

**GROW FOOD EVEN IN DROUGHT AND HEAT**



**HOMESTEAD  
RENEWABLE  
ENERGY**  
— PAGE 54 —

# MOTHER EARTH NEWS

THE ORIGINAL GUIDE TO LIVING WISELY

JUNE/JULY 2014

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**PEST  
CONTROL  
GLOSSARY**  
for Organic Gardeners

## **SMALL STEPS CAN CHANGE OUR WORLD**

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Hidden Downsides of the Green Revolution

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MORE THAN A MAGAZINE ... A WAY OF LIFE

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SUZANNA GARRETT



FOTOLIA/EGONZITTER



BARBARA DAMROSCH



FOTOLIA/ROMAN GORIELOV; BELOW: KEITH WARD



MORE THAN A MAGAZINE ... A WAY OF LIFE

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Jacques Cousteau

Our Real Food and Crop at a Glance departments are now retired (but the numerous, illustrated crop-specific articles in the latter's series are available online at [www.MotherEarthNews.com/Crops-At-A-Glance](http://www.MotherEarthNews.com/Crops-At-A-Glance)). In their place, we are pleased to present The Gardener's Table, with seasonal recipes created by renowned gardener-cook Barbara Damrosch (Page 18). Also new in this issue: Ever-inspiring, sustainable-farming rock star Joel Salatin replaces Beautiful and Abundant with his new column, The Pitchfork Pulpit (Page 73).

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Circle #36; see card pg 97



# Preserve Now, Savor Later

Stretching the shelf life of food can be as low-tech and hands-off (set trays in the sun to dry) or as elaborate and large-scale (a day devoted to pressure-canning summer's bounty) as you'd like. No matter where you fall on that spectrum or whether you have surplus fruit from an ample orchard or a profusion of basil from a petite, potted herb garden, the information you need to safely and deliciously put by fresh food awaits in our online Home Food Preservation Headquarters. This hub stocks more than 40 years of reliable, comprehensive know-how on pressure canning, water bath canning, drying, fermenting, freezing, pickling, root cellaring and more. We boil down the details on required equipment and which preservation method best suits which crops, plus furnish a packed-pantry's worth of recipes. You'll also find plans for building a solar dehydrator (don't miss the design on Page 67) and several styles of root cellars, plus everything else you need to go from harvest basket to cupboard with confidence. Dive into the world of preserving for better eating, significant money savings and greater food security at [www.MotherEarthNews.com/Food-Preservation](http://www.MotherEarthNews.com/Food-Preservation).



## EXCLUSIVE ONLINE ARTICLES

### Pick for Peak Flavor

Many fruits and vegetables deliver distinct clues as to their best harvest time for optimal flavor, nutrition and texture, but you have to know how to sleuth out the signs. Eliminate much of the guesswork—and never lament a crop picked under- or over-ripe again!—with this rundown of the telltale signs of ready-to-reap melons, beans, squash and dozens of other crops. Go to <http://goo.gl/PE52Kh>.

### Learn, Share Self-Reliance

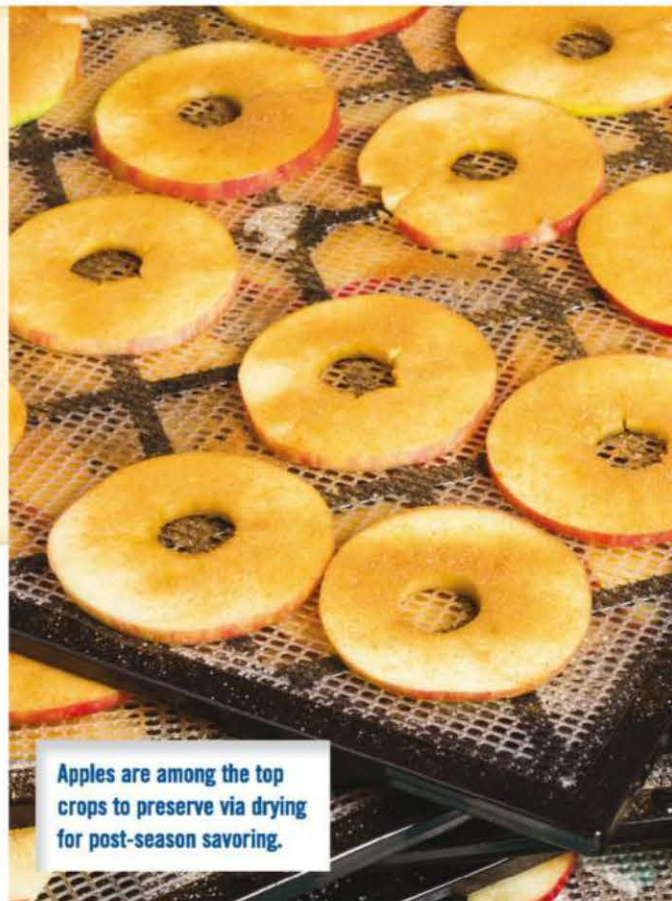
From pigs to permaculture to PV panels, the self-sufficiency topics you can explore this September during International Homesteading Education Month run the gamut. And don't hog your own expertise! Along with attending events, join in the skill-sharing festivities by hosting your own. Go to [www.MotherEarthNews.com/Homesteading-Month](http://www.MotherEarthNews.com/Homesteading-Month).

### Simple Summer Fruit Recipes

Cool off with this collection of easy seasonal eats that showcases some of the most ephemeral stars of the summer harvest—juicy, naturally sweet berries and melons—in all of their refreshing glory. Try Raspberry Salsa, Chilled Melon Soup, Strawberry and Arugula Salad, Lemon-Watermelon Sorbet, and more. Go to <http://goo.gl/CZQrN3>.

### The Art of Building With Stone

Cast stones as beautiful, functional accents on your property with this how-to for small-scale stone-scaping. On top of tips for choosing and maneuvering these masses of minerals, you'll get the basics on transforming them into one-of-a-kind structures—a picturesque stone culvert and a simple, elegant stone bench—that add ambience and sturdy utility. Go to <http://goo.gl/6Lyype>.



## 1 MILLION STRONG!

The MOTHER EARTH NEWS Facebook page at [www.Facebook.com/MotherEarthNewsMag](http://www.Facebook.com/MotherEarthNewsMag) has surpassed 1 million Likes! We're proud and delighted to foster this growing, dynamic space where gardeners, homesteaders and wiser-living enthusiasts can connect with the magazine and each other.



Additionally, we invite you to engage on the Facebook pages we've created for each state and province. These new pages are the perfect forum for chatting over the virtual fence with neighbors about your garden, livestock, DIY endeavors or other passions; sharing stories or photos; and asking questions. We post seasonal advice from our extensive Archive, as well as interesting news we spot that's relevant to your neck of the woods.

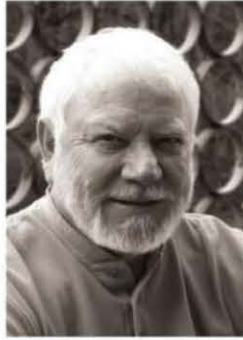
To find the page for your state or province, head over to [www.MotherEarthNews.com/Facebook](http://www.MotherEarthNews.com/Facebook), or log in to Facebook and type "Mother Earth News" plus the name of your state or province into the Facebook search bar. You should then see the title of the page appear (for example, "Kansas Community—Mother Earth News"). Select the page, click on Like, and you're set! Remember to visit your page often—don't just rely on your News Feed—so you catch every update!





## MEET OUR GREEN HOMES BLOGGERS

Our Green Homes Blog blends the best of modern design with traditional building principles and natural materials to inspire comfortable, eco-friendly dwellings. Get to know two bloggers below, and follow the latest from all of our contributors at [www.MotherEarthNews.com/Green-Homes-Blog](http://www.MotherEarthNews.com/Green-Homes-Blog).



**Who:** David Wright

**Where:** Grass Valley, Calif.

**What:** An award-winning architect and a pioneer in passive solar home design, David shares his expertise in and gives real-world examples of building homes that work with nature to meet their energy needs. Read David's posts at <http://goo.gl/JZBJfH>.

**MOTHER:** For many of us, the idea of a summer sans air conditioning sounds unbearable. How do passive solar homes minimize or even eliminate the need for AC?

**David:** Passive solar homes have a number of features that, in combination, reduce the need for AC, such as window orientation, window shading, higher insulation values, and additional thermal mass. In a cool or moderate climate, a passive solar home just needs to be opened up and allowed to breathe overnight, when the outdoor temperature drops below the inside temperature. The cooler nighttime air will extract heat from the structure's thermal mass. By morning, when you close the windows, the home will be nice and cool inside, and the cool thermal mass will keep the interior comfortable for hours. Passive solar homes in hotter, drier climates will need the cooling from overnight ventilation supplemented, but they'll still require less AC than typical homes do.

## FREE GARDENING APP

Freshly updated and expanded, our *Food Gardening Guide* app puts all the authoritative, in-depth growing info you need right at your fingertips. In addition to detailed how-to for cultivating all major garden crops, the *Guide* also outlines skills and strategies invaluable to the organic gardener's repertoire, including:

- All-natural, effective pest control
- Wise watering practices
- Soil-improvement techniques
- Free, homemade liquid fertilizers
- Cover crop selection and management
- Low-cost, DIY season-extension gear

The *Food Gardening Guide* is available free for Apple and Android devices. Learn more—and peruse our cache of other wise-living resources for smartphones and tablets—at [www.MotherEarthNews.com/Apps](http://www.MotherEarthNews.com/Apps).



**Who:** Leigha Dickens

**Where:** Asheville, N.C.

**What:** Leigha, a green-building coordinator for Deltec Homes, writes of sustainable home construction and renovation ideas that foster low-impact, low-maintenance and long-lasting homes. Read Leigha's posts at <http://goo.gl/2Eb85L>.

**MOTHER:** Where are the average homeowner's energy-efficiency bucks best allocated? And what's a quick way anyone can slash energy use at home?

**Leigha:** Heating and cooling are any home's biggest energy expenditures, so the most beneficial step is to cut the amount of heating and cooling you need upfront. The most cost-effective way to do that is to strengthen the "building envelope"—the box of insulation that separates inside from outside—by installing extra insulation everywhere in a new home, and in areas you can access easily in an existing home, such as the attic. A fancy heating and cooling system can be a waste of money if your "envelope" isn't already solid. As for a quick tip: A clothes dryer consumes electricity just to dry your laundry at a faster pace. With a tried-and-true clothesline and a little patience, the sun will dry your clothes free.



**MOTHER EARTH NEWS** (ISSN 0027-1535) is published bimonthly, six issues per year, by Ogen Publications Inc., 1503 SW 42nd St.; Topeka, KS 66609. Periodical postage paid at Topeka, KS 66609, and at additional mailing offices. **Subscriptions:** \$19.95 for one year in the United States and its provinces; \$27.95 per year in Canada and \$31.95 per year foreign, prepaid in U.S. funds. **(CANADA GST NBR. 89745 1720 RT0001).** **Postmaster:** Send changes of address to **MOTHER EARTH NEWS**, 1503 SW 42nd St.; Topeka, KS 66609-1265. **Subscribers:** Write to **MOTHER EARTH NEWS**, 1503 SW 42nd St.; Topeka, KS 66609-1265 or call 785-274-4300 or 800-234-3368. Outside the U.S., call 785-274-4300. **Subscribers:** If the Post Office alerts us that your magazine is undeliverable, we have no further obligation unless we receive a corrected address within two years. To purchase back issues from January 1995 to present, send \$7.50 per issue to **MOTHER EARTH NEWS Back Issues**, 1503 SW 42nd St.; Topeka, KS 66609. Copyright 2014 by Ogen Publications Inc. All rights reserved. **MOTHER EARTH NEWS** is a registered trademark. Material in this publication may not be reproduced in any form without written permission. Permission requests must be in writing and should be directed to Bryan Welch; **MOTHER EARTH NEWS Permissions**, 1503 SW 42nd St.; Topeka, KS 66609. Send story ideas to Cheryl Long at **MOTHER EARTH NEWS**, 1503 SW 42nd St.; Topeka, KS 66609. Ogen Publications Inc. cannot be held responsible for unsolicited manuscripts, photographs, illustrations or other materials. Printed and manufactured in the United States of America. Publications Mail Agreement No. 40754547. Return undeliverable Canadian addresses to: **MOTHER EARTH NEWS**, P.O. Box 875, STN A, Windsor, Ontario, Canada N9A 6P2.

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# We Get What We Pay For

In this issue, we take a close look at the shortcomings of industrial food production.

Noted environmental journalist Richard Manning outlines on Page 34 how agriculture's so-called Green Revolution of the mid-20th century is delivering a high-carb but nutrient-poor diet, which causes chronic health issues for humans and livestock. Contrary to what Big Ag likes to claim, industrial agriculture is *not* feeding the world, nor is it "sustainable," given its heavy dependence on fossil fuels. We interviewed food and farming activist Vandana Shiva to expand upon these points and to highlight community responses to the advances of corporate agriculture (Page 40).

Following on Page 42, food writer Kim O'Donnel illuminates many of the negative consequences related to the production of meat in huge confinement facilities. O'Donnel discusses why many people are switching to a more plant-based diet, choosing to become "flexitarians" by eating less meat and choosing higher-quality meat than what comes from the industrial food system.

When we decide to spend more for superior-quality, grass-fed meat, our choice not only fosters our health, it also helps mitigate global warming. As climate-change researcher and rotational-grazing rancher Wayne White explains on Page 15, the proper management of grazing livestock on pastureland actually allows the soils beneath the grasses to become "carbon sinks," pulling climate-altering carbon dioxide back into the ground, thus helping to reduce global warming.

These experts present compelling evidence that we have allowed industrial agriculture to steer civilization onto a destructive path. It's up to us to change that direction. Every time we decide to pass on junk food and instead spend a bit more for pastured eggs and meat, or opt to buy organic grains, produce and dairy products, we win in three ways: better health for our families, more humane treatment of livestock, and less damage to soil, water and other natural resources.

For example, our report on Page 16, "Got Organic Milk?" summarizes a new study showing that organic milk, from cows fed on pasture and forage, is more healthful than milk from industrial dairies that feed their cows mostly on grains and "concentrates." The organic milk samples in the study averaged an incredible 62 percent more essential omega-3 fatty acids than industrial offerings.

The old adage "You get what you pay for" holds true here. If we choose to buy whatever food is cheapest, we get less value—nutritionally, environmentally

and ethically. But if we understand the consequences of cheap food vs. quality food, we will opt to pay a little more for the good stuff, which will help deliver the good life.

Simple daily choices, made by thousands and thousands of individuals, are what will ultimately foster the emergence of a sustainable food system that can truly feed the world and protect the planet.

We hope the articles in this issue will convince you it's worth it to pay a bit more for your burgers.

—MOTHER

We can  
collectively  
change the  
food system  
by choosing to  
buy nutritious,  
wholesome,  
high-quality,  
organic foods.

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MOTHER EARTH NEWS is published by Ogden Publications Inc.,  
1503 SW 42nd St., Topeka, KS 66609, 785-274-4300.  
For subscription inquiries in the U.S., call 800-234-3368.  
Outside the U.S., call 785-274-4300; fax 785-274-4305.  
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“My house is only 515 square feet, so the garden tends to take over. I don’t have much growing space, but I make the most of it.”



EDITORS' PICK

### DIY Wheat Thresher

We've been growing 'White Sonora' wheat on our small homestead for three years. As your article "From Field to Flour: How to Grow Wheat" (April/May 2014) indicated, threshing wheat can be a challenge, and we definitely struggled to find the best way to do it. We tried a couple of hand-threshing methods at first: beating the heads against the inside of a bucket or smashing the heads with a rubber mallet. Both processes were quite tedious.

We looked into machines, but even the cheapest models were still too pricey. That's when we came up with an easy, quick device of our own: a thresher made from a bucket, drill and chain. You can see a video of our bucket thresher in action and get instructions for making your own at <http://goo.gl/xAzJnE>. Because threshing wheat by hand is so labor-intensive, it deters some people from growing it. We were unsure about continuing to grow it until we put together the bucket thresher. Now I don't think we'll ever stop!

Jenna Winkler  
Gilbert, Arizona

### Nursery Plants: Bee Cautious

In response to the article "Nursery Plants Contain Bee-Killing Chemicals" (Green Gazette, February/March 2014): I've always preferred purchasing transplants at the farmers market simply to support local, small-scale sellers. Avoiding these dangerous chemicals now seems an even more important reason. No more starts from mainstream garden centers for me!

I hope fellow readers will pass along this article to their gardening friends, as I think many people are in the dark about this troubling situation.

Hazel Douglas  
West Covina, California

### Full Circle

Thank you for the striking photo of the young deer in



Reader Suzanna Garrett's Virginia garden brims with bounty and beauty.

the ferns in the New Jersey Pine Barrens on the last page of the April/May 2014 issue (EarthWords).

I have 10 acres here in the southern Appalachians. My wife and I both work full time, but we still make gardening and preserving much of our own food a priority. For most people, the idea of living sustainably likely doesn't conjure images of hunting, but for us, being able to supply our own meat is at the heart of our living-off-the-land philosophy. We don't buy from-the-feedlot, full-of-antibiotics beef at the grocery store, and although we have plenty of opportunities to get beef directly from local farmers, we don't do that either. Instead, I hunt and process white-tailed deer for the majority of our meat. Two deer will provide us with loin, roasts and lots

of burger for a year of good, lean, all-natural meat.

The photo of the deer brought the hunt full circle for me, as part of my property includes a small, flat-bottom hollow, and I leave much of it in a natural state for the wildlife. Every spring, at least two fawns are born in the hollow and live there until winter, when they move on. Hunting is an integral part of my family's pursuit of a more sustainable life. I appreciated the photo of the deer, which reminded me of that.

DJ Cohenour  
Smoot, West Virginia

### Hay Days

In the February/March 2014 issue, a reader wrote in to Dear MOTHER to ask about information on nonelectric tools for small homesteads, particularly what one could

### A Garden Runneth Over

I'm an avid organic gardener along the Maury River in the mountains of Virginia. Gardening brings me immeasurable joy, and I want to share a few photos from last year's plots. My house is only 515 square feet, so the garden tends to take over. I don't have much growing space, but I make the most of it.

Suzanna Garrett  
Lexington, Virginia





### Picture-Perfect Paneer

I've always loved the idea of making cheese, but I was afraid to attempt it myself. On a whim, after seeing the simple recipe for paneer ("Craft These Fresh, Easy Cheeses," April/May 2014) on the MOTHER EARTH NEWS Facebook page, I decided to give it a shot. The instructions were easy to follow, and I had fresh cheese to enjoy that same night! Besides eating it on its own, I tried my paneer crumbled onto a salad. Delicious!

*Laura Gazarian  
French Lick, Indiana*

use to harvest a small hay-field by hand. A note from MOTHER following the letter said an article about tools for large gardens was in the works. When you do the article, don't forget walk-behind haymaking equipment for doing up a few acres at a time.

We switched from conventional, full-sized equipment just last year, so with only

one season under our belts, we haven't yet figured out cost per bale, but we're pleased to be able to put up our crops in smaller, more manageable work sessions.

