum***

Season: Cool

Grain yield: up to 20 pounds per 100 square feet

Site: Full sun; well-drained, moderately fertile soil

Days to harvest: 140

Gluten: Yes

Special considerations: None

Wheat and the discovery of the gluten in its flour — or at least the discovery of ways to take advantage of the gluten — changed how the world eats. Without it, there'd be no soft, yeasty leavened breads, no tasty quick breads, just flat breads.

Gluten is the substance that, when mixed with water, forms elastic strands. These strands allow bread dough to capture gases released by yeast and to stretch, grow, and develop an airy texture. Other grains contain gluten, but wheat has the most. Eighty to 85 percent of its protein is gluten.

Biting into a piece of whole wheat bread and knowing that it is "your" bread, from planting to oven, is one of the great pleasures of life. Wheat is easy to grow. It's such a manageable crop that you'll wonder why you hadn't tried your hand at it before.

TYPES OF WHEAT

Modern wheat varieties fall into two general groups, hard and soft. These groups further break down into groups based on color — red or white — and growing period — spring or fall. Some are better suited to certain areas than others.

Soft Wheat

The kernels of soft wheat contain less protein than those of hard wheat, so the starch is softer and contains less gluten. Soft wheats are best suited to making biscuits, cakes and other pastries, and quick breads. They are milled into pastry and cake flours, or they may be rolled and flaked for cereals.

Soft wheats are planted in fall or spring. They may be red or white. Red soft wheats are grown mainly east of the Mississippi River. White soft wheats have lower protein levels but they produce high yields. They are grown mostly in the West and the northern United States.

Hard Wheat

Hard wheats have small, hard kernels and high protein and gluten levels. Because of their high level of gluten, hard wheats are best suited to bread baking. The amount of protein and the uses for hard wheats vary depending on the variety and growing conditions. Hard wheat may be red or white and is planted in spring or fall.

Hard red spring wheats are grown in the Upper Midwest and Great Plains states. They contain more protein than winter wheats and, thus, more gluten, so they are generally ground into bread flour.

Hard red winter wheats have medium to high amounts of protein and are milled into all-purpose and bread flours. Breads made

Five Kinds of Wheat

from hard red wheats have the typical dense texture of whole-grain loaves.

Hard white winter wheat has the same nutritional value as hard red wheat. The milled flour is pale tan, darker than white flour but not as dark as regular whole wheat. It tastes less bitter than other wheat flour. The bran of white wheat is not as hard as other wheats, so it doesn't cut the gluten strands as breads rise, giving them a somewhat softer texture than loaves baked with hard red wheat.

White wheat isn't really new; the American market just didn't know about it until the 1990s. White wheat has long been popular in China, Southeast Asia, and Australia for use in breads and noodles.

Durum Wheat

A different species, durum wheat (*T. durum*) has the hardest kernels and contains the most protein of any of the wheats. However, it doesn't have a lot of gluten. Durum is best suited to making pastas and grows in the northern Great Plains.

Which One to Choose?

The best variety of wheat for the garden depends on the weather and soil conditions where you live. Extension agents, local farmers, seed stores, and many Internet suppliers offer good advice on suitable varieties for your area.

One source for seed is the farmers' market, where you can pick up wheat berries sold for grinding. Be aware of what you're getting, though, to ensure that it's suitable for your garden. The best way to do that? Ask the vendor. Wheat berries from the natural-foods store are okay, too, but again, you need to find out where it came from so you know whether it's appropriate to grow in your garden.

Also check what's available from grain sources on the Internet. The advantage of getting wheat from an Internet or mail-order source is that you'll have a wider selection of varieties and more information about what you're getting.

If you find something you particularly like, save part of each year's harvest for planting the following year.

GROWING WHEAT

For growing wheat, select a site in full sun with well-drained soil. Well-drained soil is especially important for winter wheat. The wetter the soil, the less able wheat — and many other perennial plants — is to tolerate cold temperatures and the less likely it is to survive winter. A sandy loam with a good balance of nutrients and a pH between 7.0 and 8.5 is ideal.

Winter survival goes down when wheat is deficient in phosphorus, so make sure the soil contains adequate phosphorus if you plan to grow winter wheat. You may need to mix in bonemeal or rock phosphate as you prepare the soil.

Steer clear of sites with fertile soil, and don't mix high-nitrogen fertilizer into the soil. Rather than improving the grain, high fertility and excess nitrogen cause wheat stalks to grow too quickly and too tall. These tend to lodge or topple over, dropping grain

Winter vs. Spring Wheat

The main difference between winter and spring wheat is the time when you sow them. Winter wheat is sown in late summer to early fall. It grows for a few weeks, winters over when cold weather arrives, then is ready for harvest in midsummer.

Because winter wheat is harvested before the mad rush of fall, when everything else in the garden is ripening and calling for your attention, it'll save you a lot of stress. It's also an option for planting in areas where spring is too wet to sow in time to get a good spring wheat harvest.

Spring wheat is grown where winter conditions are too severe for winter wheat. It is sown in early spring, as early as soil can be worked, and harvested in summer. Both hard and soft wheats may be planted in spring.

onto the ground and making harvest difficult. If lodging occurs before heading begins, the plant may never form grain.