We purchased our walk-behind, two-wheel tractor from Earth Tools in Owenton, Ky. ([www.EarthTools.com](http://www.EarthTools.com)), along with the sickle bar for cutting, the rake and the baler. Hooking

and unhooking the implements takes some muscle and some extra people, but we're looking forward to haying again this year.

*Annette Moze  
Coloma, Michigan*

*Annette, not only will you find that article—which does profile walk-behind*

(CONTINUED ON PAGE 93)

## The Incredible Bulk

### Quantity and Quality

Thank you for the article about buying clubs and buying in bulk in the April/May 2014 issue ("Buy in Bulk for Big Savings on Better Food"). I'm a drop-point manager for Azure Standard, a bulk and natural food delivery service based in Oregon ([www.AzureStandard.com](http://www.AzureStandard.com)). I started just a few months ago after discovering such great foods at amazing prices, and I'm thrilled to have additional companies to look into now thanks to the wholesale distributor resources listed in your article.

My family purchases much of our fruit in bulk and cans most of it, and we're now looking forward to doing the same with other produce and meat. Becoming part of a food-buying club and buying in bulk are great ways to save money and build friendships and community.

*Ashley Storms  
Justin, Texas*

### Get (Better) Meat in Bulk, Too!

After much research and a quality vs. cost comparison of various meat farmers and community-supported agriculture programs providing meat in our area, we settled on a CSA program for pastured beef, chicken and pork that operates like a buying club for six-month increments.

There is no minimum order required. We place our six-month order and pay in advance, and we then pick up our order monthly. This way, we've locked in rates and the farmer has locked in customers, but we only need the freezer infrastructure to accommodate a month's worth of food.

We estimate the buying club saves us about 13 percent over grocery store prices, and the quality and integrity of the animal care is much higher.

*Amy Stross  
Cincinnati, Ohio*



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# Straight Talk



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Circle #39; see card pg 97

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# Pesticides and Kids

Pesticides and other chemicals in food are a threat to people of all ages, but a batch of recent studies shows that children and expectant mothers pay the highest price for pesticide exposure.

A 2012 study by researchers at University of California, Davis and UCLA found that, based solely on what kids participating in the study ate, cancer benchmark levels “were exceeded by all children (100 percent) for arsenic, dieldrin, DDE and dioxins.” The team’s strongest advice for avoiding cancer, based on this finding? Children should eat primarily organic dairy products, fruits and vegetables to reduce pesticide intake.

Mainstream health professionals have been slow to advocate organic food consumption, but many have voiced concerns about the cumulative effect pesticides have on young brains and bodies. Many chemicals consumed daily by kids who eat conventional and processed foods are endocrine disruptors, which means the chemicals are capable of interfering with development. And though children and pesticides don’t mix, kids are still exposed in many ways. In a 2013 Environmental Protection Agency (EPA) study, urine samples from 135 preschool children tested positive for three unwelcome chemicals: chlorpyrifos (99 percent of children), 2,4-D (92 percent) and permethrins (64 percent). Though not tested for in this study, neonicotinoids are another pervasive pesticide threatening children’s health. So, what exactly are these chemicals?

**Chlorpyrifos** is an organophosphate insecticide used on grains, cotton, fruits, nuts, vegetable crops, lawns and ornamental plants. In a 2012 study funded by the U.S. National Academy of Sciences, pregnant women’s exposure to chlorpyrifos was associated with brain damage in their children that resulted in reduced intelligence. Numerous studies have suggested a link between childhood exposure to organophosphate insecticides and attention-deficit disorders.

**2,4-D** is one of the most widely used herbicides in the world, and its application rate is about to increase even more thanks to the deployment of new crops genetically engineered to be resistant to it. Water and residues on food are sources of this endocrine disruptor, and recent tests suggest some 2,4-D may be laced with dioxin, one of the most potent of all known carcinogens.

**Permethrins** are increasingly abundant, broad-spectrum insecticides. A 2013 Canadian study found permethrins in 97 percent of urine samples

from grade-school children. Another 2013 study, published in the journal *Environmental Health Perspectives*, found high permethrin levels in New York City residents. More than any other pesticide group, permethrins have been linked to autism. If a child is genetically predisposed to autism, exposure to permethrins can activate the disorder. The EPA classifies permethrins as “likely to be carcinogenic to humans,” but permethrin insecticides are used on many crops and are the most common active ingredient in indoor/outdoor insect sprays. Mosquito misting systems spray permethrins into the air several times a day, indoor foggers gas buildings with permethrins, and any insecticide that claims to “kill on contact” usually includes a permethrin as an active ingredient. Chances of direct exposure rise in summer, when these insecticides are most often sprayed, but permethrins can persist in dust on surfaces, especially in enclosed spaces. Young children are apt to come into contact with toxic chemical dusts because they typically spend time close to the ground.

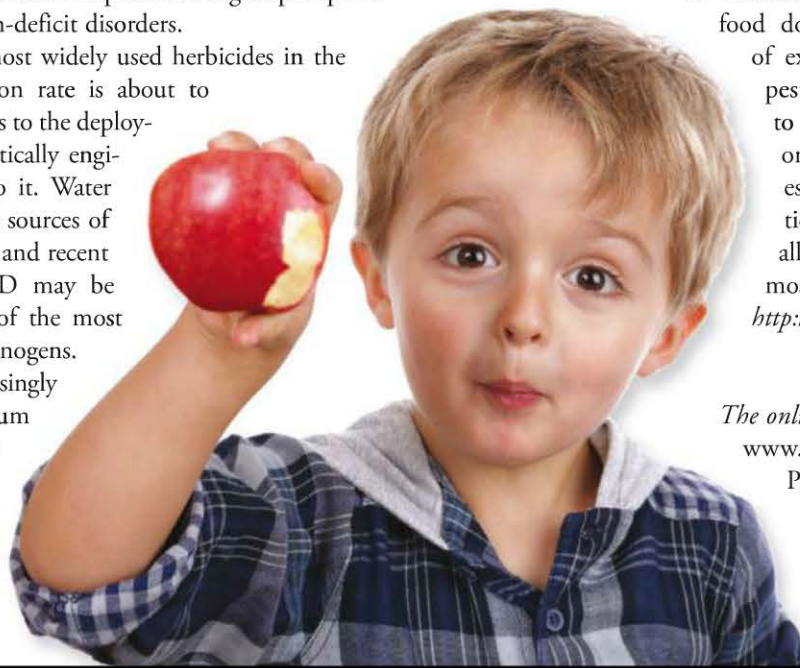
**Neonicotinoids** are potent pesticides notorious for killing bees, and residues do persist on fruits and vegetables. A 2012 Japanese study was the first to show that neonicotinoids affect brain development in mammals. The researchers warned that “detailed investigation of the neonicotinoids is needed to protect the health of human children.”

The full list of chemicals that may threaten children’s health is much longer, and a 2013 Australian study revealed that exposure of either parent to certain pesticides during the year before a child’s birth can even increase risk of brain cancer for the child. The American Academy of Pediatrics recently called for more research on links between pesticides and children’s ailments—specifically birth defects, childhood cancers, behavioral disorders and asthma. It also advocates feeding children organic food to lower pesticide exposure, asserting that young children whose brains are developing are uniquely vulnerable to chemicals. While eating organic food doesn’t address other areas

of exposure to cancer-causing pesticides, when it comes to kids, the benefits of an organically grown diet are especially vital. For information on which conventionally grown produce has the most pesticide residues, go to <http://goo.gl/2WW5gX>.

—Barbara Pleasant

The online version of this article at [www.MotherEarthNews.com/](http://www.MotherEarthNews.com/) Pesticides includes links to more information and cited research. —MOTHER



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# How Pastures Affect Climate Change

According to a 2014 report by leading climate scientists, convened by the U.S. National Academy of Sciences and the U.K.'s Royal Society, the atmospheric concentration of carbon dioxide has increased by 40 percent since pre-industrial times. More than half of this increase has occurred since 1970, and of all greenhouse gases in the atmosphere, carbon dioxide plays the most significant role in warming the Earth. To curb the climate crisis, some policymakers and concerned citizens have recommended solutions such as renewable energy development, greater resource efficiency and cleaner cars. Land management deserves a spot on that list. How homesteaders and ranchers manage livestock, and how they manage the pastures those livestock graze on, plays a significant role in atmospheric carbon pollution.

Mainstream pasture-management practices seriously degrade pastureland worldwide. Among the damaging processes are plowing grasslands on highly erodible soils and slopes to plant annual crops, destroying diverse mixtures of native perennial grassland species to plant monocultures of domesticated grasses, overgrazing pastures, and failing to properly rotate grazing livestock. All of these practices reduce the carbon content of soils, thus diminishing soil productivity and exacerbating climate change.

Soil carbon is a central product of photosynthesis and an essential component of healthy soil. Pastures and soils are

thus crucial “carbon sinks.” The science works like this: Plants extract carbon in its gaseous form (carbon dioxide) from the atmosphere, and combine the carbon with hydrogen and oxygen to form carbohydrates, which the plants then transport through roots and out to the soil, where fungi feed on the carbohydrates and deliver mineral nutrients back to the plants. This invisible partnership between plants and fungi is the foundation of the terrestrial carbon cycle, as plants incorporate carbon from atmospheric carbon dioxide into carbohydrate biomass, both above and below the Earth's surface. (Plant biomass averages an impressive 47 percent carbon by dry weight.)

Much of the carbon in stems, leaves and roots re-enters the atmosphere when plants decay, but a portion of it is stored in the soil. Soil carbon will be more secure and long-lasting the deeper carbon is buried, the less the soil is disturbed, and the more the soil is protected from sun, wind and water by perennial vegetative cover. Such protections prevent the carbon from releasing into the atmosphere. That's also good for the land: Adequate soil carbon is essential for water and nutrient retention. Soils with high carbon content thus resist drought better and are more productive than soils low in carbon.

How does all this translate into smart livestock grazing? Management practices proved to sequester carbon in pastures are easy to implement, and have multiple eco-

logical and economic benefits. Planting diverse mixtures of native or well-adapted perennial grasses and legumes eliminates the need for synthetic fertilizers and increases photosynthetic production compared with planting monocultures of domesticated grasses. However, planting some cool-season domesticated grasses, such as brome and fescue, in pastures can substantially extend the grazing season. Overall, think diversity.

Even in diversely planted pasturelands, though, grazing practices make a big difference. Overgrazing reduces carbon sequestration and productivity, but ranchers can avoid it with a rotational grazing system that incorporates multiple paddocks. Stocking density and rotation time depend on the season, the weather and the health of the soil. A rough guideline is to move animals to a new paddock after they've consumed about half of the biomass, and then rest each paddock until new growth is evident. Following these guidelines to foster healthy pastures will store more carbon in the soil, thereby helping to ease global warming.

—Wayne A. White

*For more on smart land management, see White's book Biosequestration and Ecological Diversity: Mitigating and Adapting to Climate Change and Environmental Degradation, available at <http://goo.gl/D6YRrG>. To read more about the negative effects of industrial agriculture, turn to Page 34. —MOTHER*



# Got *Organic* Milk?

The first large, nationwide comparison of organic and conventional milk composition, conducted by Washington State University (WSU), found that organic milk has a healthier ratio of omega-6 to omega-3 fatty acids. Many researchers think a higher intake of omega-3 fatty acids (found in meats and dairy products from grass-fed animals, flaxseed, seafood, walnuts and some leafy greens) reduces the risk of heart disease and, potentially, cancer by offsetting the too-high intake of omega-6 fatty acids in the contemporary U.S. diet. The typical U.S. diet contains a ratio of 10:1 omega-6 to omega-3 fatty acids (the imbalance coming from consuming too much processed and fried food, grain oil, seed oil, and meat and dairy from grain-fed animals), while the ratio should be closer to 4:1 or even 2:1.

The 18-month study on the nutritional qualities of milk, published in the peer-reviewed online journal *PLOS ONE*, compared nearly 400 samples of organic and non-organic whole milk from 14 commercial milk processors. The study found that organic milk has an omega-6 to omega-3 ratio of 2.28:1—just about perfect in terms of an optimal diet, according to WSU's explanation of the findings.

The ratio of omega-fatty acids in conventional milk, according to the study, was up to 2.5 times higher, at about 5.8:1. Researchers attributed the difference in the milks to what the cows ate. Most conventional dairy cows' diets are made up of ingredients high in omega-6 fatty acids, such as corn and corn silage. Organic dairy cows, by standards set by the USDA National Organic Program, spend a minimum of 120 days per year outside on grass pasture and eat forage-based feeds, such as hay, when grass pasture isn't available.

"The very large increase in omega-3 fatty acids in organic milk—62 percent higher than in conventional milk—really surprised the whole research team," says Charles Benbrook, a program leader with WSU's Center for Sustaining Agriculture and Natural Resources. "These are the heart-healthy fatty acids that play a critical role during pregnancy and lactation, and as a child grows," he adds. "The magnitude of the difference is the largest I know of between an organic food and its conventional counterpart."

Consumers should choose whole organic milk to get the most benefit from this difference. "The omega-3 and omega-6 fatty acids are in the fat portion of the milk," Benbrook says. "Whole milk is about 3.4 percent butterfat, so if you drink 2 percent instead of whole, you're giving up about half of that benefit."

—Joanna Poncavage



## New Rogue Hoe

A good hoe and a good rake top the list of the most essential tools for many gardeners. While "combination" tools usually don't perform quite as well as single-function options, we think you'll find that the new "garden hoe/rake" from Rogue Hoe stands out as an exception. This U.S.-made tool features a sharp, 6.5-inch-wide V-shaped blade for slicing weeds and creating planting furrows. Or, turn it over to use the flip side to rake or cultivate your garden beds. Being able to tackle all of those tasks with a single tool is super-handdy! Made from recycled agricultural disc blades, the tool head's high-quality steel yields sharp edges. Find Rogue's garden hoe/rake (\$39.95) and the company's extensive selection of other gardening tools at [www.RogueHoe.com](http://www.RogueHoe.com).

—Cheryl Long, Editor-in-Chief



in efforts to protect natural resources. This alliance also aims to motivate other Latinos to

take an active role in protecting public lands. Another project gathered young people to testify before a state senate committee to protect New Mexico's Gila River. For more information, go to [www.HispanicAccess.org](http://www.HispanicAccess.org).

—K.C. Compton

## On Living Forever

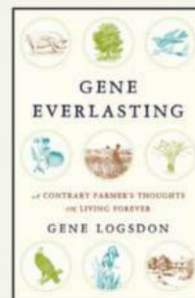
Farmer-philosopher Gene Logsdon returns with his newest book, *Gene Everlasting: A Contrary Farmer's Thoughts on Living Forever*, and we are the richer for it. You may know his work by one of his more than two dozen books, which range from practical (*Small-Scale Grain Raising*) to deeply thoughtful (*Living at Nature's Pace*). From his farm near Upper Sandusky, Ohio, Logsdon has honed his keen observations of the natural world. In *Gene Everlasting*, he wrestles with mortality—and the dubious ambition of trying to live forever. Here, he muses about how parents could discuss death with their children: "What if we, as loving parents and conscientious teachers, told children that, yes, someday, the people you love are going to die but they will always live in your memory safe from both the strife and suffering of life and the inscrutable agony of spiritual immortality." Much more wise insight from Logsdon lies between the covers of this

small but poignant book. Read an interview with Logsdon at <http://goo.gl/yHLpde>, and turn to Page 80 to purchase *Gene Everlasting*.

—Robin Mather

## Hispanic Access Foundation

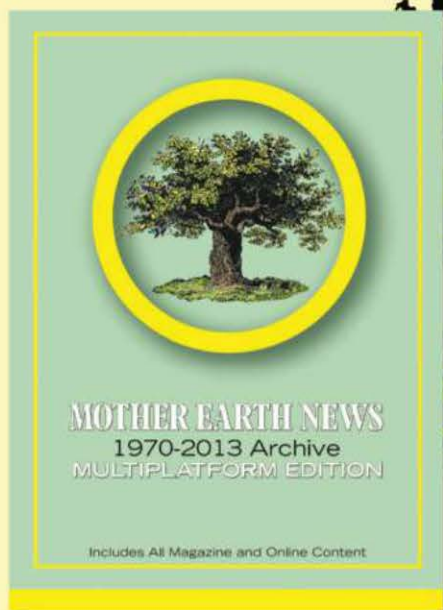
U.S. Latinos overwhelmingly support strong conservation initiatives, environmental protection and energetic government action on climate change, according to several recent demographic polls. However, not many organizations previously existed to rally the community around environmental issues. The newly formed Hispanic Access Foundation is out to alter that situation by working with its network of Catholic and evangelical partners as well as 17,000 community-based service organizations throughout the country. As one recent initiative, the foundation created an alliance of Latino religious leaders engaged



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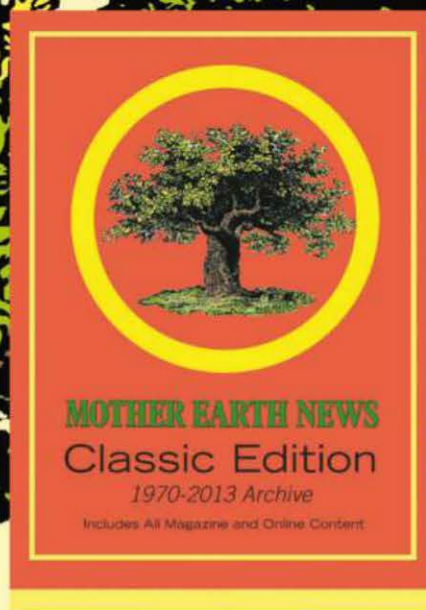


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# SUMMER SQUASH

*Easy to Grow, Easy to Eat*

Crooknecks, zukes and trombones! Discover squash's uses in the kitchen.

Story and photos by Barbara Damrosch

Summer squash (*Cucurbita pepo*) is the first fruiting vegetable to appear in the summer garden, long before the first tomato is ripe. Maybe by August the squash will seem ordinary, but now—with squash blossoms sounding their golden trumpets—the season has officially begun. The flowers held aloft on a slender stem are male. The female ones look similar, but at their base there is a small bump that will, in a few days, become a delicious little squash—ready to pick.

Summer squash takes varied forms, from the standard green zucchini to the bright yellow squash (crookneck or straight); from round ones, such as 'Ronde de Nice,' to flat, scalloped pattypan. Most grow on large, bushy plants; exceptions include the heirloom Italian "trombone" squash (such as 'Zucchetta Rampicante'), which trails on long vines and has a denser texture. All squash types are mild-tasting, which, on the one hand, makes them non-threatening to those put off by strong vegetable flavors, but on the other hand, issues a call to action for the creative cook. When I cook summer squash, I rely on its light



## Sautéed Squash Slices With Sage

This dish offers a good way to use summer squash that has passed the petite stage. The squash absorbs surprisingly little oil when sliced and sautéed in a pan. I like to combine yellow and green summer squash for color contrast. A scattering of fried sage leaves on top gives flavor and crunch. *Yield: 4 to 6 servings.*

*1/2 cup olive oil*

*15 to 20 medium to large sage leaves*

*Two 9- to 10-inch-long summer squash,  
sliced diagonally into 1/2-inch ovals*  
*Salt and pepper*

To fry the sage leaves, heat the oil in a small skillet for about 3 minutes, or until the oil is fragrant and the surface ripples. Drop in a sage leaf to test the heat; it should sizzle. Drop in the rest and cook for up to 1 minute. The leaves

should turn a darker green but not black, with the edges becoming slightly curled. Remove with a slotted spoon or spatula, and drain on paper towels. Sprinkle the leaves with coarse sea salt, then set aside at room temperature.

Pour the remaining oil into a medium-large skillet and fry the squash slices in two batches, moving them around and flipping them so they brown evenly on both sides (15 to 18 minutes). Line the squash slices up in rows on a warm platter, sprinkle with salt and pepper, and distribute the sage leaves over them. Serve while hot or warm.

**Note:** If you like your squash crisp, coat sliced summer squash with panko or breadcrumbs, then fry in oil until golden and crunchy. Drain well on paper towels and serve immediately on a warmed platter.



Fried sage leaves accent crisp squash.





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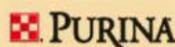
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background flavor to overlay with the more complex notes of herbs.

As luck would have it, early summer heralds the best time in the herb garden—when foliage is at its freshest, the essential oils that give herbs their flavors are the most powerful, and flowers for garnishing often bloom. Perennial herbs, such as sage, tarragon and thyme, and annuals, such as dill and parsley, will spark up squash dishes.

## Cultivating Cucurbits

Choose a sunny site where cucurbits, such as squash, cucumbers and melons, have not grown recently. Hungry squash plants prefer fertile soil rich in organic matter. When the soil has warmed to at least 62 degrees Fahrenheit, sow three seeds each in hills spaced 3 feet apart. When seedlings emerge, thin to one.

Keep the bed weed-free by cultivating shallowly with a hoe while the plants are growing. Later, the large leaves will shade out most weeds.



Stuff male squash blossoms with goat cheese or use them as a garnish for other dishes.

Unlike hard-skinned winter squash, summer squash can be enjoyed before they've reached full maturity, and can be harvested at any size, from a few inches long to more than a foot in length. But the fruits go from tiny to enormous in a flash, so if you're after squash that are, say, 6 inches or smaller—when they are especially lovely and tender—you'll need to check the plants daily to catch fruits at just the right moment. Harvesting squash often will also spur the plants to continue to produce fruit. The formation of squash monsters, which can grow unnoticed beneath the giant leaves, makes a plant less productive, so keep up with the picking!

Handle harvested fruits gently to avoid nicking the skin. Wounds admit bacteria that can lead to rot. Squash will store up to a week in the fridge, but for best quality, use them at their freshest.

Find a full guide to growing these early summer treasures in "All About Growing Summer Squash" at <http://goo.gl/B3JGw2>.

## Stuffed Zucchini Cups

Summer squash is fun to use as canapés. Thinly cut rounds may substitute for a cracker, for instance, with goat cheese on top. But cooking intensifies the vegetable's mild flavor. Here, they're sliced thickly, baked, and hollowed out to make savory edible cups. Any soft-textured herbs you like can be substituted for the ones suggested below. Note that the flower heads of lavender are composed of numerous tiny florets, easy to pluck out and set in place with tweezers to lend an assertive flavor and vivid color. (Try sprinkling lavender flowers over the top of a tossed salad.) A chive floret, Johnny-jump-up blossom or even a calendula petal would also do, if lavender isn't part of your garden. *Yield:* About 20 appetizer cups.

2 ounces plain, creamy goat cheese  
2 ounces cream cheese  
1 small clove of garlic, peeled  
2 tsp each fresh thyme, tarragon and flat leaf parsley, finely chopped

*Salt and pepper*

*Five 6-inch-long zucchini, each with a diameter of 1 to 1¼ inches*  
1 tbsp olive oil  
1 tbsp fresh lavender florets, for a garnish



Delicate and surprising, stuffed zucchini cups make lovely canapés.

Bring both cheeses to room temperature to soften, then mix them in a small bowl. Finely grate the garlic clove with the smallest holes on a box grater, or with a Microplane. Add the garlic and herbs to

the cheese and mix well. Season to taste with salt and pepper, then set aside.

Preheat the oven to 350 degrees Fahrenheit, and prepare the squash cups. Cut the zucchini crosswise into three-quarters-inch-long rounds. (Discard any

that are less than 1 inch in diameter, or save them for another purpose.) Using a melon baller or a small spoon, scoop out the top of each one to make a saucer-like hollow. Smear olive oil over a baking sheet and place the cups on it so they don't touch each other, saucer-side up. Bake them for 15 minutes, remove from the oven, and blot any liquid that collects in the hollows as they rest with a paper towel. While the squash cups are still warm, make balls of the cheese mixture and set

them into the cups. Shape them with your fingers—they don't need to be perfect! Place lavender florets on top, arrange the cups on a flat plate, and serve within a few hours at room temperature.



## Perfect for the Pan

Choose small- to medium-sized squash for sautéing or steaming. They're delicious served simply—with just butter, salt and pepper, and a sprinkling of fresh herbs. Try summer squash steamed whole, then sliced lengthwise and doused with vinaigrette, set on a bed of lettuce, and enjoyed as a room-temperature salad. Medium-to-large cucurbits are best in soups, gratins, or dishes in which they are stuffed and baked. Larger fruits pose more difficulty in finding good roles for them; they may be best grated and frozen for casseroles and zucchini bread. Or freeze them with onions (directions at right.)

Summer squash season is a long one. I've designed the recipes here to inspire creativity in the gardener-cook. Don't overlook the squash flowers, which also have wonderful possibilities. Stuffed with cheese, dipped in batter and then fried in oil, they make toothsome fritters. Prepare squash blossoms in simpler ways, too. Sliced into ribbons, the flowers keep their wonderful deep-yellow color even when stirred into a hot soup (as shown below) or strewn across a tossed salad. Pick the male blossoms—the plants produce more of these than needed for pollination—in the morning when they are fresh and wide open to welcome bees.



Harvest summer squash often to enjoy them at their most tender and to keep plants producing,

that's convenient for your cooking style, pressing out as much air as possible before sealing. Keep the packages flat to better stack them in the freezer. Thaw packages as needed, then steam or sauté briefly, adding butter, salt and pepper, and your favorite fresh herbs. 🌿

Barbara Damrosch farms with her husband, Eliot Coleman, at their Four Season Farm in Harborside, Maine. She is the author of *The Garden Primer* and, with Coleman, of *The Four Season Farm Gardener's Cookbook*. Both are available on Page 80.

## Zuke Soup With Blossom Ribbons

Any summer squash can act as the base for a fine puréed soup, but I like the way the colors and textures of the ingredients stand out in this chunky zucchini soup recipe. Squash blossom ribbons add bright golden color. Serve this soup as a light meal with salad, or as a first course before dinner.

*Yield: 4 servings.*

*2 tbsp olive oil*

*1 medium-large onion, coarsely chopped (about 1½ cups)*

*Three 6- to 7-inch-long zucchini, cut into small chunks (about 3 cups)*

*Dash of salt*

*2 cups chicken broth*

*1/2 tsp grated nutmeg*

*3/4 cup whipping cream*

*1 tbsp whole, fresh tarragon leaves*

*Freshly ground pepper*

*4 squash blossoms*

In a large saucepan, heat the olive oil over medium heat until fragrant, then add the onions and reduce heat to medium-low. Stir onions frequently for 5 minutes. Add the zucchini and salt, cover and sweat for 2 minutes. Add the chicken broth and nutmeg, stir and bring to a simmer. Cook for 10 minutes or until the vegetables are soft but have kept their shape. While the soup is cooking, cut off the bottom half-inch of each squash blossom, removing the reproductive parts. Slice the petals lengthwise into quarter-inch-wide strips.

Stir in the cream, tarragon and pepper. Taste and add salt if needed. Return to a simmer, then remove the pan from the heat. Add the blossoms, reserving some of them for garnishing. Stir, then ladle the soup into shallow bowls, distributing the reserved flowers over the top.

Serve right away.



Nutmeg and blossoms adorn this light, creamy zucchini soup.

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# Build Your

# DEBT-FREE DREAM HOME

Readers share how they paired patience with resourcefulness to craft their ideal abodes without going into debt.

By Amanda Sorell

**M**any of us hope to someday own a home that's perfectly suited to our penchants, but are wary of falling into debt for decades. The reports that follow illustrate the crafty and creative ways that MOTHER EARTH NEWS readers have acquired or built their own homes while avoiding a mortgage. (Go to [www.MotherEarthNews.com/Debt-Free-Homes](http://www.MotherEarthNews.com/Debt-Free-Homes) to read all of the reports we received.) These debt-free homes are diverse—from a geodesic kit home in California to a spacious log cabin in South Africa—but their owners' counsel is consistent: With innovation, patience and a willingness to learn, you can do it, too.

## Plan Your Plot

Do you intend to construct a house by yourself, or hire out some of the labor? Will you build your shelter from scratch, or find a fixer-upper? Decide how large you want your home to be—the smaller you build, the less you'll pay out of pocket. Also consider whether you'll need to set up temporary housing, such as an RV or a trailer, as you build. After you've moved in, you can sell your temporary housing and invest that money into your home. Starting with a clean slate may feel overwhelming, but by adhering to the following advice from readers, as well as studying the recommended resources on Page 28 for guidance and inspiration, you'll embark on your course to a debt-free dwelling with confidence.



Roy Trembath's log home in South Africa is built out of eucalyptus trees, an invasive species.



**Learn the law of your land.** After you've decided where to build, check with your county or city to find out whether you'll have to comply with any building codes or inspection requirements. If you're in a rural area, you may need only an electrical or sewage inspection. Other areas may demand a wide range of inspections and permits. See "Essential Advice for Owner-Builders" at <http://goo.gl/nXbBPg> for information you'll need to know about building codes before you raise your roof.

**Revive a residence.** Refurbishing an abandoned structure is one route to substantial savings. Julie Pfister and her husband, Tom, were living with their son in Sidney, Neb., near a 400-square-foot, WWII-era kit home that had succumbed to a fire and been condemned. Julie and Tom were able to see beyond its blackened walls, however, and purchased it from the owner for \$5,000. They soon learned they would need a city engineer to sign off on their construction plan, and would have to undergo city inspections after each renovation step. They also needed insurance before they could work and live in the unfinished home. Undeterred, they hauled out the structure's damaged innards bucket by bucket, and the bungalow gradually morphed into a small, energy-efficient home. After a little less than a year, they had moved in. The Pfisters did all the labor themselves, and say they'd do it all again. "You don't have to start new. You can

start with what's available and make it perfect with a little work and some common sense," Julie says.

**Do it yourself.** Before you lament a lack of know-how to undertake such a project, ask yourself whether you're willing to learn. A readiness to study new skills will be the most important tool

you can wield—along with plenty of patience. Roy Trembath is a do-it-yourselfer in South Africa, and his advice is to do your homework. Roy studied every action he took while building his house, and discovered that his DIY mindset frequently led to frugality. Roy harvested the timber he used, bought a secondhand saw to cut his own floorboards, and built his own furniture. His 3,600-square-foot home cost about \$25,000—less than the down payment he would have dished out for a conventional mortgage on a home of the same size.

## Turn Trash Into Treasure

You don't need to purchase new materials to build or furnish your home. Do a little digging to unearth discarded lumber and gently used appliances. To find what you need, check construction sites and demolition companies,

visit Habitat for Humanity ReStores, and peruse websites such as [www.EBayClassifieds.com](http://www.EBayClassifieds.com), [www.Craigslist.org](http://www.Craigslist.org) or [www.Freecycle.org](http://www.Freecycle.org).

Bill and Priscilla Poupore foraged many of the materials for their straw bale house in West Texas. To begin construction, they

"Building our home was a leap of faith and a big transition, but the relief from debt has been totally liberating."  
—Jacki Rigoni



Though drought made straw scarce in Texas, the Poupores sourced enough to build their straw bale home. Reclaimed telephone poles support the roof.

paid \$4,000 for a concrete foundation and tapped into their retirement funds to purchase cement, lime and sand to make plaster. They sought bargains on straw bales, and even scouted free, reclaimed telephone poles to repurpose as roof supports. The Poupores have been working on their 1,100-square-foot house (pictured above) for the past decade, paying for supplies as they go. By wielding reclaimed materials and extending the costs and labor over 10 years, they've dodged debilitating debt.

LaMar Alexander also shaped his debt-free home out of salvaged components. While living in a trailer on a piece of inherited land in Utah, he cleared the property, then designed and built a 400-square-foot cabin (shown below) for \$2,000 in just two weeks. LaMar bought lumber at discounted bulk prices from suppliers, and salvaged double-pane, low-e glass windows and steel-insulated doors from a nearby abandoned house. He sourced wood for the porch from a local lumber mill, and made the cabin's interior trim out of recycled cedar fence boards. LaMar repurposed items in his trailer for use in his new shelter: fridge, lights, shower, sink, stove, plumbing, propane tanks, water pump and wiring. He hand-drilled a well, designed a solar composting toilet, installed rainwater harvesting and greywater systems, and invested in solar panels and a small wind turbine. Without monthly bills or a mortgage to manage, LaMar has been able to pursue creative ventures that bring in enough money to pay for property taxes and propane.

## Make a Move

Just as you can sleuth out recycled wood and low-cost appliances, you can also bag a bargain on the house itself. If you have the perfect piece of land but lack the home to match, you can save a great deal of money by buying and moving a house that would

otherwise be torn down. (Read the *MOTHER EARTH NEWS* article "Ultimate Recycling: Relocating a House" to learn more and to read firsthand accounts; go to <http://goo.gl/2q6wQS>.)

Deb and Warren Kelln of Clavet, Saskatchewan, decided that moving a house was their best bet for debt-free living. The Kellns originally lived in a mobile home on acreage where they kept cattle, horses, sheep and chickens. In late 2012, a neighbor who owned a 1,200-square-foot house that had been sitting unused on his property for the past eight years told Deb he was going to tear it down. She objected, asking how much he wanted for it. The only payment her neighbor required was 10 dozen eggs—a payment Deb's chickens happily produced. Deb and Warren then paid movers \$6,000 to have the house relocated 12 miles to their property. Building the foundation cost another \$6,000, but Warren, a carpenter, performed all of the labor on the foundation and the house with the help of a couple of friends. A rural municipality inspector approved their work, and the Kellns moved into the home in late 2013. Deb has worked to outfit the home almost exclusively by procuring used windows, doors, furniture and appliances at garage sales and online. "It's not because we can't afford to buy new—it's just a conscientious choice," Deb says. "So many

people have so much and dispose of it for no reason. My house is full of antiques that are better than anything you can buy now."

## Take Your Time

Deciding to build a debt-free home is a daring venture that encompasses countless big decisions. Our readers repeatedly advised against rushing the process, insisting that patience, persistence and careful consideration of every detail pays off in the end.

Paul Scheckel, a renewable-energy expert from Vermont, says shortcuts will



LaMar Alexander's tiny Utah cabin has a loft inside to free up valuable floor space. He also harvests rain and rescues greywater for his garden.



Betsy and Larry Mehaffey built this off-grid log cabin in Idaho over the course of several years to spread out the expense and effort.

only become headaches later on in the building process. Paul built his home slowly for 20 years. With only a power saw to begin the work—but no codes to abide by in his rural area—Paul designed and built a two-story, 1,500-square-foot home. He used old windows and rough-cut, reclaimed lumber, and located other goods at garage sales. He also relied on and traded with his friends and other homesteaders: “The camaraderie and assistance with the hard, heavy and thankless jobs were the seeds of a lasting community,” he says. Nothing was as fast or as cheap as Paul had expected, but in the end, he avoided 20 years of mortgage payments and loves his hand-built home. “The trick I finally learned in order to deal with stress was to take things in achievable, bite-sized bits: ‘Today I will frame one window.’”

Larry and Betsy Mehaffey also relied on patience while crafting their 980-square-foot cabin (above). In June 2002, they pur-

chased 5 acres in Dixie, Idaho, and lived first in a tent, then in a 180-square-foot cabin. They began building their home in June 2006, and persevered through long, hot days to pour the foundation, peel and scribe logs, and put up a metal roof. They installed windows and doors just before the first snow fell. The Mehaffeys used about \$20,000 from the sale of their former home and from Larry’s periodic carpentry jobs to finance the structure. Over the next few years, they added appliances, piped in propane, and built cabinets and furniture, turning this cumulative handiwork into their dream home. “Doing most of the work ourselves was slower, harder and at times frustrating, but also more affordable and much more satisfying,” Betsy says. “By entering the project debt-free and choosing to live a simple life, we were able to avoid a large building debt. Even with the long hours and hard work, we are daily amazed to be living in the cabin of our dreams.”



After laying their foundation (above), the Burggraf family hosted a barn-raising-style gathering to erect their Tennessee home (right).





The Rigoni-Escobar family traded their million-dollar home and mortgage for a small dome kit home in California that they could construct together.

## Work Together

Few homeowners we spoke with embarked on their debt-free journey alone. Many recruited family and friends—often a barter would be enough to secure a comrade's assistance.

Henry Burggraf and his family brought friends and neighbors together to complete their 1,300-square-foot home in Tennessee (Page 27, bottom). Henry traded hunting rights on his farmland with a construction worker named Joe, who offered to frame Henry's house in return. The Burggrafs had already laid the foundation and built the first floor. After Joe finished the frame, the Burggrafs raised the rest of the house with an entire community of people, modeled after an old-fashioned barn raising. Six families pitched in to help get the house up and roofed in just five sessions. After about one year spent finishing the interior, the Burggrafs moved into their new dwelling.

Building a debt-free home was a family affair for the Rigoni-Escobar clan in Northern California (above). In 2013, Jacki Rigoni, Mauricio Escobar and their three young children moved out of their million-dollar home in San Francisco and purchased 9 acres of land outside of San Jose, Calif. While living in an RV on the land, they bought a 400-square-foot, \$11,000 geodesic kit home. Along with a foundation and an outdoor shower/outhouse, their modest new quarters cost about \$20,000 total.

"The hardest part was deciding that the mortgage-for-30-years track wasn't for us," Jacki says. "Funny—but it's



not so obvious when everyone around you is convinced that being strapped to a mortgage is what grown-ups do."

Jacki says the family recognizes what they took for granted about their former home, such as indoor plumbing and garbage service, but that nothing could ever persuade her family to return to shouldering million-dollar debt. "We really savored the opportunity to work together as a family and to model self-sufficiency for our kids," Jacki says. "It has been a major leap of faith and quite a transition, but the relief from the stress of debt has been totally liberating."