To ensure that your site provides the right nutrient balance for wheat, have the soil tested to learn exactly what it needs. (The local extension service will do this for you.) Follow the test results and till and work in amendments as you prepare the seedbed.

Planting

You'll need 0.4 to 0.625 pound (6 to 10 ounces) of seed per 100 square feet of garden area. Sow wheat in regular rows, in 4-foot-wide rows, or in solid blocks. Regular rows should be 6 inches apart with the seedlings 1 inch apart.

Work the seed into the soil by raking the bed to a depth of 1 to 1½ inches. Then make a pass over the area with a lawn roller to firm the bed and increase the contact between seed and soil. In a small garden, you can put down a plank and walk on it for the same result.

Winter Wheat

Plant winter wheat early enough to allow eight to twelve weeks of growth before the soil freezes so that the plant is vigorous and healthy as it goes into winter. With cooperative weather, the wheat should be 5 or 6 inches tall by the time winter arrives.

If you plant too early, the wheat will grow too tall before winter sets in, which may cause it to lodge or blow over in storms. It will also be less resistant to winter injury and disease. Insects that are active in late summer can also be a problem for early-planted wheat. If you plant too late, the roots will not be developed enough to withstand the cold, and the plants won't winter well.

As soon as you can get on the land the following spring without wallowing in mud, roll the wheat again. This old practice increases the number of stems emerging from one crown by squashing it and stimulating it to produce more stalks in a process called tillering. After this, just keep down the weeds, if you can, and enjoy watching the wheat grow until harvesttime.

A young wheat plant, just after flowering, will have tight, green, developing seed heads.

Spring Wheat

Sow spring wheat as soon as the ground can be worked in spring. Do the initial soil preparation in fall, so you don't have to worry about waiting for the soil to dry before planting in spring. Spring wheat is ready for harvest in late summer.

Some people recommend giving spring wheat a head start by sowing it in flats six weeks before the last frost date. Transplant the seedlings after the last frost; you don't need to wait till weather is warm.

Harvest

Wheat is about ready to harvest when its stalks start to turn from green to shades of yellow, brown, and gold. When the heavy heads

tip toward the earth, it's time to test the grain. Pick a head, pluck out a few grains, and pop them into your mouth. If they are soft and doughy, the grain is not yet ready. Test daily. One day the grains will be firm and crunchy. That's when you harvest.

Keep an eye on the grain. If you wait too long to harvest, the grain can shatter and fall to the ground and birds will move in to help harvest.

To harvest wheat growing in a very small plot or in rows, just pick or cut the stems below the heads. Place them in a paper bag to dry for a couple of weeks.

For larger areas, use a scythe and cradle or a sickle to harvest the grain. Cut the stalks at their base, then bind them into sheaves and pile up 8 to 12 sheaves to form a shock. Leave the shocks in the field or move them indoors to a well-ventilated spot for a week to ten days to dry.

When the heads are dry and no hint of green remains, thresh and winnow the grain.

Wheat is fully ripe and ready to thresh when no hint of green remains on the seed heads.

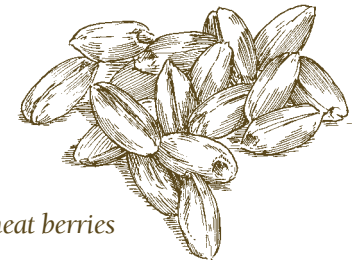
BUYING WHEAT

Realistically, unless you're a committed purist, you'll probably never give up buying flour and other wheat products from the grocery. For one thing, the effort it takes to keep yourself supplied with home-produced wheat flours to the exclusion of all else is often more than you can manage. Luckily, you can buy wheat almost anywhere food is sold, and in a tremendous number of forms. Most are made from red wheat, but as white whole wheat grows in popularity, it's beginning to show up on grocery and natural-food store shelves in the same forms as red wheat.

Berries

Individual whole-wheat grains that have not been cooked, mashed, or otherwise changed are called berries. If they are in good condition, they will sprout and you can even use them as seed. Buy wheat berries in natural-food stores, from feed stores, from farmers who grow wheat for their livestock or for commercial flour manufacturers, and through Internet and mail-order sources. If you buy them anywhere other than a food store, make certain they have not been treated with insecticides or fungicides that make them unfit for human consumption.

You can use wheat berries to make porridge or in the same sort of dishes you would make with rice. Grind wheat berries into a coarse meal with a blender or into wheat flour with a mill.



wheat berries

The berries you buy in a natural-food store or on the Internet should arrive clean; store them in a cool dry place. Grain from a farmer will probably need to be cleaned to remove residual dirt and chaff; otherwise, it might muck up your grain mill or break a tooth.

Cracked Wheat

This is the whole uncooked or processed berry that has been cut with steel blades into coarse pieces. It cooks faster than do whole berries but not as quickly as bulgur (see below). Natural-food stores and some supermarkets sell it. If they don't have it, they'll often order it for you.

Bulgur

Also called burghul or bulghar, depending on who's spelling it, bulgur comes from wheat berries that have been steamed, parched, and cracked. You can buy coarsely or finely ground bulgur in bulk in most natural-food stores or in boxes at good groceries. You can also make your own by boiling the wheat berries until they're barely tender, about half an hour, then draining them thoroughly and toasting them in flat pans in a warm oven until completely dry, about an hour. Grind the parched berries to the degree of fineness that suits your taste.