## Where the Heart Is

Equipped with this collected advice from debt-free home builders, you can commence with planning your own project. A blend of careful preparation, creativity and camaraderie will set you on course for mortgage-free living. Your DIY digs will be more than just a shell that shelters you. The house you find or build will be a reflection of your personal style and your approach to self-sufficiency—and in exchange for your time and energy, you'll gain the security and satisfaction of financial freedom. 🌳

## RESOURCES

### HIGHLY RECOMMENDED BOOKS

**Home Work, Shelter II** and **Tiny Homes** by

Lloyd Kahn (see Page 80 to order)

**Making Better Buildings** by Chris Magwood

**Building Your Own House: Everything You**

**Need to Know About Home Construction**

**From Start to Finish** by Robert Roskind

**Mortgage Free!: Innovative Strategies for**

**Debt-Free Home Ownership** by Rob Roy

**Building Green** by Clarke Snell

**Homebuilding Debt-Free: Guide for the Owner-**

**Builder** by Lynn Underwood

### HANDY ONLINE GUIDES

**Development Center for Appropriate**

**Technology:** [www.DCAT.net](http://www.DCAT.net)

**International Code Council:** [www.ICCSafe.org](http://www.ICCSafe.org)

**"A Guide to DIY Kit Homes":**

[www.MotherEarthNews.com/Kit-Homes](http://www.MotherEarthNews.com/Kit-Homes)

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Circle #49; see card pg 97



Fruit and nut trees buffer vegetable crops from temperature extremes.

# GROW FOOD IN DROUGHT & HEAT

These six strategies, along with dozens of recommended short-season annual crop varieties, will keep your garden thriving as the climate heats up.

By Gary Paul Nabhan

If we've learned anything as food growers in recent decades, it's that climate change has placed not just one but many kinds of stress on our gardens and farms. "Global warming" does not adequately describe the

"new normal," given that many food sheds and farms have suffered from a variety of catastrophic floods, freezes, droughts, wildfires, heat waves, grasshopper infestations and crop diseases over the past few years.

The big, paradoxical question confronting many farmers and garden-

ers is: How do we adapt to and plan for uncertainty? While such a question may initially seem unanswerable, farmers from all parts of the world have responded over many centuries through better crop selection and strategies to mitigate the worst effects of sun and wind.

To best adapt, we need thousands of different annual crop varieties evolving in fields and undergoing evaluation in continually changing climatic conditions, as well as responding to pressures from novel strains of diseases, garden pests and weeds. But just how do we determine and select which annual crops' seeds are most likely to help us

cope with the drought, heat waves, severe storms and other climatic disasters we face?

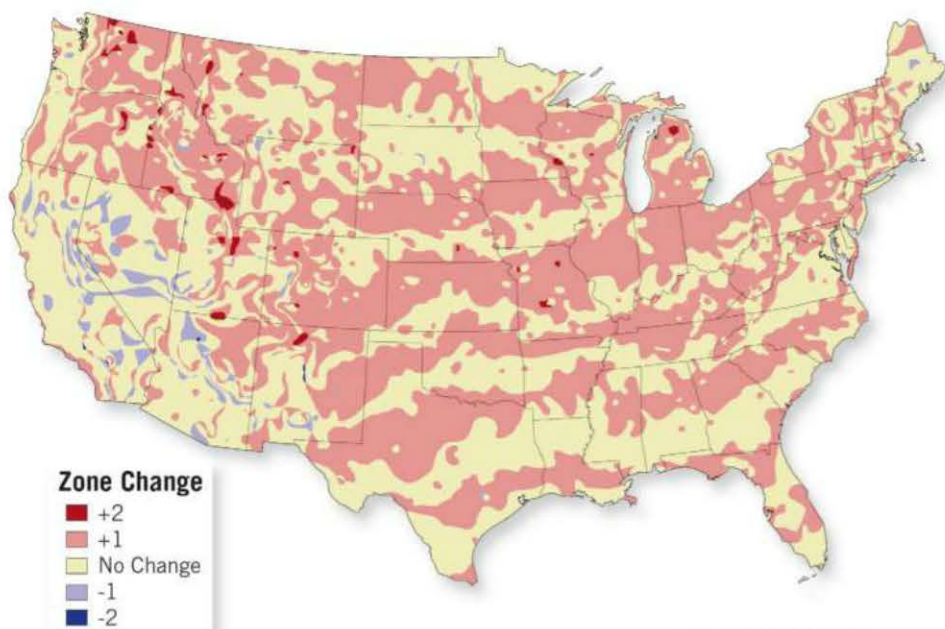
## Learn From Desert Plants

As a Southwest gardener and orchardist already facing hot, dry conditions, I try to take tips from the native desert wildflowers growing around me. They've convinced me that there is more than one way to approach a drought. While most seed catalogs interchange the terms "drought tolerance" and "drought resistance," these terms are often used imprecisely to describe a whole suite of desert-plant adaptations. Drought-resistant perennials include ju-jube, loquat, macadamia nut, mulberry, persimmon and pomegranate. True drought *tolerance* is a characteristic of deep-rooted, desert-hardy trees—such as carob trees and date palms—that can survive months without rain by extending their roots down and tapping into underground aquifers.

In the interest of precision, I propose one more category. Many herbaceous annual and perennial crops function as drought *evaders* in that they circumvent drought. They begin their life cycle with the onset of rains intense enough to trigger germination, and then complete the cycle before the brief wet season is over. They largely avoid desiccation and drought stress by ripening their fruit and dispersing their seeds well before severe soil and water deficits recur, so they never truly experience extended drought. Many early-maturing, short-season vegetables and grains employ these drought-dodging strategies.

Short-season crops have exceptional value in an era of water shortages and climate uncertainty because, after it's transplanted in a field, a crop that matures in 60 days rather than 90 may require 20 to 25 percent less irrigation than its late-blooming counterpart, thus conserving water and energy.

The chart on Page 33 indicates early-maturing, heat-tolerant varieties that avoid drought, pests, and early and late freezes, rather than attempting to withstand them. For example, short-



THE ARBOR DAY FOUNDATION

Since 1990, USDA Hardiness Zones, based on average minimum winter temperatures, have shifted north because of global warming. Pink areas indicate a shift of one zone; red areas, two zones.

season flour corns from the Sonoran Desert—such as 'Tarahumara Harinoso de Ocho' and 'Onaveño'—and even the 'Gaspé Flint' corn of moist, temperate Quebec will begin to tassel out and produce ears in 45 days, and will yield dry, fully mature kernels for grinding in about 60 to 70 days.

These examples from both the far Southwest and the far Northeast underscore that every region has some

early-maturing crop varieties adapted to its prevailing growing season.

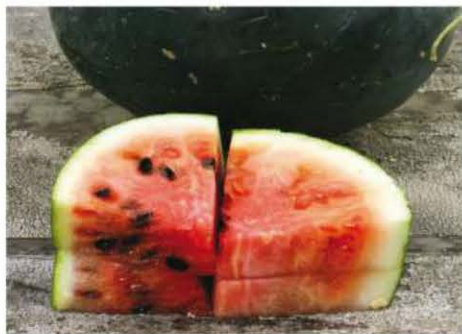
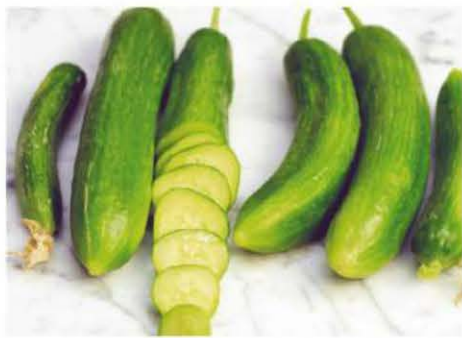
## Crop Resilience

The most effective ways to enhance the resilience of food production in a climatically uncertain future are to:

① **Eliminate monocultures.** Grow several varieties of the same (or related) species together in the same plots or fields. By mixing varieties that



Clockwise from top left: 'Blue Speckled' tepary bean; 'Chinese Red Noodle' long bean; 'Seminole' pumpkin; 'Whippoorwill' cowpea.



Clockwise from top left: 'Beit Alpha' cucumber; 'Ping Tung Long' eggplant; 'Omar's Lebanese' tomato; 'Arkansas Black' watermelon.

have different flowering times, frost or heat tolerance, and water requirements, you'll be hedging your bets and preventing most stresses from damaging your entire harvest.

**2 Plant drought evaders.** Some of the elements of your crop mixtures should be early-maturing, short-season crop varieties that can germinate during brief wet seasons when soil moisture levels are temporarily adequate, thereby decreasing irrigation demands and lowering the risk of crop failure. (See the chart on Page 33 for a list of

recommended drought-tolerant crops and varieties.)

**3 Include perennials.** Use intercroppings of annual and perennial species with diverse growth habits and from various plant families. This strategy establishes polycultures that collectively harvest more rain and sun, and use proportionately less groundwater and fossil fuel. For instance, by planting vegetables under canopies of fruit, nut or legume trees—a technique known as “alley cropping”—you'll buffer the vegetable crops from temperature ex-

tremes and minimize potential danger from harsh climatic events such as hailstorms. Even so-called sun-loving vegetables, such as chiles, actually do better in some regions under the partial shade of mesquite, honey locust, cherry or plum trees.

Diverse crop mixtures share beneficial soil microbes as well. A motto for growing diverse agricultural crops resilient enough to fend off the threats of climatic disruption is: No annual grown alone, no perennial left behind!

**4 Try intercropping.** Many vining plant varieties, such as pole beans and watermelon, have already been selected for decades, or even centuries, to be suited to intercropping. Planted next to corn, millet or sorghum, they will climb right up the stalks. This helps produce the added harvests of edible produce that agro-ecologists call the “overyielding effect.” A good example of this is a Three Sisters garden of corn, beans and squash. The combined yield of this planting grown together on the same land is often higher than what any of these crops planted individually would produce in the same space.

**5 Use your microclimates.** Get to know your land and take advantage of any moderated microclimates. In other words, use your landscape's terrain advantageously by matching crop needs with each agro-habitat.

**6 Establish landraces.** Create your own landrace crops—local varieties that have adapted specifically to the natural environment of your garden or homestead—by observing your garden carefully and saving seed from the plants that do best.



Mixing crop varieties helps develop resilience amid climate uncertainty. Saving seed from your best plants creates crops well-suited to your location.

Gary Paul Nabhan is an agricultural ecologist, ethnobotanist and writer whose work has focused primarily on the desert Southwest. He is considered a pioneer in the local-food and heirloom seed-saving movements. This article was adapted from his recent book *Growing Food in a Hotter, Drier Land: Lessons from Desert Farmers on Adapting to Climate Uncertainty* (see Page 80 to order).

# Heat-Tolerant Annual Crop Varieties

When selecting what to grow, choose from these 87 short-season crop varieties that will help your garden to evade droughts and other climate disruptions. To find mail-order sources for these varieties, use our Seed and Plant Finder at [www.MotherEarthNews.com/Custom-Seed-Search](http://www.MotherEarthNews.com/Custom-Seed-Search).

Recommended Varieties	Days to Harvest	Recommended Varieties	Days to Harvest	Recommended Varieties	Days to Harvest
<b>Amaranth</b>		<b>Eggplant</b>		<b>Pole bean</b>	
'Mayo'	60	'Applegreen'	62	'Blue Coco'	55
'Red Stripe Leaf'	28	'Aswad'	70	'Rattlesnake'	60
'Tampala'	42	'Black Beauty'	72	<b>Sorghum</b>	
<b>Artichoke</b>		'Florida High Bush'	76	'Honey Drip'	110
'Rouge d'Alger'	60	'Florida Market'	78	<b>Squash</b>	
<b>Beet</b>		'Ichiban'	70	'Green-Striped Cushaw'	75
'Crosby's Egyptian'	50	'Ping Tung Long'	65	'Lebanese Light Green'	40
'Egyptian Flat'	50	'Turkish Orange'	65	'Lebanese White Bush Marrow'	50
<b>Chard</b>		<b>Lima bean</b>		'Magdalena Big Cheese'	105
'Fordhook Giant'	60	'Alabama Blackeyed'	61	'Seminole'	95
'Perpetual Spinach'	70	'Christmas'	75	<b>Sunflower</b>	
<b>Corn</b>		'Henderson Bush'	60	'Skyscraper'	75
'Black Aztec'	70	'Sieva'	75	<b>Teff</b>	
'Black Mexican'	62	'Willow Leaf'	65	'A.L. White'	115
'Chapalote'	90	<b>Malabar spinach</b>		<b>Tepary bean</b>	
'Gaspé Flint'	70	'Red Stem'	70	'Blue Speckled'	85
'Mexican June'	90	<b>Melon</b>		'Mitla Black'	75
'Reventador'	80	'Casaba Golden Beauty'	90	'Pinacate'	90
'Tarahumara Harinoso de Ocho'	55	'Small Persian'	100	<b>Tomato</b>	
<b>Cowpea (Southern pea, black-eyed pea)</b>		<b>Mustard</b>		'Burbank'	70
'Bisbee Black'	65	'Florida Broadleaf'	23	'Native Sun'	50
'Blue Goose'	80	'Red Giant'	20	'New Zealand Pink Paste'	80
'Brown Crowder'	54	'Southern Giant Curled'	50	'Omar's Lebanese'	80
'Calico Crowder'	65	<b>Okra</b>		'Orange King'	55
'California Black-Eyed Pea'	55	'Burgundy'	49	'Ozark Pink'	65
'Chinese Red Noodle' (long bean)	75	'Clemson Spineless'	50	'Porter'	65
'Haricot Rouge du Burkina Faso'	70	'Gold Coast'	62	'Siletz'	52
'Mayo Colima'	70	'Louisiana Green Velvet'	58	'Texas Wild Cherry'	63
'Pinkeye Purple Hull BVR'	63	'Star of David'	60	'Tiny Tim'	45
'Six Week Browneye'	42	<b>Orach</b>		'Traveler 76'	76
'Whippoorwill'	70	'Red'	37	'Tropic VFN'	80
<b>Cucumber</b>		<b>Pepper</b>		<b>Watermelon</b>	
'Armenian' ('Snake Melon')	50	'Charleston Belle'	67	'Ali Baba'	100
'Beit Alpha'	56	'Datil'	80	'Arkansas Black'	85
'Edmonson'	70	'Golden Cal Wonder'	66	'Desert King'	85
		'Tabasco Short Yellow'	75	'Georgia Rattlesnake'	90



Traditional rice harvest  
in Chittoor District, India.

# Hidden Downsides of the GREEN REVOLUTION

Since the mid-20th century, industrial agriculture has been producing more calories than ever, but the resulting diet is causing widespread disease.

By Richard Manning

For decades, urgent international debate about whether sustainable agriculture can feed the world has foundered on a false assumption. We've been sucked into a game rigged by the constrained doctrine of the Green Revolution, the 20th-century shift to high-yielding rice, wheat and corn varieties that are dependent on irrigation and heavy fertilization. We've made the mistake of focusing on crop yield—on mere quantity—but there is so much more to this equation.

Rural India is as good a place as any to begin digging to the roots of the problems with industrial agriculture. Poor farmers there have long been offered the Green Revolution's so-called miracle crops, and many have said, "No, thanks." Stories such as this are legion

within the vast network of breeders and agronomists charged with spreading the miracles worldwide: poor, starving farmers weeping and pleading to be permitted to keep growing their treasured local varieties of rice instead of obeying a government decree that they plant the "new and improved." Why would a destitute farmer refuse these "blessings"?

## The Root of the Matter

H.E. Shashidhar, a gene-jockey agronomist employed at a monkey-infested lab near Bangalore, India, dug until he got an answer to this question—actually, layers of answers. Each layer, peeled back, can help recast our thinking about sustainability everywhere. Shashidhar took the somewhat radical step of asking farmers who grew unirrigated, dryland rice why they persisted in cultivating

long-cherished local landraces instead of science's best varieties, which yielded sometimes four or five times as much food. Ignorance? Superstition?

For one thing, said the farmers, the landraces tasted better—but then what's taste if you and your children are starving? A lot, it turns out, but put taste aside for a minute. Here's the more obvious point: The miracle crop varieties do indeed yield well—most years. But they are delicate, and in more vicious drought years, they fail altogether. If a hut full of starving children depends on you, better to have a small, dependable crop year after year than to face catastrophe one year out of five. Ignorance? No. Rather, a cold calculation completely based on local realities, and one that set Shashidhar to thinking and tinkering. So why not have it both ways? Why not gather and cross-breed local landraces with the new varieties to create a high-yielding, drought-tolerant variety customized to local tastes?

To be resilient, crops—not just in India, but in desiccated areas worldwide—must be drought tolerant, requiring longer roots to reach deeper for water. The landraces do indeed have long roots. The improved varieties don't, but they have short stems, which was what the Green Revolution was all about: short plants, dwarfing. We think it was about fertilizer, pesticides, irrigation and monocrops, but all of these were really derivative of dwarfing. By breeding plants to invest less energy in producing stems, more energy goes to grain. Further, short plants have the architecture necessary to support the extra weight of seed heads swollen fat by fertilizer and irrigation.

The miracle that forestalled mass starvation in the mid-20th century—and let's give it its due for doing exactly that—was simply the dwarfing of rice and wheat. So what Shashidhar really needed was a rice plant with a short stem *and* long roots, and he set about to make one. He tracked and guided his work with genetic markers, which is not genetic engineering but a common method of conventional plant breeding. Yet his genetic markers yielded a discovery lying right at the heart of the issue: One can't breed a rice plant with a short stem and long roots because both traits are controlled by the same gene, making it, really, a single trait. It's either long



Modern cereal varieties are bred to utilize synthetic fertilizers and pesticides, the manufacture and use of which pollute land, air and sea.

and long or short and short. This means the world has been fed now for a couple of generations by short-stemmed *and* short-rooted plants, which has had unintended consequences for humans and plants alike.

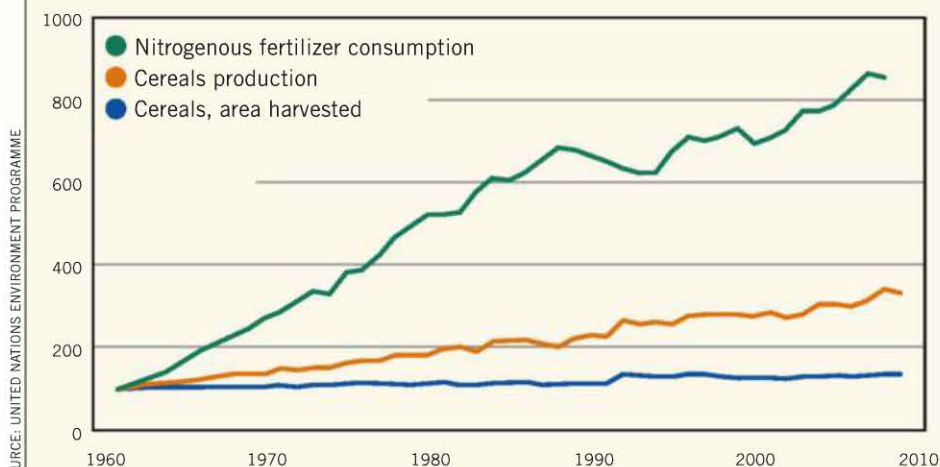
## Gauging "Success"

The enormous success of the Green Revolution in boosting yields has, in fact, occurred in mainly three plants: corn, wheat and rice. "Success" means that about three-quarters of all human nutrition now derives from these three plants alone. They make up the world's high-carbohydrate diet. Among the global poor—especially among the urban poor—most folks survive on something south of

2,000 calories a day, which is supplied by meager bowls of grain gruel or rice and a bit of oil. Many are fortunate to have even these austere rations, and yet, in the multi-starred hotels around the world where conventions of agricultural economists gather to congratulate each other, the data sets prompt celebration. It states in crisply rendered PowerPoint that farmers have fed the world. Yield-per-acre times acres cultivated times calories-per-bushel divided by people. It pencils.