Bran

The bran is the outer layer of the grain. It is 43 percent insoluble fiber but also contains proteins and carbohydrates, as well as high levels of vitamins and minerals. Commercial wheat processing scrapes off the bran. (If refiners didn't take it off, you wouldn't have to buy it back.)

You can buy bran straight or processed into cereal flakes or nuggets that look a lot like tiny worms; these are generally sold as whole bran. Straight bran is usually easiest to find in a natural-food store; the other two cereals are common on grocery shelves.

Many people think of using bran only in muffins, but you can add it to your diet in subtle ways by mixing small amounts into such foods as bread, cereal, and quick bread.

Wheat Germ

The germ is the embryo of the wheat seed. It is removed in processing at the same time as the bran. Wheat germ comes either raw or toasted in oil. Either way, make sure it's fresh because the germ contains the oil of the grain, which goes rancid just as unpreserved oil does.

In the supermarket, wheat germ is available in vacuum-sealed jars; in natural-food stores, it is commonly sold in bulk or packaged in plastic bags. Unless the wheat germ is refrigerated, you may be better off with the supermarket jars. Never, never buy bulk wheat germ that has been sitting in a big barrel in a warm store. It won't taste good and it won't be good for you.

Farina

Hard wheat that has been coarsely ground is called farina. It may be ground from the entire kernel, making it a whole-grain product. More frequently, the kernel is processed to remove the bran — but not the germ — before being ground. You can find farina packaged as cereal, such as Cream of Wheat, or sold in bulk at natural-food stores.

Flours

The flour you grind yourself in a home mill is superior to store-bought flour, no matter where you buy it. Not only is it fresher and therefore more nutritious and tasty, but also you can control the fineness of the grind. That said, numerous forms of wheat flour are available in stores. Among them are whole-wheat and all-purpose and bread flours, all of which may be bleached or unbleached.

Bleached white flour has been treated with chlorine gas and benzoyl peroxide to whiten and brighten the color. Unbleached white flour is somewhat less refined — it has not been treated to make it whiter — and it is available from all the major flour

Bleached, Bromated, Enriched

Commercial millers bleach, bromate, and enrich white flour to make a supposedly better product. Judge for yourself.

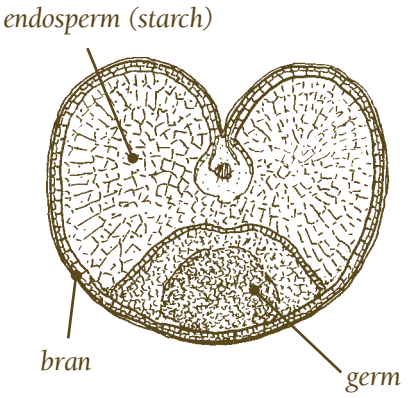
Bleaching makes wheat flour very white. Bleached white flour is popular with some bakers for producing very delicate baked goods, although some people find it has a strong chemical taste. Manufacturers use either benzoyl peroxide to bleach wheat, a product also used in some acne treatments, or chlorine dioxide, which is related to laundry bleach. The label on commercially available flour will specify whether it is bleached or unbleached.

Bromated wheat flour has been treated with potassium bromate, which "matures" or ages bleached flour in a way that encourages gluten development. It is no longer common on grocery store shelves in the United States; it is illegal in Europe, Canada, and Japan because it is a suspected, but not proven, carcinogen.

Some commercial bakeries still use bromated wheat flour because it makes a strong dough that bakes into a high-rising bread. Where flour has been bromated, federal law requires that this information be included on the label. Ascorbic acid is sometimes used as a substitute for potassium bromate.

Enriched wheat flour is bleached white flour to which some nutrients have been added. The milling and bleaching processes remove the wheat's germ, bran, and many nutrients, including vitamin E, niacin, riboflavin, thiamin, vitamin B6, folic acid, and pantothenic acid. In 1941, after it became apparent that highly refined white flour was causing malnourishment, the federal government required that refined flour be enriched. The label on a bag of enriched white flour will list niacin, iron, thiamin mononitrate, riboflavin, and iron.

Cross Section of a Wheat Berry



manufacturers in most supermarkets. It is usually enriched; however, you can find unbleached and unenriched white flour. (Don't confuse white flour — bleached or otherwise — with flour made from white wheat; they're not necessarily the same.)

Whole-wheat flour used to be called entire wheat flour, a self-explanatory name to remind you that the entire wheat berry was ground into the flour. Almost all major flour companies manufacture it, and usually you can find at least a couple of brands in any supermarket.

Because it contains bran and germ, whole wheat is a nutritious, coarse flour full of fiber, B vitamins, trace minerals, proteins, and vitamin E. Because bran restricts the development of the gluten — its sharp edges cut the strands — bread made from 100 percent whole wheat is heavy and dense.

Whole-wheat flour should be refrigerated, which is one reason it's better to buy from natural-food stores or local mills. Some people feel the stone-ground whole-wheat flours are better than those milled with steel blades, but the major brands all seem to taste and act about the same to me.

Graham flour has been described as having had the coarsest bran sifted out to create a fine brown flour with only slightly more bran than unbleached white flour with the germ intact. Other sources offer coarse-ground whole wheat as graham flour. Some experts use graham flour and whole-grain flour interchangeably. Others consider them two different flours but never clarify the distinction. No wonder people get confused! If you're buying flour, concentrate on what the flour seems like to you without worrying too much about what it's called.

All-purpose white flour is the finely ground endosperm of the wheat berry from which the germ and bran have been removed in milling. The flour is usually enriched to replace the nutrients lost in milling. Most is ground from hard red wheat, but sometimes hard and soft wheats are blended. All-purpose flour contains 10 to 12 percent gluten.

Think of white flour as a compromise flour. The best use for it is in combination with whole-grain flours to make lighter baked products and for introducing whole grains to someone who is used to eating white-flour goods exclusively.

Bread flour is a milled white flour with high gluten levels. It may be bleached or unbleached.

Triticale

Triticale (pronounced tri-ta-CAY-lee) is a cross between durum wheat and rye, developed in the late 1960s. The reasoning behind it was to produce a kind of super grain with the yield of wheat, the winter hardiness of rye, and a higher protein value than either.

Today's triticale is higher in protein than rye and wheat, as well as in two key amino acids — lysine and threonine. Yield, stress tolerance, and disease resistance are better than for wheat. Its taste is a little stronger than that of wheat but a little milder than rye, but the grain contains less gluten, so it is less suitable on its own for use in baking bread. Thus far, triticale is not as hardy as rye, but breeders are now using winter wheat varieties in their trials, so it may one day be.

If you decide to grow triticale, plant, cultivate, harvest, and store it exactly as you would winter wheat. Look for seed at a natural-food store or order it from a seed company. Plants are susceptible to ergot, so keep an eye out for this disease and destroy any plants that develop the tell-tale black grains.

Buying Triticale
Buying triticale is less complicated than buying wheat because, so far, fewer things have been done to it. Not all natural-food stores carry triticale in all its currently available forms, and grocery stores usually don't carry it at all.

Triticale berries. These are slightly longer than wheat berries and plumper than rye berries. You should be able to find them in natural-food stores that sell wheat berries. So far I have not seen cracked triticale, but you could certainly make your own from the berries. Some stores may be offering it, as the process is no more complicated than grinding berries into flour.

Flaked and rolled triticale. These look like and can be used in the same way as rolled wheat and oats. Natural-food stores that don't carry the flakes will often order them for you.

Flour. Triticale flour resembles rye flour. If your natural foods store doesn't have it, you can grind your own or order it. Use it like wheat flour, but be aware that its gluten is more delicate and easier to damage than that of wheat. Avoid overkneading and over-raising the dough.

Kamut

Kamut is the registered trademark for an ancient wheat (***T. turgidum*** var. ***durum***) that was rediscovered in Egypt about 40 years ago and sent to Montana, where it is now grown. A close relative of durum wheat, Kamut has large kernels marked with a hump. Its kernels are said to contain 20 to 40 percent more protein than wheat and to be higher in lipids, amino acids, vitamins, and minerals. No wonder Kamut has become the golden child in commercial cereal products. One other reason: The owners of the trademark require that it be grown and certified as organic.

It has been claimed that people who are allergic or sensitive to wheat can eat Kamut. You might try it, but just remember: Kamut is wheat and it contains gluten.

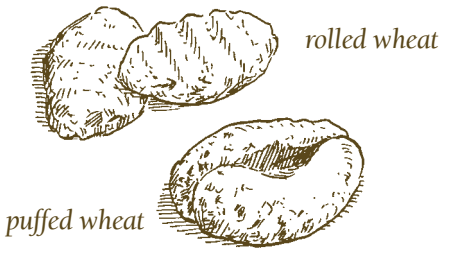
Cake and pastry flours are milled from soft wheat. Pastry flour has less gluten than cake flour, 7 to 9 percent vs. 9 to 10 percent. You can make pastry flour by sifting 2 or 3 tablespoons of cornstarch with each cup of all-purpose flour to dilute the gluten.

Semolina is coarsely ground from durum wheat. High in protein, it is used to make pasta.

Rolled, Flaked, and Puffed

Wheat berries may be processed through a roller or a flaker. Rolled wheat look a lot like rolled oats and can be used in the same way. Wheat flakes are flattened, like corn flakes. Both rolled and flaked wheat are good for adding variety to granola recipes. They are sold in bulk in natural-food stores; I've rarely seen them in supermarkets. They're often added to commercial cereals, however.

Puffed wheat shows up on the shelves of health-food stores sometimes; it's expensive and not much different from the puffed wheat you can buy in the grocery store. If you're really interested in using whole grains, you probably won't be much interested in buying all the air that goes with puffed wheat.



WHEAT IN THE KITCHEN

Although wheat most often brings to mind breads and pasta, the steamed whole grains can also be used in casseroles, for breakfast cereal, and as a simple side dish. Whole wheat can also be incorporated into desserts, for a nutty taste and more substantial texture. And don't overlook bulgur wheat as an easy, tasty accompaniment to beans or as a salad ingredient.

100 Percent Whole-Wheat Bread

Even people who normally dislike whole-wheat like this bread because it's somewhat sweet and quite moist. A slice of this bread, a chunk of cheese, and an apple make a substantial lunch or breakfast.