Poverty is no longer marked solely by starvation, at least not everywhere. How much more obvious can this be than in the United States, and increasingly in the rest of the developed world, where the poor are fat? Separate issues? Not if one analyzes the

## Industrial Agriculture Is Unsustainable



Since the early 1960s, the global growth in cereals has depended on agricultural intensification, with little expansion in the area harvested.

## The world's top health problems derive from the way we eat and grow food.

stream of food in the developed world, just as carbohydrate-laden and grain-dominated as in the undeveloped. In the developed, it's not porridge and gruel, but rather a stream of mush disguised by marketing, processing, coloring and flavoring—but still a stream of mush. Increasingly this mush is rendered by alchemy to sugar, and with the sugar comes a series of plagues: type 2 diabetes, heart disease, hypertension, depression.

In some ways, this caloric incongruity is nothing new, but has been developing for 10,000 years. One line of thought, now a couple of centuries old, that focuses on “diseases of civilization” argues that humans adopted agriculture at great peril. Agriculture equals carbohydrates and has from the beginning, and the diseases that stem from eating excessive amounts of carbohydrates appeared at the beginning. The plagues, though, have accelerated in modern times as we've doubled down since the Green Revolution.

The Bill & Melinda Gates Foundation sponsors a massive and unprecedented study being carried out by the Seattle-based Institute for Health Metrics and Evaluation. Called “The Global Burden of Disease,” it looks at causes of death, debilitation, and

loss of quality of life from people suffering 291 diseases in 187 countries. First results published in the journal *Lancet* in late 2012 reveal that the world's top health problems—our worst plagues,

almost every one—derive in one manner or another from the way we eat and grow food. The world's worst health problems are, in short, diseases of civilization.

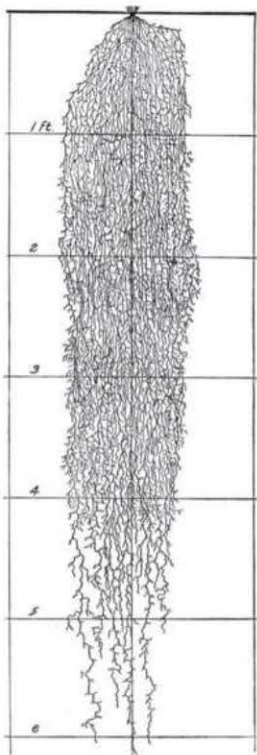
This sobering bit of business strikes straight at the heart of the question of sustainability, which has asked whether the land, the biota, the planet could stand industrial agriculture. The equally urgent question, now, is whether *humans* can stand it.

### Taste, Deep Roots, and Your Brain

The emerging, welcome and necessary blame on carbohydrates for our health problems misses something important by focusing on what we eat and forgetting what we are not eating, which brings us back to the roots. The roots and something vitally important the rice farmers were telling Dr. Shashidhar when they said they preferred the taste of their local varieties. Just like the gene for dwarfing, taste and roots are different sides of the same coin.

Deep roots enable plants to tap into the highly mineralized subsoil, and the array of minerals manifests as taste and color in the resulting food, and then as complete nutrition for the people who eat it. For a couple of generations the world has largely fed itself on short plants that only scratch the surface by rooting in topsoil long since depleted and deprived of its mineral content.

The sense of taste that drives traditional Indian farmers toward landraces is not a culture-bound anomaly unique to their time and place, but rather a rule of human evolution, a seminal human trait. There's a good reason that stomach samples taken from ancient bog men carcasses in Europe show evidence of dozens of species of plants consumed in a single day, or that traditional hunter-gatherers were nomadic, ranging far and wide to gather a dizzying variety of seeds, roots and berries. Or, for that matter, that all human cultures through all of pre-agricultural time ate meat. The animals we ate also ranged far and wide and mostly ate deeply rooted perennial grasses, thereby bio-accumulating an array of minerals we call micronutrients. These behaviors are fundamental



Heritage cultivars, such as ‘Turkey Red’ wheat (above), and perennial wheat relatives, such as Kernza (close right), put down strong, deep roots, unlike the modern semi-dwarf wheat varieties (far right) that make up our diet.





Modern agriculture is efficient at producing and distributing calories, but we're losing the nutrition and resilience of traditional crop varieties.

to the human condition. Our brains and bodies, more so than any other species, are exceedingly complex, and this complexity requires complicated cellular networks, all of which are supported by intricate biochemistry that fuels itself on a vast array of proteins, fats and minerals, the raw materials of our form. Humans require variety to achieve their full potential—especially brain potential—and evolution gave us preferences that make us seek out variety: our sense of taste. Taste is adaptive. To ensure we get a full complement of micronutrients, evolution wired us with a drive powered by neurochemical rewards to seek out those micronutrients and the variety that supplies them. The irony is that no one understands this better than modern food processors, marketeers and packagers who exploit that reward system to lure us into eating fluffed-up lumps of carbohydrates disguised as food.

## Overfed Yet Undernourished

The consequences of depriving us of variety, as industrial agriculture has done, are enormous. The good news is, this problem has now been placed on the table by some of the same institutions that brought us the Green Revolution. For instance, the United Nations Food and Agriculture Organization (FAO) will now tell you that a third of humanity suffers from what the organization calls “hidden hunger,” which is defined as a diet ample in calories but insufficient in nutrients and micronutrients. Anemia from iron deficiency, goiter from iodine deficiency, and blindness from severe vitamin A deficiency lead the list as the worst problems. That is, fully a third of humanity is blind or brain damaged to the point of debilitation solely because of the way we grow food. Another 1.4 billion people are overweight from eating a diet long on carbohydrates and short on everything else. The widespread conditions of kwashiorkor and marasmus—resulting from the lack of protein and marked by visible stunting and listlessness—are yet further consequences of carbohydrate subsistence, and both are endemic in the poorer reaches of the world.

Vitamin B12, iodine, magnesium, cholesterol (yes, cholesterol is a vital nutrient), vitamin D, calcium, fiber, folate, vitamin A, omega-3s, vitamin E and iron—each is plentiful in the same foods we have

eliminated from the modern industrial diet and each is vital to brain function and physical well-being. Furthermore, scientists are in the early stages of understanding the phenomenon of “bio-availability”—that the lack of a given vitamin or micronutrient is not simply remedied by adding a given amount back through a supplement. The body's ability to absorb those nutrients is greatly influenced by the presence or absence of other nutrients. For instance, people eating a full complement of healthy meats tend to not need added vitamin C. At all. Eating spinach with lemon helps the body absorb much more of the iron in the green's leaves. Eating eggs and cheese together delivers a better uptake of vitamin D and calcium. Variety supports our internal complexity.

## Biodiversity and Human Potential

We're no longer in India, but in the U.S. heartland, in Minnesota corn country. Will Winter is a veterinarian and subversive, if speaking against corn and soybean row crop monocultures in the heartland is subversive—and indeed it is. But he's tired of treating sick cows, and that's what veterinarians do at industrial feedlots and dairies, because all the cows, every one, are sick from a diet of ground grain and protein meal.

Take these same cows (he's done it) and turn them loose on an established pasture with access to woodlots and brush, and they'll begin eating the woody stuff, and then the grass, and then they'll get better. No doctoring necessary. Winter says this phenomenon, as was the case in India, is about roots. Perennial grasses and brush form deep roots that extend into the subsoil, which makes nutrients missing from feedlot diets available to the cows. Instinctual taste preference tells the cows they need these minerals; they seek them out, and then they get better.

These nutrients are transmitted to the people who eat the meat and drink the milk from cows grazed on permanent pasture. This realization is the impetus of the burgeoning demand for grass-fed meat, and at the heart of this dietary shift are omega-3 fatty acids, which science is finally acknowledging are in short supply in the human diet. Critically short. A recent global summit of researchers studying the lack of omega-3s in our diets called for a “Kyoto-type

Industrial ag produces food deficient in omega-3 fatty acids, which are essential for brain health.

approach” to the worldwide omega-3 shortage to head off a crisis they attest is every bit the equal of global warming. Michael Crawford, the British researcher who has examined the issue for more than 30 years, thinks we are in danger of becoming a “race of morons,” so great and widespread is the brain damage from lack of this essential fatty acid.

Yet making this all an issue of omega-3s or carbohydrates misses the point. There is no single focus or magic bullet or wonder micronutrient, no matter what the marketers might tell you. There is only diversity. What is accomplished when Indian rice farmers grow landraces with deeper roots or Minnesota farmers run cows on permanent pasture is increased diversity, which is another way of saying they are widening the links and pathways to the essential forces and complexities of the planet. Roots link to minerals. Manure captures the wide-ranging gleanings of animals and builds soils that promote microbial life. Microbes promote health in soil, plants and human guts. Landraces link to the full genetic heritage, built by eons of life forces, to the wisdom of time. We are evolved to be woven into this web of life.

For a long time, some of us have understood that increasing biodiversity in agriculture is absolutely essential to making it sustainable—“farming in nature’s image,” to use the words of Wes Jackson of the Land Institute in Salina, Kan. But still, the industrial ag folks and the Green Revolutionaries challenge us: “Yeah. Diversity is nice, but can sustainable agriculture feed the world’s population?” And then they rig the game by defining “feed” in just the same way they define agriculture—a narrow, linear process of input, throughput, output, yield per acre, calories per bushel, calories per person.



At 18 years old, this grass-fed Angus is still nursing and calving. Industrially raised, grain-fed cows are worn out and slaughtered at a much younger age.

Humans are more than simply a caloric equation to solve. Better to pose the question correctly, as Wendell Berry did in his essay “What Are People For?”

We don’t have to get lost in the metaphysical weeds trying to answer that question. It may be uncertain what we are for, but it is totally certain that we will not fulfill that purpose—what-

ever it may be—without fully developed brains. Evolution’s best clue about the answer to Berry’s question comes from realizing the uniqueness of our brains. Evolution went to great lengths to give us extraordinary power of thought.

I think this is what the Koyukon people, traditional hunters of central Alaska, mean when they say, “Animals are our food. They are our thoughts.”

Human potential—the physical, glowing, buzzing human brain—is literally formed and developed with an unimaginably complex swirl and flood of biochemistry. Our bodies and minds only attain their potential by maintaining a web of ties to the forces of life: deep roots, many branches, flora and fauna, micro and otherwise. Biodiversity. Roots are our thoughts, too. Literally so.

The truth is, it is not clear whether we can feed the planet’s 7.2 billion with sustainable agriculture, but it is abundantly clear that we cannot sustain our thoughts and our humanity without it. 🌱

Award-winning journalist Richard Manning has covered nature, politics, and agriculture for more than 30 years. He is the author of *Against the Grain: How Agriculture Has Hijacked Civilization* (see Page 80 to order); his most recent book is *Go Wild*.

**Because of the process of bio-accumulation, meat from free- and wide-ranging animals provides a variety of minerals and micronutrients, crucial elements for human health.**





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Circle #11; see card pg 97

# FARMING FREE

## *An Interview With Vandana Shiva*

A global activist speaks out about GMOs and the misconduct of industrial agriculture.

By Thaddeus Christian

Genetically modified organisms, or GMOs, are constantly in the news these days. Scientists debate the safety of engineered foodstuffs, consumer advocates demand GMO labeling, and farmers and gardeners decry the emer-

gence of corporate seed monopolies that limit what we can do in our own dirt. It is with this controversy in mind that we recently spoke with veteran anti-globalization campaigner Vandana Shiva.

Vandana Shiva is the founder of the Research Foundation for Science, Technology and Ecology and the Navdanya organic seed network. She is a pre-eminent advocate for the preservation of food sovereignty, civil liberties and biological diversity. The author of almost

30 books, she also initiated the global Seed Freedom movement to organize events and celebrate seed defenders (learn more at [www.SeedFreedom.in](http://www.SeedFreedom.in)). Shiva began her journey by defending oak forests with the Chipko movement in northern India. Chipko—meaning “hug” in Hindi—was a 1970s campaign to protect villagers’ rights against corporate and government intrusion, specifically the stripping of local forests sanctioned by the Uttarakhand state forest department. Shiva has followed her calling to protect natural resources and indigenous agrarian traditions to this day, albeit on a grander scale.

MOTHER EARTH NEWS interviewed Shiva to discuss the importance of food

policy and how it affects what’s on your plate and what’s in your garden.

Genetically modified (GM) crops are promoted as essential for an ever-growing population. How do you respond?

Genetic engineering hasn’t demonstrated increased yields as promised by biotechnology corporations. (See the report “Failure to Yield” from the Union of Concerned Scientists at <http://goo.gl/EtJxss>.)

Despite this, GM crops account for more than 80 percent of North American crop acreage. Why did farmers adopt this controversial technology?

Farmers do not choose GM crops. The industry destroys all options. In India, in the case of cotton, the industry blocked public research and locked companies into licensing agreements to sell only Bt cotton, a variety genetically modified with *Bacillus thuringiensis* bacteria. Increased seed costs and yield failures pushed many farmers into unrecoverable patterns of debt, triggering a wave of suicides. In the United States, independent researchers can’t even study GM seeds because the biotechnology and chemical firm Monsanto won’t allow them to obtain seeds. When I once asked a group of U.S. farmers why they grow GM soy, a farmer replied, “The companies have a noose ’round our neck. We can only grow what they sell to us.”

Do you think sustainable agriculture can scale up to replace the current industrial system?





Vandana Shiva (left) was part of India's Chipko movement, which sought to keep forest resources in the hands of local tribes and communities (right).

Yes, scaling up can be done if society has the will and commitment.

In the essay “For the Freedom of Food,” you wrote, “Food has become the place for fascism to act.” What do you mean by that statement?

I describe what is happening as “food fascism” because this system can only survive through totalitarian control. With patents on seed, an illegitimate legal system is manipulated to create seed monopolies. Seed laws that require uniformity—which criminalize diversity and the use of open-pollinated seeds—are fascist in nature. Suing farmers after contaminating their crops, as in the case of Canadian farmer Percy Schmeiser, is another aspect of this fascism. Pseudo-hygiene laws that criminalize local, artisanal food are food fascism. And attacks on scientists and the silencing of independent research, as in the case of Árpád Pusztai and Gilles-Eric Seralini, are examples of knowledge fascism.

*(Árpád Pusztai is an internationally esteemed biochemist who was censored and dismissed after 36 years at the Rowett Research Institute because he publicly discussed his research demonstrating the harmful effects of GM potatoes on rats. Gilles-Eric Seralini is a professor of molecular biology at the University of Caen whose published findings on the toxicity of the herbicide Roundup and Roundup-resistant corn were uncharacteristically retracted by the science journal Food and Chemical Toxicology.)*

What do you see as the biggest barrier to building a more sustainable food system, in the United States and globally?

The biggest barrier is government support of industrial agriculture and GMOs through favorable legislation and direct subsidies. That is why I talk of food democracy. Creating better food systems

should be a fundamental goal of democratic societies.

On the topic of governance, how does international trade and investment policy affect everyday farmers and gardeners?

The disaster in India with farmers' suicides is a “gift” of the previous round of free-trade treaties that created the World Trade Organization. India was forced to allow seed giants, such as Monsanto, to enter the market. We were forced to remove import restrictions, resulting in a huge agrarian crisis. “Free trade” means freedom for corporations to destroy the planet, our economies and our democracies. The Trans-Pacific Partnership (TPP), which is currently negotiating U.S. participation, is even more disastrous, because it heavily promotes corporate intellectual property rights and

GMOs. Monsanto wrote the intellectual property rights clauses and the massive multinational corporation Cargill wrote the agriculture treaty. Worse, the TPP agreements contain investor-state clauses that would allow corporations to sue governments. (*Learn more about the Trans-Pacific Partnership free-trade negotiations at <http://goo.gl/QV4Wff>.*)

Do you believe this tide of corporate globalization can be turned back by the cooperation of grass-roots organizations?

This type of globalization is collapsing. The challenge is to build alternatives before it's too late.

As for alternatives, what are the most concrete things we as individuals can do to restore food sovereignty and build a sustainable society?

Save seeds and grow a food garden. 🌱

## World's Largest Seed Conglomerates

Rank	Company	Seed Sales 2011, in millions	% Market Share
1	Monsanto (USA)	\$8,953	26.0
2	DuPont Pioneer (USA)	\$6,261	18.2
3	Syngenta (Switzerland)	\$3,185	9.2
4	Vilmorin/Limagrain (France)	\$1,670	4.8
5	WinField/Land O'Lakes (USA)	\$1,346	3.9
6	KWS (Germany)	\$1,226	3.6
7	Bayer Cropscience (Germany)	\$1,140	3.3
8	Dow AgroSciences (USA)	\$1,074	3.1
9	Sakata (Japan)	\$548	1.6
10	Takii & Company (Japan)	\$548	1.6
Total		\$25,951	75.3

Source: ETC Group, Phillips McDougall

**Flexitarian (flek-sa-TERR-ee-an) n.** A person who consumes meat in moderation as part of a plant-based diet; a marriage of the words flexible and vegetarian



# BECOME A FLEXITARIAN

Choose to eat less meat — and meat from grass-fed animals when you do — to improve your health, animal welfare and the environment.

By Kim O'Donnel

Ten years ago in America, you could eat meat—all 203.2 pounds of it per capita per year—without drawing much attention from your fellow diners. After all, eating meat defined who we were as Americans. As historian Roger Horowitz writes in *Putting Meat on the American Table*, “Eating meat has been an integral part of the American diet since settlement,” and our daily habit of 6 to 8 ounces of animal protein “has been a defining feature of our society.”

Just a decade ago, vegetarians were outliers and vegans a rare curiosity. The notion of choosing plants over flesh was often the signature of coastal health nuts and the spiritually inclined—not Middle America. From 2004 to 2007, per capita meat consumption (beef, lamb, pork and poultry) remained steady at well above 200 pounds per year. A “flexitarian” diet wasn’t yet in our lexicon. (The word was added to the *Merriam-Webster Dictionary* in 2012.)

And then a recession happened on the way to the dinner table. In 2008, Americans

ate less than 200 pounds of meat annually for the first time in seven years. Although steadily waning since the 1980s, per capita consumption of the quintessential American meat—beef—dropped to a 50-year low, to 62.1 pounds. By 2011, the United States Department of Agriculture (USDA) reported per capita meat consumption was down to 186.6 pounds.

Still, the economy is not the sole reason behind the challenge to the meat-y status quo. The past five years have witnessed a collective shift in perception and attitudes about meat for sundry reasons, includ-

ing concerns about animal welfare, food safety, personal health and environmental impact. Some celebrities—Bill Clinton, Ellen DeGeneres and Mike Tyson among them—have publicly given up meat. Vegetarians and vegans have “come out” (how *Washington Post* food editor Joe Yonan described his dietary shift) and are a slowly growing demographic. According to the results of a 2012 Gallup poll, 5 percent of those surveyed described themselves as vegetarian. For the first time, Gallup asked respondents whether they considered themselves vegan. Two percent did.