- 1 package active dry yeast
- 1 tablespoon sugar
- ¼ cup warm water (90°–105°F)
- 2 cups warm water
- 3 tablespoons oil
- 6 tablespoons honey
- 1 teaspoon salt
- 5 cups whole-wheat flour
- ½ cup nonfat dry milk

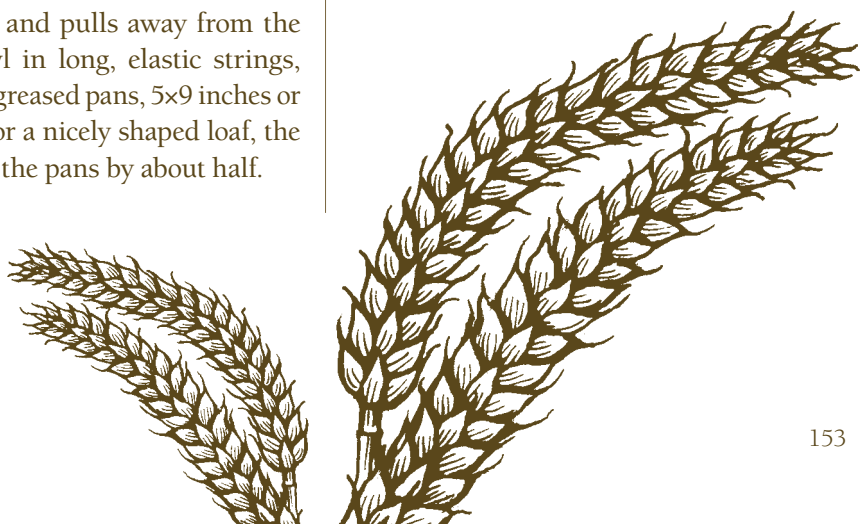
Tips for Lightening Whole-Grain Breads

- Sift the flour to remove some of the bran.
- Mix the flour and liquid, then set aside the mixture for a short period to soften the bran.
- Let the dough rise very slowly by placing it in the refrigerator for as long as three days.
- Prepare a flour-yeast-water starter the night before making the bread.
- Punch down the dough and allow one more rise than is called for before you shape it.
- Add a small amount of gluten to the recipe.
- Substitute unbleached white flour for some of the whole-grain flour.
- Choose a recipe that calls for fat, such as butter or olive oil, which will create a more tender crumb.
- Use white whole-wheat flour instead of hard red wheat for the bread; choose hard white whole wheat for bread and soft for biscuits and pastries.
- Mix a couple of tablespoons of nonfat dry milk with the dry ingredients.
- Substitute orange juice for part of the liquid; it sweetens without adding flavor.

Dissolve the yeast and sugar in the ¼ cup water and allow to stand until the mixture begins to bubble. Add the 2 cups warm water, oil, honey, and salt and then begin beating in the flour. When you have about half of it worked in, beat in the dry milk, a little at a time, taking care to break up any lumps. Then beat in the rest of the flour. When the mixture is shiny and pulls away from the sides of the bowl in long, elastic strings, divide it into two greased pans, 5×9 inches or a little smaller. For a nicely shaped loaf, the dough should fill the pans by about half.

Cover them with a damp cloth and allow to rise in a warm place until nearly doubled in bulk. Bake at 400°F for about 45 minutes or until the bread sounds hollow when tapped. Allow the bread to cool before serving.

Yield: 2 loaves



White Whole-Wheat Bread

This is definitely the loaf to start with if you are just beginning to try whole grain breads. It will turn out a rich golden color, not dark brown.

For the starter

- 1 cup hard white-wheat flour
- ⅓ cup cool water
- ⅛ teaspoon instant yeast

Mix the flour, water, and yeast in a bowl, cover with plastic wrap, and let stand overnight at room temperature.

For the dough

- 1 cup unbleached white flour
- 1 cup hard white wheat flour
- ⅔ cup warm water
- 2 teaspoons yeast, dissolved in ¼ cup warm water with one teaspoon sugar
- 2 tablespoons nonfat dry milk
- 2 tablespoons olive oil
- 1 teaspoon salt

In a large bowl, mix the starter and the dough ingredients and knead, adding water or flour as necessary to make a dough you can handle. Let it rise until double, then punch it down and let it stand on a floured surface for a few minutes.

Cut the dough into three pieces and shape into long rolls. Allow the dough to stand again for a few minutes, then move to a parchment-lined baking sheet and braid the pieces, pinching the top and bottom to form a pretty loaf.

Preheat the oven to 425°F. Cover the dough and allow to rise until double.

If you like a shiny crust, brush loaves with egg white mixed with 1 tablespoon of water. Bake in a preheated oven for about 30 minutes.

Yield: 1 generous loaf

Tabuli

Tabuli has as many spellings as bulgur, some of them amusingly phonetic — ta-boo-lee, for instance. And it has even more recipes than it has spellings. This recipe is adapted from several that I've tried and contains a number of ingredients that would keep it from being authentically Middle Eastern, and omits the traditional mint, which no Middle Easterner would be without.