A 2012 NPR-Truven Health Analytics poll showed 56 percent of respondents said they eat meat no more than one to four times per week—a striking shift from the American tradition of meat three times a day, seven days a week.

We’re hardly breaking up with meat—at the current rate, we’re still eating 8 ounces a day, substantially more than the American Heart Association’s recommended 3 to 6 ounces of daily lean meat consumption per day. But bite by bite, our appetite for meat is tapering off.

Until about five years ago, the prevailing argument for reducing the meat on our plates was dietary—to cut back on saturated fat, lower cholesterol, and reduce the risk of heart disease and other chronic illnesses. But meat eaters have many additional factors to consider as they decide what’s for dinner, and wonder whether that conventional health advice is still sound. Industrial meat, in particular, has been at the center of a growing debate because of environmental impact, inhumane animal conditions, and its contribution to the spread of antibiotic-resistant foodborne illnesses.

## Environmental Impact

Nearly all supermarket beef, chicken and pork—the three most consumed types of animal protein in this country—are produced on enormous industrial-scale farms. The U.S. Environmental Protection Agency (EPA) defines these huge farms as “agricultural enterprises where animals are kept and raised in confined situations. [Such operations] congregate animals, feed, manure and urine,



Runoff from cattle feedlots often pollutes nearby waterways (top), but the manure from grazing animals actually enriches the ground they inhabit and prevents desertification (bottom).

dead animals, and production operations on a small land area. Feed is brought to the animals rather than the animals grazing in pastures, fields or on rangeland.”

The EPA considers 15 percent of these industrial farms “concentrated animal feeding operations” (CAFOs). The num-

bers of animals on a given piece of land is part of the definition—a large chicken CAFO, for example, houses more than 125,000 birds; a large CAFO for beef cattle can house more than 1,000 head.

**Every beef-eating American for more than 50 years has been exposed to steroids and growth hormones.**

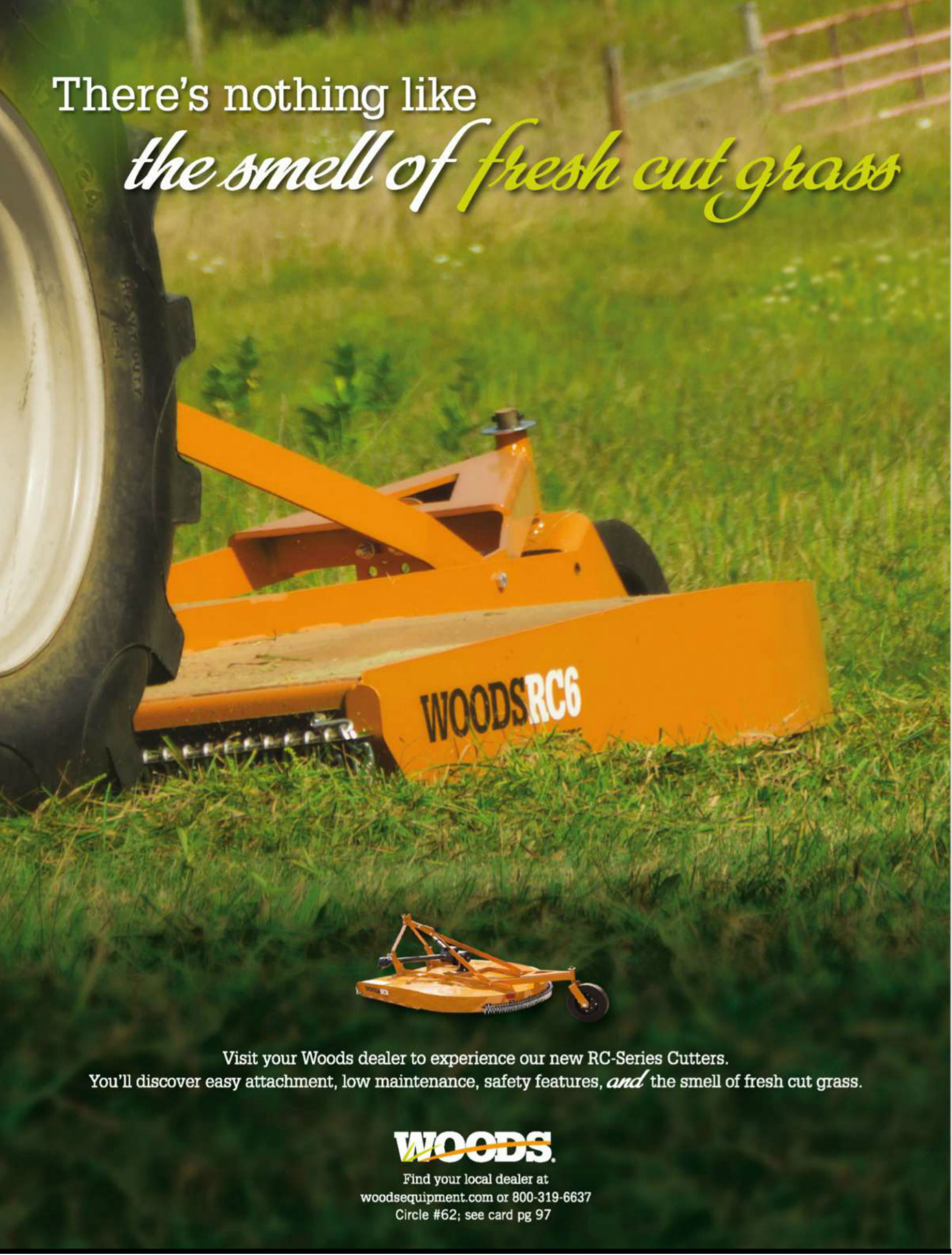
ber of animals on a given piece of land is part of the definition—a large chicken CAFO, for example, houses more than 125,000 birds; a large CAFO for beef cattle can house more than 1,000 head.

On these factory farms, animals eat commodity crops—primarily corn and soybeans—that are subsidized by tax-

payors via the Farm Bill. Half of all North American cropland—about 149 million acres—produces animal feed from genetically modified (GM) crops designed to resist weedkillers such as Roundup. These crops have spawned an epidemic of herbicide-resistant “superweeds.” In 2012, superweeds infested 61 million acres of farmland growing GM crops. The result: An increase in herbicide use rather than a reduction, as well as “stacking” of genetically modified traits in seeds to allow cocktails of potent herbicides to be used on crops.

Beef cattle are given anabolic steroids as well as estrogen, androgen and progesterin—commonly called “growth hormones”—to make them put on weight more quickly. Although the European Union banned the use of these hormones in 1988, they’re still commonplace in the United States. “Measurable levels of ... growth-promoting hormones are found at slaughter in the muscle, fat, liver, kidneys and other organ meats,” says

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## Nearly half of supermarket samples of meat and poultry test positive for bacterial contamination.

the Organic Consumers Association in a position paper. “Every beef-eating American for over 50 years has been exposed to these hormones on a regular basis.” Pigs, too, are fed growth hormones. The use of growth hormones in poultry, however, has been illegal in the United States since the 1950s.

Animal feed includes low-level (sometimes called “sub-therapeutic”) doses of antibiotics to promote growth and offset unsanitary, overcrowded conditions. About 80 percent of all antibiotics sold in the U.S. are administered to livestock, a figure acknowledged by the U.S. Food and Drug Administration (FDA) in 2010. These drugs pass through manure and leach into the soil and groundwater, ultimately polluting neighboring rivers and streams.

In its 2004 *Water Quality Report to Congress* (the last year such a report was released), the EPA cited industrial agriculture as a “major pollutant source,” poisoning some 94,000 river and stream miles (40 percent of all river miles surveyed).

To address the use of growth-promoting antibiotics on livestock, the FDA in late 2013 issued new guidance for drug manufacturers and industrial livestock farmers. The guidance is voluntary, however, and thus lacks regulatory teeth.

Animal manure is another major pollutant. According to the EPA, U.S. livestock on CAFOs produced about 500 million tons of manure in 2007—triple the amount of human waste generated by the country’s population at that time, and far more than soil surrounding the CAFOs could absorb as fertilizer. Manure is thus typically stored in giant outdoor pits known as “manure lagoons,” which sometimes leak and overflow.

In stark contrast, manure from pastured livestock is an asset in building healthy soil. Increasing research in recent years has pointed to

the benefits of grazing livestock not just on farmland but on abandoned and eroded grasslands. In 2011, the USDA published a study linking the grazing activities (and manure-manufacturing) of pastured livestock to the restoration of nutrient-starved soil in the extensive area of the



Gestation crates prevent sows from standing or turning around (top) while pigs raised on pasture can root in the dirt and cool off in the mud (bottom).

Southeast known as the Piedmont, which stretches from New Jersey to central Alabama. “From an environmental standpoint,” the USDA wrote in its report, “grasslands have traditionally been viewed as best managed by leaving the land unused. But the team found ... that the grazed land produced more grass than the ungrazed land and had the greatest amount of carbon and nitrogen sequestered in soil.”

These findings coincide with those of Allan Savory, a Zimbabwean biologist who, in a widely viewed 2013 TED Talk, argued that we can reverse desertification—land turning to desert—with managed herds of grazing livestock. Their manure and urine, says Savory, create a layer of mulch that helps the degraded soil absorb rain water and store carbon; the mulch also regulates soil temperature and breaks down methane gases. In Savory’s estimation, if we bring grazing livestock to just half of the world’s remaining grasslands, “We can take carbon out of the atmosphere and safely store it in the grassland soils for thousands of years.”

## Animal Welfare

CAFOs are not only characterized by an enormous volume of livestock, but also by extremely confined and inhumane conditions. Animals are often housed indoors, with little or no access to sunlight. For decades, factory farms

have kept egg-laying hens in tiny cages—sometimes called the most inhumane of all industrial management practices for animals—and sows (pregnant female pigs) in gestation crates, which are so cramped that the sows can neither stand nor roll over. Although still permissible on a federal level, several states have banned gestation crates. There has also been some progress on a corporate level. Smithfield Foods, the world’s largest pork producer (now owned by a Chinese firm), has pledged to phase out gesta-

tion crates on its corporate-owned facilities by 2017, and is campaigning to end its suppliers' use of them. Dozens of global food corporations, including Costco, Sodexo and Sysco, have announced their timelines to eliminate gestation crates in their respective supply chains.

Some restaurants are taking action, too. Since 2001, Tex-Mex chain Chipotle has sourced 100 percent of its pork from producers who follow humane husbandry practices, allowing pigs outside or raising them in deeply bedded pens, never giving animals growth-promoting antibiotics, and feeding them a vegetarian diet. Chipotle calls this "naturally raised," and applies the same standards to its growing network of suppliers for beef, chicken, cheese and sour cream.

## Public Health

The public has become accustomed to mass-scale foodborne illness. From the deadly 2008 salmonella outbreak in peanut butter to the recall of half a billion eggs in 2010, food-safety scares have become bigger and more commonplace.

An additional twist on foodborne illness is antibiotic resistance. Last year, the federal Centers for Disease Control and Prevention (CDC) published a report describing the public health threat caused by the widespread use of antibiotics in raising livestock. According to the report, antibiotic-resistant infections (which are a serious problem in hospitals) result in 23,000 deaths and 2 million illnesses annually. The number of antibiotics available to treat infections—including the sometimes-deadly Methicillin-resistant *Staphylococcus aureus* (MRSA)—continues to dwindle, even as those bacteria evolve to become more deadly. The CDC's "Threat Report 2013" lists *Clostridium difficile*, Carbapenem-resistant *Enterobacteriaceae*, and drug-resistant *Neisseria gonorrhoeae* as "microorganisms with a threat level of urgent," and notes another dozen bacteria that possess a "threat level of serious." (See the full report at <http://goo.gl/JR4esn>.)

Two examples of antibiotic-resistant bacteria showing up in our food supply:

- A 2011 study revealed that nearly half of all supermarket meat and



Keeping laying hens in "battery cages"—where the birds don't even have room to spread their wings—has been called the most inhumane of all industrial management practices for animals.

poultry samples tested positive for *Staphylococcus aureus* (commonly known as "staph"). Of those tainted samples, more than half were contaminated with MRSA, the antibiotic-resistant version of staph, researchers at the Arizona-based Translational Genomics Institute found.

- In January 2014, a *Consumer Reports* study reported that 97 percent of supermarket chicken breast samples were contaminated with foodborne pathogens. Nearly half of the 316 samples tested positive for multi-drug-resistant

**Nearly half of supermarket samples of meat and poultry test positive for bacterial contamination.**

bacteria. What that means: You eat chicken that makes you sick, you take an antibiotic, but the antibiotic doesn't work. And eventually, maybe *no* antibiotic will work, as journalist Maryn McKenna points out in "Imagining the Post-Antibiotics Future" on the crowd-sourced literary website [www.Medium.com](http://www.Medium.com) (read McKenna's piece online at <http://goo.gl/cqSdMJ>).

In addition, consumers have grown wary of red meat after decades of counsel from the government and the medical establishment to eat less saturated fat and cholesterol, instead turning in

large numbers to chicken and to pork, the so-called "other white meat." But today most research indicates that the cholesterol in the food you eat has no impact on the amount of cholesterol in your blood. While experts still believe that too much saturated fat raises serum cholesterol, many studies have shown that the fats in pastured meat and dairy products are different than those in their industrial counterparts, and are not only heart-healthy, but may actually protect your heart—another compelling reason to switch to meat and dairy products from pastured animals. For more, read "The Fats You Need for a Healthy Diet," online at <http://goo.gl/3a6YLa>.

## Making the Change

As meat lovers blur the lines between vegetarian and carnivorous diets, they're referring to themselves as weekday or part-time vegetarians, or vegetarian or vegan before 6 p.m., or, of course, flexitarian. If these facts have persuaded you to eat less meat, and to choose pastured or grass-fed when you do, then you're on the brink of becoming a flexitarian. There are many paths to eating less meat.

**A change in frequency.** Reduce the number of meals you eat with meat each day, and take at least one full day off from meat each week. The public health campaign Meatless Monday is arguably the best-known effort advocating an incremental, one-day-off-from-meat approach to benefit both personal health and the environment. Now in its tenth

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Buy half as much meat, and make it better meat.

— Mark Bittman, *The New York Times*

year, Meatless Monday has grown into a global phenomenon.

**A new ratio and portion size.** Rather than taking just one day off from meat, some dial back their total weekly intake. Both the American Heart Association and the American Institute for Cancer Research recommend a weekly maximum of 18 ounces of lean meat, which translates to six 3-ounce servings. Some people choose to use meat as a condiment, selecting beef or cured cuts of pork to top salads and pasta, fold into a frittata, or as an ingredient in a sauce or a stew. A few pieces of beef or chicken atop a salad, or over polenta, can make a satisfying entrée. And what's old is new—traditional specialties such as the Pennsylvania Dutch scrapple and the goetta of Cincinnati, both made with scrap meats and various grains, are making a comeback among a new generation of curious chefs and home cooks.

## Choosing Pastured Meat

Industrial meat is so cheap and ubiquitous that it's more feasible to feed oneself on greasy fast food patties than on a bean burrito or a head of fresh broccoli.

In contrast, meat from grass-fed animals, while more expensive pound-for-pound, possesses an amazingly healthful nutritional profile, rich in omega-3 fats and conjugated linoleic acid (CLA). Both omega-3s and CLA have been linked to powerful health benefits, including improved cardiovascular health and protection against some forms of cancer. In his first weekly "Flexitarian" column of 2014, *The New York Times* writer Mark Bittman compiled a list of "Sustainable Resolutions for Your Diet" in which he challenged readers: "Buy half as much meat, and make it better meat. Thinking of eating meat as an indulgence lets you buy tastier,

healthier, more sustainable meat without breaking the bank."

Humanely raised pastured meat is becoming more readily available and consumer demand is growing, says Andrew Gunther, program director of Animal Welfare Approved (AWA), which works with 1,500 producers that have earned the group's highly esteemed food label. Gunther notes that even though pastured meat represents just a fraction of the overall market, he's seeing annual sales growth of 10 to 20 percent. Grass-fed beef, which represents about 3 percent of all beef

ier. Founded in 2011 by two women butchers in the San Francisco area, the Butcher's Guild says in its mission statement that "good meat can change the world." Find a Butcher's Guild member near you at <http://goo.gl/TgkmTZ>.

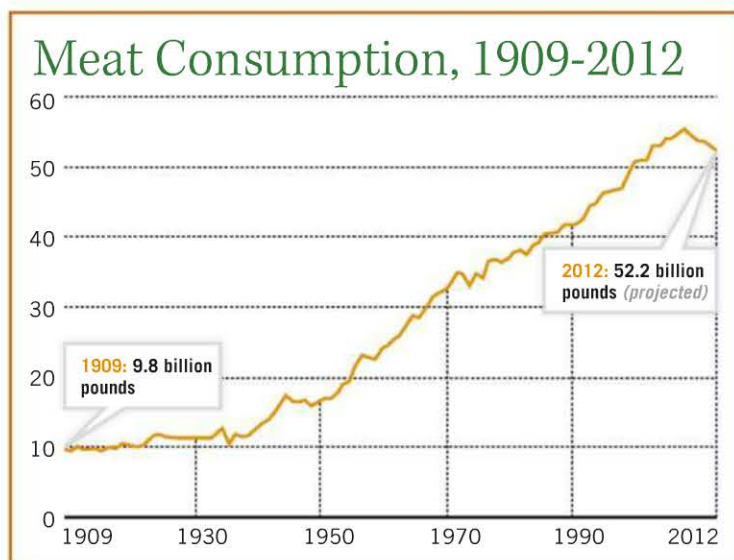
## Getting Culinary

As home cooks have broadened their culinary boundaries, so, too, have chefs and cookbook authors.

The past few years have seen plant-forward cookbooks penned by meat eaters, among them *River Cottage Veg* by British farmer and TV personality Hugh Fearnley-Whittingstall; *Plenty* by London restaurateur Yotam Ottolenghi, and my *The Meat Lover's Meatless* series. Meanwhile, books such as *The Grassfed Gourmet Cookbook* by Shannon Hayes and *Tender Grassfed Meat* by Stanley A. Fishman can guide you in preparing that humanely raised, grass-fed or pastured meat so that it's succulent and full of flavor. (See Page 80 to order all of the titles listed here.)

At [www.Eatwild.com](http://www.Eatwild.com)

or [www.LocalHarvest.org](http://www.LocalHarvest.org), you can find meat and dairy products from grass-fed animals near where you live. (And check out our individual state and province pages on Facebook to connect with people near you to exchange information about local food. See [www.MotherEarthNews.com/Facebook](http://www.MotherEarthNews.com/Facebook). — MOTHER) 🌱



Meat consumption has begun to drop, after decades of steady rise. These levels are for all meats combined and were calculated by the USDA Economic Research Service.

produced in the United States, is slowly expanding from boutique specialty venues to the mainstream marketplace; for example, some Costco stores now stock grass-fed beef, Gunther says.

## The Butcher's Revival

As demand for pastured animal products has grown, so has a network of farmers markets and local and regional marketplaces. According to the USDA, 8,144 farmers markets operated in 2013—more than double the 3,704 markets in 2004.

A revival of the local butcher—thanks in part to the Butcher's Guild, a network of independent butchers and chefs—has made finding high-quality meat eas-

Veteran food journalist Kim O'Donnel is the author of *The Meat Lover's Meatless Cookbook* and *The Meat Lover's Meatless Celebrations*. Both are available on Page 80. She has written for *The Washington Post*, *USA Today*, and [www.Culinate.com](http://www.Culinate.com).

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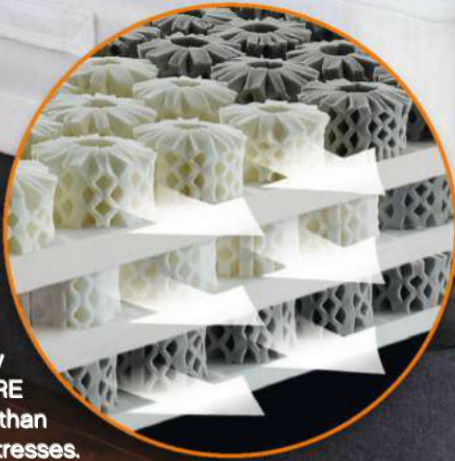
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Bobby the horse waits patiently, hitched to the Good Companion Bakery delivery wagon at the farmers market in Vergennes, Vt.

## *Ready to Roll*

# A HANDMADE MARKET WAGON

Story and photos by Erik Andrus

A different kind of horse power trotted into a Vermont town when a local baker built his own delivery wagon.

I believe living horse power can be an effective way to transport local food to market, and that more people should adopt this sustainable form of transportation. To bring working animals back to the city streets, I decided to build a commercial horse-drawn wagon in 2010. My project would allow me to sell bread and produce directly from my wagon parked on the City Green of Vergennes, Vt., the town nearest my home.

Building the delivery wagon was fun, and it combined my love of woodworking with my interest in working with animals. The project took many hours and cost about \$2,000 in materials. If I were to build a wagon like this on commission, I would probably charge \$4,500.

## Local Loaf Delivery

My family operates Good Companion Bakery on our 110-acre farm just outside of Vergennes, Vt. Sustainable transport of our baked goods, produce and meat to market was one of my motivations in building a wagon.

The cargo hold (pictured at top) is outfitted with a handmade storage system that allows us to haul 150 pastries, 80 loaves of bread, several boxes of produce and two coolers of frozen meat. We can't fit that much food in our car! And, unlike our station wagon's cargo area, which is all curves and wheel wells, I designed the hold of our horse-drawn vehicle to be a perfect match for the type of goods we sell. Every pine cargo crate has good clearance and ventilation, and a shelf with a lip keeps each crate snug on even the bumpiest of rides.

Our wagon is based on plans for a bakery van drawn by John Thompson, a British man who made scale drawings and models of horse-drawn vehicles during the 1920s and '30s, when gasoline-powered cars and trucks were rendering equine-powered transportation obsolete. Thompson drew plans for all sorts of vehicles, including passenger conveyances, furniture delivery vans, fire engines, hearses and water tankers. I chose Thompson's historic design for a bakery cart because it seemed the right size for the quantity of goods we would usually take to the farmers market in our car.

## Wheel Dealings

The first step in building our horse-drawn wagon was to select the appropriate running gear (wheels and axles). I wanted the real deal—wooden wagon wheels rather than air-filled rubber



**The horse-drawn wagon's cargo area bests the author's station wagon in food-hauling capacity (top). The bench seat on the front holds a car battery to power rear flashers and a dome light, with storage room to spare (bottom).**

tires. Wooden wheels last a long time with proper care and look more appropriate on a cart built from a historic design.

I recycled two wheels, the spring suspension and some wooden parts from an antique delivery wagon and ordered two new wheels from the Witmer Coach Shop of New Holland, Pa. My apprentices and I rebuilt our bakery cart's running gear using these scavenged pieces as well as several custom-made wooden components.

## Building the Box

We used traditional mortise and tenon joints on the wagon box construction for maximum strength and for resistance to racking (coming out of square) while lurching along on the road. The frame members are all made from solid, locally cut and milled ash. The woodwork for the footboards, bench, doors, roof structure and wall frame is also ash, smoothed with hand planes and spokeshaves.

We deviated from traditional methods by using plywood for the deck, sides, roof and panels to produce a cheaper, yet stronger, wagon. Our materials list included one 4-by-8-foot sheet of quarter-inch oak plywood for the panels, four sheets of three-eighths-inch AC-grade fir plywood, and one sheet of three-quarters-inch CDX-grade plywood for the deck. The plywood floor and sides were bound in a hardwood frame so that all the edges would be protected. The overhanging

front roof (pictured at bottom) shields the driver from bad weather, and was well worth the challenge of executing a compound curve out of plywood (we had to cut the plywood into strips).

Early in the construction process, we observed the wagon box tilting excessively whenever we added cargo inside the back or passengers at the front. We discovered that the old springs scavenged from the antique delivery wagon couldn't handle the wagon box's weight—about 500 pounds when

empty. Bailey Spring and Chassis in nearby Essex Junction, Vt., made us four new springs. These new springs stiffened the suspension, stabilized the ride, and lifted the wagon box to a good height so the driver could see better over the horse.

Every horse-drawn wagon needs some way to hitch up animals. This type of cart can be outfitted with either a center pole for two or more horses, or a pair of shafts for a single horse. I decided to use shafts, because I thought driving a single horse would be easier in city traffic (and I was right). We also mounted rearview mirrors at the front corners of the roof to give the driver a good view of goings-on behind the cart. A basic electrical system is powered by a car battery and operates the rear flashers and a dome light.

The cargo hold has decent headroom, with a ceiling height of just less than 5 feet at the center. The lid of the driver's bench seat is hinged to provide even more storage space.

Some of the delivery wagon's decorative details are my interpretation of the ornamentation in John Thompson's original drawings. These include a wheat carving on the little square door into the cargo hold behind the driver's head (pictured above). The Good Companion Bakery graphic on the outside of the wagon box was designed and hand-lettered with brushes by my brother-in-law for an old-fashioned look consistent with the cart's historic design.



**Carved wheat on the door behind the driver's head hints at the tasty loaves stashed within the cargo hold.**

## Working Animals and Drivers, Unite!

We get many admiring and appreciative comments about our delivery wagon from friends and neighbors. Bobby, our horse, has no trouble trotting 1.5 miles to the City Green with a full load of loaves, pastries, produce and meat. He eventually overcame his apprehension about two things he never encounters on our farm: pedestrian crosswalks and railroad tracks.

Although Bobby learned to manage city streets and traffic quite well, the unpredictable behavior of motorists around our slow-moving rig was stressful for both Bobby and me. We've had enough near-misses in traffic to satisfy my adrenaline cravings for a long time. Our bakery cart still hits the streets for special occasions. For regular service as a weekly transport, though, we'll await a time of more leisurely traffic, when a few more horse-drawn wagons join us on the road and we'll be the norm—not the exception. 🌿

Erik Andrus operates a bakery on Boundbrook Farm near Vergennes, Vt., with his family, Bobby the horse and many other working animals. Read more about them and inquire about purchasing a custom horse-drawn vehicle from Andrus at <http://goo.gl/HXRf3W>. A version of this article originally appeared in the Spring 2011 issue of *Small Farmer's Journal*.



**Apprentice Tristan Fulford bolts the running gear to the frame during construction (left). The finished cart returns to the farm after a visit to the Vergennes, Vt., farmers market (above).**

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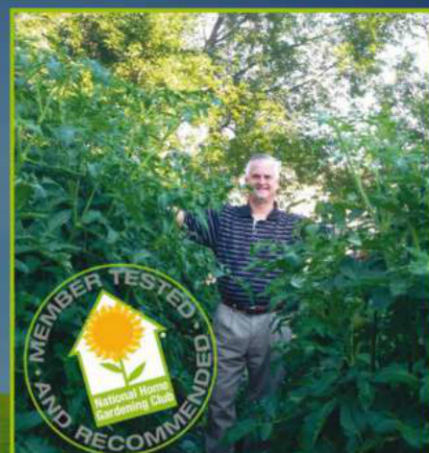
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Me standing in my bed of Dino-Green fed tomatoes. I really like the product and I would like to lead many others to the natural route. ~J. Sikina-Director of New Product Development, W. Altlee Burpee Co.

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Circle #21; see card pg 97

# RENEWABLE ENERGY OPTIONS for Your Homestead

Downsize your dependence on fossil fuels with these innovative tools.

By Richard Freudenberger

**R**unning a small farm or homestead takes a lot of effort, but a world of labor-saving devices can make life simpler without using fossil fuels. Solar, wind, microhydro, biofuels and even human power offer clean, renewable sources of energy to complete your tasks efficiently and without sacrificing convenience.

You don't have to be an off-gridder to share in the good fortune, either — most everything compiled here can be

used without a commitment to off-grid living. You may be surprised by how many tools and implements exist as alternatives to the mainstream, fossil fuel-powered choices we're all so accustomed to. Visit the expanded, online version of this article at [www.MotherEarthNews.com/Renewable-Homestead](http://www.MotherEarthNews.com/Renewable-Homestead) for more product ideas and links to manufacturers' websites.

## Solar Power on the Farm

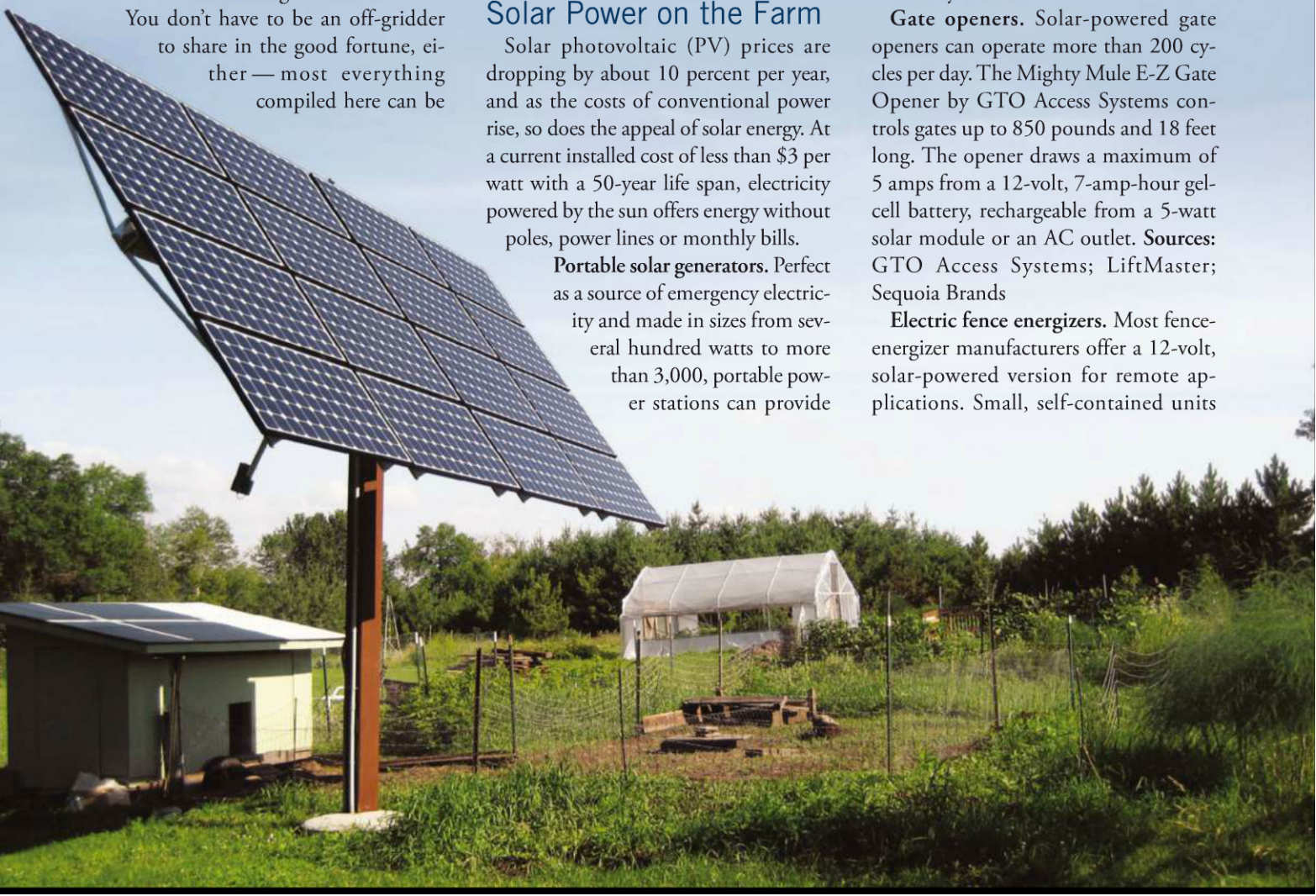
Solar photovoltaic (PV) prices are dropping by about 10 percent per year, and as the costs of conventional power rise, so does the appeal of solar energy. At a current installed cost of less than \$3 per watt with a 50-year life span, electricity powered by the sun offers energy without poles, power lines or monthly bills.

**Portable solar generators.** Perfect as a source of emergency electricity and made in sizes from several hundred watts to more than 3,000, portable power stations can provide

120-volt alternating current (AC) and 12-volt direct current (DC) electricity on remote locations in one compact package. They come with one or more PV modules, an inverter and built-in battery storage. For the DIY-inclined, Well WaterBoy Products offers a plan to build your own 160-watt solar cart. **Sources:** Earthtech Products; Silicon Solar; Well WaterBoy Products

**Gate openers.** Solar-powered gate openers can operate more than 200 cycles per day. The Mighty Mule E-Z Gate Opener by GTO Access Systems controls gates up to 850 pounds and 18 feet long. The opener draws a maximum of 5 amps from a 12-volt, 7-amp-hour gel-cell battery, rechargeable from a 5-watt solar module or an AC outlet. **Sources:** GTO Access Systems; LiftMaster; Sequoia Brands

**Electric fence energizers.** Most fence-energizer manufacturers offer a 12-volt, solar-powered version for remote applications. Small, self-contained units



**Solar-charged energizers can power electric fencing in remote locations.**

start at about \$125. **Sources:** Gallagher Animal Management Systems; Valley Farm Supply; Woodstream

**Automatic chicken coop door openers.** Solar coop door openers run on 12-volt batteries connected to solar panels and can incorporate a timer. The 11-by-15-inch Pullet-Shut Automatic Chicken Door (\$180) mounts to the wall of your coop and operates from any 12-volt power supply, including the optional \$50 solar panel and battery kit. **Sources:** ChickenDoors.com; Front Yard Coop

**Refrigerators.** Developed in part for vaccine storage in remote areas, these extremely efficient coolers can use up to 80 percent less energy than conventional models. To be solar-compatible, the fridges are DC-powered and come in 12- and 24-volt configurations. Some models run on as few as 40 watts. **Sources:** Steca Electronics; Sundanzer; Sun Frost

**Solar water pumps.** PV-electric DC pumps are available for surface water and as submersible well units, manufactured in 12-volt, 24-volt and higher-voltage configurations. (Some models can use AC.) Submersible pumps are considerably more costly but can pump up to 15,000 gallons of water per day. Surface pumps that deliver 200 to several thousand gallons of water per hour start at \$600. **Sources:** Advanced Power; Dankoff Solar Pumps; SunPumps

**Water distillers.** These devices use the energy of the sun to distill saline or contaminated water into pure drinking water. Large units provide about 1.5 gallons per day. Smaller distillers deliver up to 2 quarts per day. (You can build your own solar still with our plans at <http://goo.gl/hLTnFb>.) **Sources:** Echomax Aquamate; SolAqua



## Battery-Powered Tools and Equipment

Battery-powered tools and devices are environmentally friendly insofar as the energy used to charge them is cleaner than gasoline. They can be charged through an inverter tied to an off-grid electricity-generating system, and, with a bit of creative cobbling, some can also be charged directly from PV modules through a controller.

**Lawn mowers.** Cordless-electric push, self-propelled and riding mowers have been on the market for some time, with push models starting at about \$150 and riding models running at least \$2,000. Mow up to a third of an acre on a sin-

gle charge with the Neuton CE6 walk-behind mower. The Hustler Turf Zeon is the first electric, zero-turn mower and, according to Hustler, can mow more than an acre on a single charge. Cub Cadet's RZT S is a zero-turn riding mower that the company says will cut for 60 minutes without power fade. Compare available zero-turn mowers at <http://goo.gl/grzpQQ>. **Sources:** Black & Decker; Country Home Products; Cub Cadet; Hustler Turf Zeon; Mean Green; Recharge Mower; Ryobi Limited; Worx

**Snowblowers.** The electric snowblower model you choose will depend on whether you need a machine to clear a short sidewalk or to clear 10 inches of snow from a driveway. For big jobs, the Ariens AMP 24 Sno-Thro has the ability to shoot snow more than 40 feet and can operate for 45 to 60 minutes, according to the manufacturer. It's available for about \$1,700. **Sources:** Ariens; GreenWorks; Snow Joe; Toro

**Chainsaws.** Electric chainsaws are generally quieter than their gas-guzzling counterparts. Black & Decker makes the lithium-battery-powered 20V MAX trimming saw with an 8-inch bar that can perform 150 cuts before recharging. The larger GreenWorks 40V G-Max lithium chainsaw has a 16-inch bar and will cut an entire cord of wood on a single charge.

Oregon Power Tools' new PowerNow 40V MAX lithium cordless saw has a 14-inch bar, cuts through 12-inch logs and costs about \$400. **Sources:** Black & Decker; GreenWorks; MTD Products; Oregon Power Tools; Stihl; Worx

**Solar PV tractors.** Only a few companies make tractors powered by roof-mounted solar panels. Free Power Systems' four-wheel Sun Horse 4812 is a compact tractor that can plow a field and fits into the back of a pickup truck. (Go to [www.FreePowerSys.com/videos.html](http://www.FreePowerSys.com/videos.html) to watch a





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video of the Sun Horse in action.) Weighing in at 790 pounds, the Electric Ox<sub>2</sub> from Electric Tractor Corp. is a four-wheel tractor built primarily for towing, but the multipurpose model accommodates attachments, such as a mower deck, rotary sweeper, snow thrower and dozer. Homestead Enterprises' SolTrac Crawler can be built to order with about six months of lead time. **Sources:** Electric Tractor Corp.; Free Power Systems; Homestead Enterprises

**Yard and garden tools.** Lawn tools available in the electric lineup include pole saws, leaf blowers, hedge trimmers and weed trimmers. Part of a 12-piece collection of yard and garden tools based on a 40-volt G-Max lithium-ion battery pack, the GreenWorks cordless front-tined cultivator tills up to 5 inches deep and 10 inches wide. The manufacturer says it'll run for about 40 minutes per charge and costs about \$300. **Sources:** Black & Decker; GreenWorks

## Wind Energy on the Farm

Wind may be everywhere, but not everywhere is suitable for wind turbines. For those sites worthy of the investment, how-



Free Power Systems' Sun Horse tractor charges from a roof-mounted PV panel.

ever, wind power can be impressive—especially for supplementing PV systems. (Is a wind turbine right for your backyard? Go to <http://goo.gl/xhRCr4> to find out.) Wind turbines in the 300- to 1,500-watt range come in AC and DC configurations.