- 2 cups boiling water
- 1 cup coarse bulgur
- 2 stalks celery, chopped
- 1 cucumber, peeled and diced
- 1 bunch green onions, chopped
- 3 tablespoons chopped black olives
- ¼ cup chopped fresh parsley
- ½ cup lemon juice
- ¼ cup olive oil
- ¼ cup salad oil
- Romaine lettuce
- 1 avocado, peeled and sliced
- 1 medium tomato, chopped
- 3 tablespoons pine nuts
- ¼ cup cooked or canned garbanzo beans

Pour the boiling water over the bulgur in a large mixing bowl and allow to stand for 1 hour. Drain, then squeeze out as much of the moisture as you can with your hands.

Add the celery, cucumber, onions, olives, and parsley, and gently mix together. In a jar with a lid, combine the lemon juice, olive oil, and salad oil, and shake well. Pour into the bulgur and vegetables, mix again, and refrigerate several hours or overnight.

At serving time, arrange romaine leaves on a large platter, pile the tabuli mixture in the center, and garnish with the avocado, tomato, pine nuts, and beans.

Yield: 6 servings

Whole-Wheat Pizza

This recipe was born on a cross-country trip in a camper when all the kids wanted pizza and nothing but brown flour remained in the pantry. It turned out to be everybody's favorite pizza. The recipe works well with hard white whole-wheat flour as well as with hard red-wheat flour.

- 1 package active dry yeast
- 1¼ cups warm water (90°–105°F.)
- 1 tablespoon sugar
- ½ teaspoon salt
- 2 tablespoons oil
- 3 cups whole-wheat flour
- 1 tablespoon olive oil

Dissolve the yeast in the water with the sugar. Allow to stand until the mixture bubbles, then add the salt and oil and gradually beat in the flour. Use more or less as needed to make a dough you can handle. Cover with a damp cloth for 15 minutes, then flop the dough onto a lightly floured surface and knead thoroughly until smooth and elastic. Put the kneaded dough in a greased bowl, cover, and allow to stand in a warm place until the dough is doubled in bulk.

When the dough has doubled, punch it down and either roll it out with a rolling pin or just push it into a circle with your hands, to fit a 14-inch pizza pan. (If you don't have a pizza pan, fit the dough onto an oiled baking sheet. It looks less authentic but works just as well.) Spread the tablespoon of olive oil on top of the dough. The dough may still be quite springy and not want to hold its shape. Just keep pushing it back into place and don't worry if its shape isn't perfect.

Preheat the oven to 500°F.

Try the minimalist approach to toppings that is popular in Tuscany. Instead of a lot of sauce, sprinkle on chopped mushrooms or olives, a few slices of tomato, bits of sausage (optional) and a light covering of cheese and bake for about 20 minutes, or until the bread is baked through and the top is hot and bubbling.

Yield: 4 servings

Variation

A wonderful play on the familiar pie is the potato pizza, called "stone pie" in some parts of New England. It sounds wrong — starch on starch, but the result is remarkably satisfying. Just thinly slice raw potatoes, preferably Yukon gold or red, brush the slices with a little olive oil, and arrange them on top of the unbaked pizza crust. Season with salt, pepper, and a little garlic or rosemary. Bake as above until the potatoes are soft.

Baked Beans with Bulgur

I got this recipe in a class on cooking with whole grains. As Diana Robertson, the instructor, was talking about the recipe, which she created, I was skeptical. But as it cooked, it smelled better and better, and when we finally sampled some she had prepared the day before, I was dumbfounded. The recipe makes what could easily be the best baked beans I've ever tasted, and the combination of wheat and beans makes a good protein.

- 1 cup dried navy pea beans
- 1 cup coarse bulgur
- 1 medium onion, chopped
- 1 3-inch cube of salt pork, diced
- ¼ cup firmly packed brown sugar
- ¼ cup molasses
- ½ teaspoon salt
- 1 teaspoon dry mustard
- 3 cups stock (or water)

Soak the beans overnight in cold water, or use the quick-soak method of bringing them to a boil and letting them stand in the hot water for an hour. Simmer the soaked beans until they are tender, anywhere from 2 to 4 hours, depending on how dry the beans were to begin with.

In a baking dish large enough to hold at least 8 cups, combine the beans and the bulgur. Add the onion, salt pork, brown sugar, molasses, mustard, and salt . Cover with the stock and bean water.

Bake, covered, in a 200°F oven for 8 hours, adding more liquid from time to time to keep the beans moist enough.

Yield: 6 servings

Variation

Substitute cooked wheat or emmer farro berries for the bulgur.

Triple-Rise, Whole-Wheat Biscuits

- 2½ cups soft whole-wheat flour
- 1 tablespoon sugar
- 1 teaspoon baking powder (one without aluminum sulfate, such as Rumford)
- ½ teaspoon baking soda
- ½ teaspoon salt

- ¼ cup cold butter
- ½ envelope active dry yeast
- ¼ cup warm water and 1 teaspoon sugar
- ¾ cup buttermilk, at room temperature
- 3 tablespoons melted butter

Sift the flour, sugar, baking powder, baking soda, and salt into a large bowl. Cut in the butter until the mixture resembles very coarse meal. Dissolve the yeast in the sugar-water mixture. When it begins to bubble, mix it with the buttermilk and add to the dry ingredients, mixing well.

Turn out the dough onto a floured board and knead briefly, then pat out to a thickness of about ¾ inch. Brush the top of the dough with the melted butter and cut with a sharp biscuit cutter. Place half the biscuits on a parchment-lined baking sheet so they are not touching each other. Top with the remaining pieces. Refrigerate for at least 2 hours, then move them into a warm place to rise.

Preheat the oven to 400°F, then bake for 10–12 minutes, or until the biscuits are lightly browned.

Yield: 10–12 biscuits

Note

Some bakers store the prepared dough in the refrigerator for a day before patting it out and cutting the biscuits.

Applesauce Cake

This is a moist, spicy cake, heavier than those made with white flour. It really doesn't need frosting.

- ½ cup butter
- ½ cup honey
- 1 egg
- 1 cup applesauce (unsweetened)
- 1 cup raisins
- ¼ cup chopped nuts
- ¼ cup toasted, shredded coconut
- 2 cups whole wheat flour (preferably pastry)
- 1 teaspoon baking soda
- 1 teaspoon cinnamon
- 1 teaspoon allspice
- ½ teaspoon salt
- ½ teaspoon baking powder
- ½ teaspoon ground cloves

Cream the butter and honey and egg until the mixture is smooth. Stir in the applesauce, raisins, nuts, and coconut. Sift the dry ingredients together into the applesauce mixture and stir with a wooden spoon until well blended. Pour the batter into a greased and floured nine-inch layer pan or into three small (about 3 × 6 inches) loaf pans and bake at 375°F. 20 to 40 minutes, or until cake tests done. The baking time will vary with the size of your pans.

Yield: 6–8 servings

RESOURCES

Seeds to Plant or Eat

Whole grains will sprout and can be used as seed. If you buy whole grains for eating from sources other than food stores, make certain they have not been chemically treated to prepare them for planting. The supply sources mentioned in this book all sell grains that are safe to eat as well as to sprout and plant.

Anson Mills

803-467-4122
www.ansonmills.com
Handmade mill goods from organic heirloom grains

Baker Creek Heirloom Seeds

417-924-8917
www.rareseeds.com
Heirloom varieties of amaranth, buckwheat, corn, quinoa, millet, wheat, vegetables, and flowers

Bluebird Grain Farms

509-996-3526
www.bluebirdgrainfarms.com
Rye, emmer (faro), red and white wheat; flour and other grain products

Bountiful Gardens

707-459-6410
www.bountifulgardens.org
Untreated, heirloom, or open-pollinated seed for sustainable agriculture; seed-saving supplies. Grain seed includes amaranth, barley, buckwheat, emmer (faro), hull-less oats, millet, quinoa, rye, triticale, and wheat.

Fedco Co-op Garden Supplies

207-873-7333
www.fedcoseeds.com
Organic grains, vegetables, and flowers

Homegrown Harvest

866-900-3321
www.homegrownharvest.com
A variety of whole grains, some organic, including hard and soft white whole wheat

Johnny's Selected Seeds

877-564-6697
www.johnnyseeds.com
Wheat, barley, oats, buckwheat, and rye in large and small quantities, some organic, no genetically engineered seed; searchable by growing zone

Kitazawa Seed Company

510-595-1188
www.kitazawaseed.com
Rice, amaranth, and Asian vegetables

Nichols Garden Nursery

800-422-3985
www.nicholsgardennursery.com
Wheat, buckwheat, amaranth, quinoa, rye, and oats

Peaceful Valley Farm & Garden Supply

888-784-1722
www.groworganic.com
Wheat, amaranth, quinoa, rye, oats, corn, barley, millet, buckwheat, and garden supplies

Prairie Garden Seeds

306-682-1475
www.prseeds.ca
Millet, corn, amaranth, quinoa, hull-less oats, both hull-less and regular barley, wheat (more than 30 varieties, some of them ancient)

Quinoa Corp.
310-217-8125
www.quinoa.net
Bulk quinoa seed and processed quinoa products, such as pasta

Salt Springs Seeds
250-537-5269
www.saltspringseeds.com
Open-pollinated and organic seed, numerous grains, and a wealth of information about planting, harvesting, and threshing grains, and seed saving. Canadian sales only.

Seed Savers Exchange
563-382-5990
www.seedsavers.org
Membership organization devoted to saving and sharing heirloom seeds, including grains

Seeds of Change
888-762-7333
www.seedsofchange.com
Organic seeds, buckwheat, oats, triticale, rye, amaranth, quinoa, corn, and many more

Southern Exposure Seed Exchange
540-894-9480
www.southernexposure.com
Heirloom seeds including amaranth, corn, dent corn, and hybrid sweet corn, hull-less oats, millet, organic rye, and buckwheat; no genetically modified seed; good information on regional growing conditions.

Sproutpeople
877-777-6887
www.sproutpeople.com
This internet-only mom-and-pop business has many organic grains, vegetable seeds, and beans for sprouting and sprouting equipment. Four varieties of rice, rye, hull-less oats, amaranth, hull-less barley, triticale, hulled spelt, kamut, quinoa, millet, and corn. Features full sprouting instructions, a question-and-answer section, and lots of good information.

T. J. Marketing
712-884-2347
www.growpopcorn.com
Popcorn, popcorn seed, and popcorn poppers

Equipment

Emergency Essentials
800-999-1863
www.beprepared.com
Supplies for emergency preparedness; food-safe storage containers, dehydrated foods, and power units.

Pleasant Hill Grain
800-321-1073
www.pleasanthillgrain.com
Large selection of hand and electric grain mills, with full explanations about the advantages and disadvantages of each. Fulfillment, service, and information earn rave reviews from customers.

Scythe Supply
207-853-4750
www.scythesupply.com
European style scythes, scythe blades, snaths, whetstones, hammers, anvils, and equipment; just what you need for hand mowing and harvesting, from people who use the tools themselves.

USA Emergency Supply
888-872-8702
www.usaemergencysupply.com
Emergency supplies, bulk grains, food-safe storage containers, and grain mills

Internet Information

Canadian Organic Growers
www.cog.ca
Information on growing all crops organically for gardeners and farmers

Cereal Knowledge Bank

www.knowledgebank.irri.org
In-depth information and research on corn, rice, and wheat. Managed by the International Rice Research Institute and the International Maize and Wheat Improvement Center.

Federal Trade Commission

www.ftc.gov/appliances
Energy Guides and data rating the annual cost of running electrical appliances, including freezers.

Grains and Pulses Blog

http://grainsandpulses.blogspot.com
A forum for information exchange on growing grains and pulses for food

I-Tech Designs, Allen Dong

www.plantsciences.ucdavis.edu/LTRAS/itech
Plans for building equipment for small farms, including the grain dehuller, mechanical and hand winnowers, a thresher, and many more.

Rodale Institute

www.rodaleinstitute.org
Leader in organic farming research; links, news, blogs, and in-depth information on no-till planting

Save Our Seed

www.savingourseed.org
Dedicated to helping farmers save seed and preserve old grain varieties; contributions from several Southern universities.

Thomas Jefferson Agricultural Institute

www.jeffersoninstitute.org
Nonprofit education and research institute dedicated to alternative crops; numerous links to similar groups.

Whole Grains Council

www.wholegrainscouncil.org
An educational resource to help people fit whole grains into their diets. Features recipes, lists of whole-grain foods, and resources

Books

Bernard Clayton's New Complete Book of Breads

By Bernard Clayton
Simon & Schuster, 2006
A large collection of bread recipes, many using whole grains; instructions and plan for building and using a backyard adobe oven; recipe for whole grain dog biscuits.

The Bread Baker's Apprentice

By Peter Reinhart
Ten Speed Press, 2001
Detailed information and recipes with photographs for baking breads in the style of French bakeries. Includes technical explanations of how basic ingredients work.

The Nitty Gritty Bread Machine Cookbooks

By Donna Rathmell German
Bristol Publishing Enterprises, 1991
A series of six books about baking with bread machines for baking and using them to mix dough. Many include recipes for whole grains.

Whole Grain Baking

By King Arthur Flour
The Countryman Press, 2006
A massive compendium of recipes for baking everything from crepes and cakes to breads, all tested in the King Arthur kitchens. Includes information about baking equipment and a glossary of baking terms.

Whole Grains: Every Day, Every Way

By Lorna Sass
Clarkson Potter, 2006
A thorough exploration of common and less familiar grains, their characteristics, and uses. Recipes including simple grain dishes, desserts, baked goods made with whole grain flours.

Books on Rice

Older books are valuable because they describe growing rice before the age of total technology. The Leonard and Martin book describes the process as it is practiced in Japan and as it has come to be practiced more recently in this country. The Logsdon and Kingman books briefly deal with growing rice at home.

The Book of Whole Grains

By Maryanna Kingman
St. Martin's Press, 1976

Cereal Crops

By Warren H. Leonard and John H. Martin
The Macmillan Company, 1963

The Cereals in America

By Thomas F. Hunt
Orange Judd Company, 1914

Grain Crops

By Howard K. Wilson
McGraw-Hill Book Company, 1948

Small-Scale Grain Raising

By Gene Logsdon
Rodale Press, 1977

Movies

The Farmer's Wife (2005)
Nebraska farm couple Darrel and Juanita Buschkoetter allowed filmmaker David Sutherland to record their daily lives on the farm as they struggle with financial problems, government aid, bad weather, and crop failure. The two-disk PBS special demonstrates the difficulty of running a family farm in an environment of corporate farming.

King Corn (2007)
This documentary by Aaron Woolf follows two friends, Ian Cheney and Curt Ellis, who move to America's Corn Belt and plant an acre of the corn with the intention of following their yield into the U.S. food supply. The documentary reveals a great deal about modern farming with government subsidies, genetically modified seeds, and herbicides. The information is disturbing, but the youthful spirit of Cheney and Ellis creates an energetic, personal story.

The Real Dirt on Farmer John (2006)
This PBS film follows the life of John Peterson, a young Illinois farmer who inherited family property. In the 1960s, he opened the place to hippies, artists, and just about anybody else who wanted to hang around, scandalizing conservative locals. In the 1980s farming crisis he lost most of the land, and neighbors expected he'd leave. Instead, he recreated a new-style organic farm with volunteer labor from people dedicated to eating locally raised produce and willing to help make that happen. Peterson cross-dresses, rides a tractor in feathers and lace, and prances down a field in pink tights, but he's a good farmer and the whole thing works. Lots of fun with some important insights.

INDEX

Page references in *italics* indicate photographs or illustrations; page references in **bold** indicate charts or graphs.

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