**Electric power generation.** Wind turbines for electric power are generally two- or three-bladed designs mounted on towers that are at least 40 feet tall. Homestead-scale turbines usually generate 24-volt DC; AC models are available for larger farm and commercial use. Only models certified by the Small Wind Certification Council have test data to back up their claims. (Go to [www.SmallWindCertification.org/Certified-Small-Turbines](http://www.SmallWindCertification.org/Certified-Small-Turbines) to see certified models.) Models rated to produce up to

15,000 kilowatt-hours (kwh) annually start at about \$2,100 (plus the cost of a tower). **Sources:** Bergey Windpower; Endurance Wind Power; Evance Wind Turbines; Kestrel Renewable Energy; Xzeres Wind Corp.

**Wind-powered water pumps.** Pneumatic water pumps use air pressure to move water from source to tank. A windmill compresses the air. Some pneumatic pumps can switch between pumping air (for

aerating a pond, for example) and pumping water. Fluid water pumps employ a cylinder to lift and move water through a delivery pipe. Both pneumatic and fluid windmills work at lower wind speeds, and they require towers only 12 to 25 feet tall. **Sources:** Aermotor (parts only); Dempster (parts only); Hitzer; Ironman Windmill; Koenders Windmills; O'Brock Windmill Distributors; Outdoor Water Solutions

## Homestead Hydropower

Hydropower sites can operate continuously, as long as water is flowing. Even low-flow sites may still be useful for electricity production on a small scale.

**Electricity generation.** Pelton or impulse turbines driven by a river or stream



Water-pumping windmills perform on towers only 12 to 25 feet tall (left). Drop-in-stream pumps require minimal upfront installation (right).



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Hand water pumps come in various styles and lift water from either shallow or deep wells.



can provide an impressive amount of electricity even with modest water flow rates. Storable DC power is generated by a permanent magnet alternator at 12, 24 or 48 volts to produce between 45 and 1,500 watts, depending on turbine nozzle configuration, water flow rate and head (the vertical distance water drops). Prices start at about \$1,500. **Sources:** Energy Systems and Design; Harris Hydro

**In-stream generators.** Have a fast-moving stream at least 15 inches deep? Drop-in-creek generators require minimal installation. The 100-watt Ampair Energy UW100 will let you generate up to 2.4 kwh per day with an upfront cost of about \$1,400. AC output is rectified to 12, 24, or 48 volts DC. **Sources:** Ampair Energy; Energy Systems and Design; LoPower Engineering-Harris

**Hydraulic ram pumps.** Ram pumps use the flow and fall of water to push some of it uphill without electricity. The pumps work 24 hours a day, delivering from 14 gallons daily to more than 1,500 via larger models. Costs are \$565 and up, or you can make your own from plumbing parts for about \$100. Learn how to build a hydraulic ram pump at <http://goo.gl/DPBQKf>. **Source:** Rife Hydraulic Engine Mfg.

## Internal Combustion With Biodiesel

Although Rudolf Diesel intended his engine to run on coal dust or peanut oil when it debuted in the 1890s, the ready availability of petroleum fuel altered his plan. Biodiesel, the modern, eco-friendly

alternative to petrodiesel, is made with a catalyst that breaks down the molecular structure of a variety of plant oils and animal fats, which then replicate the structure of petrodiesel fuel. Because biodiesel has inherent cleansing characteristics that can remove deposits from tanks and lines that build up from petrodiesel, you will need to service your machine's fuel filter more frequently in the beginning. Aside from this, you will not need to modify your engine to run on biodiesel fuel. Equipment owners should check manufacturers' warranty limits before using biodiesel—if the fuel is made to ASTM D6751 standards, it is as safe for your machine as diesel fuel. Biodiesel comes straight (B100) and in blends (B6 to 20).

**Generators.** As with vehicles, diesel-powered portable generators can run on biodiesel without modification. Yanmar manufactures 3.5-kilowatt (YDG 3700) and 5-kilowatt (YDG 5500) air-cooled generators with 120- and 240-volt AC outputs, as well as options with 12-volt DC outputs. Fuel consumption averages about a quarter-gallon per hour. Prices start at \$3,375. **Sources:** Blain Supply; Yanmar America

**Walk-behind tractors.** On farms smaller than 20 acres, or for working steep, rough terrain, two-wheel, walk-behind tractors offer exceptional maneuverability and efficiency. Several of the walk-behind tractors in the Italian-made BCS line are diesel-powered, with 8-, 10- or 11-horsepower options and an independent power takeoff. BCS offers several implements,

including a tiller, plows, a sprayer and more. (See Page 82 for more about two-wheel tractors.) **Sources:** BCS America; Ferrari Tractors; Grillo Agrigarden

## Human-Powered Machines

The human body can produce a couple of hundred watts of power over a sustained period. Even though industry has largely moved toward mechanization, human muscle still has a place around the homestead. The devices here let us work smarter, not harder, by harnessing leverage and mechanical advantage to shave time and difficulty off of labor-intensive chores.

**Hand water pumps.** Reliable, freeze-protected hand pumps lift water from shallow cisterns and deep, cased wells. **Sources:** Bison Pumps; Flojak Industries; Tuthill Devco; Well Waterboy Products

**High-wheel cultivators.** These old-time tools still hold their own for managing a big garden. Beaver (\$95), EarthWay (\$150) and Hoss Tools (\$140) make cultivators that come with a variety of attachments—including a seeder (Hoss). **Sources:** Beaver Mfg.; Hoss Tools; EarthWay Products

**Grain mills.** Hand-cranked grain mills use stone or metal burrs and can usually be adapted to a belt-drive motor. GrainMaker has developed a bicycle-attachment kit for a number of its mills. Watch MOTHER EARTH NEWS editors take the bike mill for a spin at <http://goo.gl/ZwM7wL>. **Sources:** Country Living Productions; GrainMaker; In-Tec Equipment; WonderMill

**Manual grain threshers.** Threshers separate grains, such as wheat and rice, from their stalks. Manual threshers make sense for home-scale grain production; they use a foot-powered spinning reel to knock grain free. Or, for a clever hand-made thresher, see Page 10. **Sources:** The Back to the Land Store; Sylvan Tec

### TOOL TIME!

This roundup only scratches the surface of renewable energy options for your farm or homestead. Learn more and visit manufacturers' websites in the online version of this article at [www.MotherEarthNews.com/Renewable-Homestead](http://www.MotherEarthNews.com/Renewable-Homestead).

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Circle #58; see card pg 97

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Circle #38; see card pg 97

# Gardeners' Glossary of PEST CONTROL SOLUTIONS

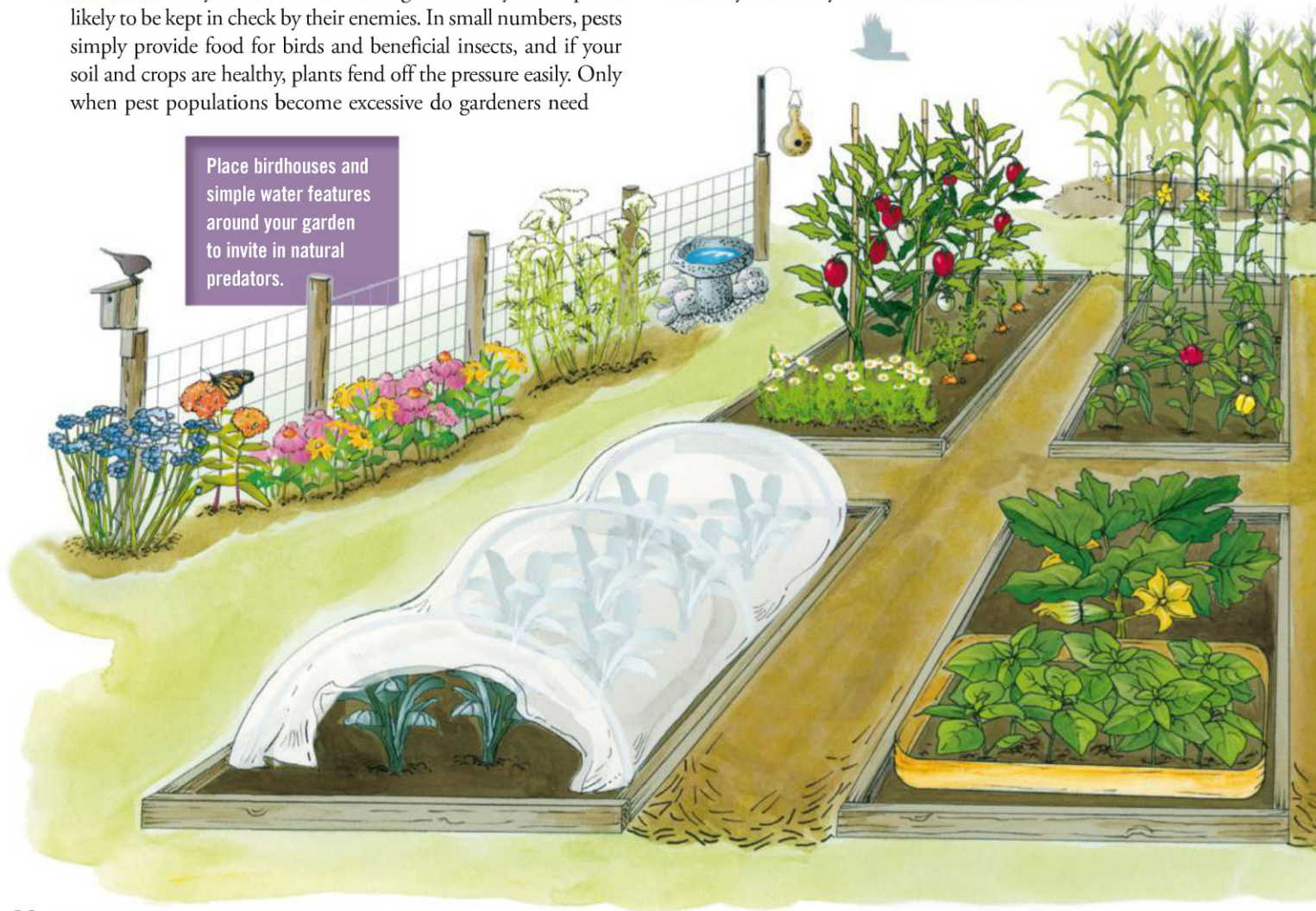
Keep bad bugs at bay by using protective covers, handpicking, attracting beneficial insects, and applying short-lived organic insecticides only if necessary.

By Barbara Pleasant and Shelley Stonebrook  
Illustrations by Linda Cook

**A**n abundance of buzzing, hopping, fluttering and crawling insects is a trademark of any healthy organic garden. This diversity means insects that might feed on your crops are likely to be kept in check by their enemies. In small numbers, pests simply provide food for birds and beneficial insects, and if your soil and crops are healthy, plants fend off the pressure easily. Only when pest populations become excessive do gardeners need

to step in to restore balance to keep their gardens thriving. Keep this simple mantra in mind during your pest control efforts: Look closely. Examine your plants regularly, noting what kinds of insects you see. Observe whether you see just a few of a particular kind of insect or whether populations are growing, and look up pictures of what you see so you know which are beneficial and which are

Place birdhouses and simple water features around your garden to invite in natural predators.



detrimental. (For pictures of and detailed information about beneficial and pest insects, see our online Organic Pest Control Series at [www.MotherEarthNews.com/Pest-Control-Series](http://www.MotherEarthNews.com/Pest-Control-Series).)

We've separated this glossary into sections that present a three-pronged system of organic pest control: First, attract a diversity of beneficial insects by interplanting flowers and herbs—especially those that produce nectar from numerous small florets, such as mints and sweet alyssum. Second, put a variety of physical controls in place when pests get out of check or are known to be troublesome in your area (see a chart of the 15 worst garden pests on Page 63). Last, if needed, bring in organic insecticide reinforcements. The products listed in this glossary all have been approved by the U.S. National Organic Program.

## Pest-Eating Beneficials

The following insects feed on other insects, helping prevent pest species from doing more than minor damage to your crops.

**Assassin bug.** These 1-inch-long predatory bugs have shield-shaped backs and are active pest hunters. Larvae and adults feed on aphids, caterpillars, Colorado potato beetles, insect eggs and more. Assassin bugs are among the few natural predators that help control Mexican bean beetles.

**Braconid wasp.** North America is home to nearly 2,000 species of these non-stinging wasps. Adults are less than a half-inch long, and they lay eggs inside or on host insects; the maggot-like larvae feed on their prey from inside. Braconids lay eggs on numerous pests, such as aphids, caterpillars (including cabbageworms and tomato hornworms), and leaf miners.

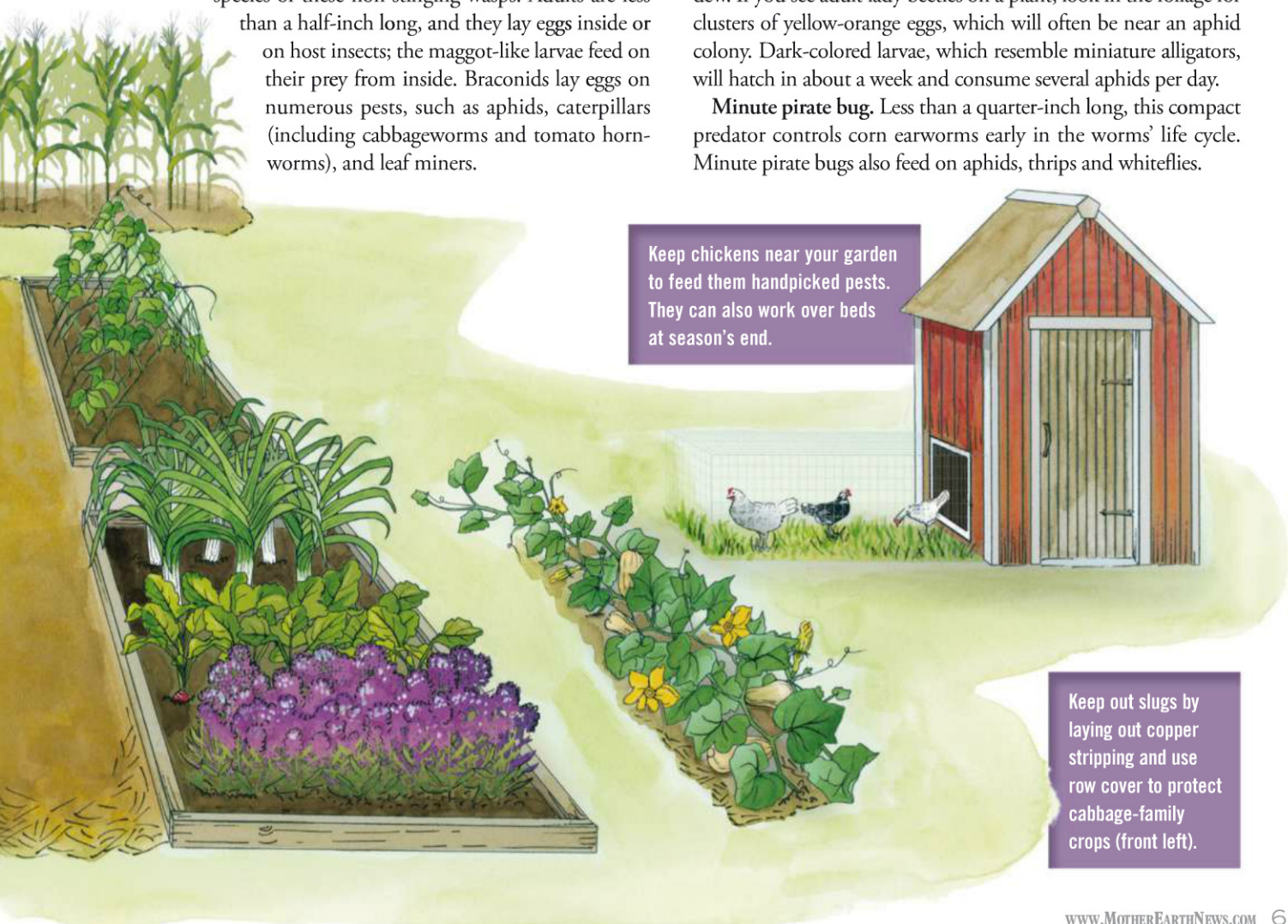
**Ground beetle.** These beneficial insects live in the soil beneath mulches, around compost piles, and in the sheltered areas below perennial plants. Some create vertical tunnels that they use to ambush and trap prey, but most ground beetles wander about aboveground, foraging for food at night. They dine on asparagus beetles, cabbageworms, Colorado potato beetles, corn earworms, cutworms and slugs.

**Hover fly (aka syrphid fly).** Black-and-yellow-striped hover fly adults resemble yellow jackets but are harmless to humans. Larvae are petite, tapered maggots that crawl over foliage to feed on small insects. They are aphid-eating machines and also devour mealybugs, mites, thrips, scale insects, and small caterpillars, such as cabbageworms.

**Lacewing (aka aphid lion).** Lacewing larvae prey on aphids, cabbageworms, caterpillar eggs, whiteflies and more. They feed for about a month, in which time each larva consumes about 600 aphids. Remove row covers from plants during evening hours so lacewings can check them for pests. Do not use pesticides when lacewings are active, which happens early in the gardening season compared with most natural insect predators.

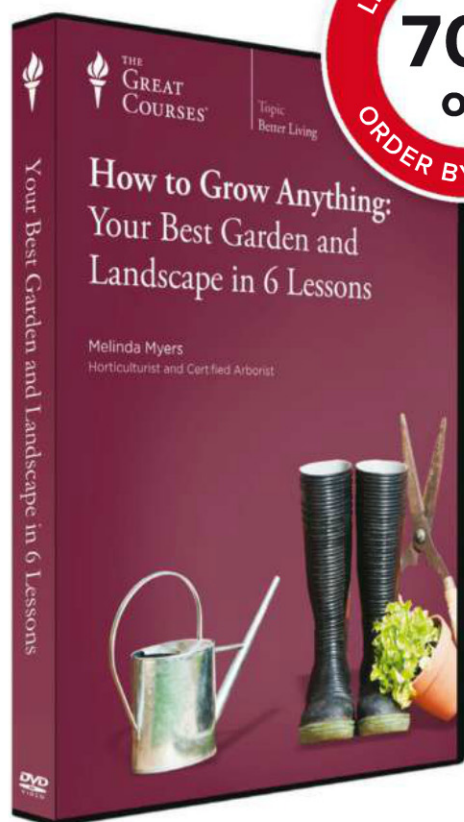
**Lady beetle (aka ladybug).** Lady beetle larvae and adults eat aphids, small caterpillars and insect eggs. A few species specialize in eating mealybugs, mites, scale insects and even powdery mildew. If you see adult lady beetles on a plant, look in the foliage for clusters of yellow-orange eggs, which will often be near an aphid colony. Dark-colored larvae, which resemble miniature alligators, will hatch in about a week and consume several aphids per day.

**Minute pirate bug.** Less than a quarter-inch long, this compact predator controls corn earworms early in the worms' life cycle. Minute pirate bugs also feed on aphids, thrips and whiteflies.



Keep chickens near your garden to feed them handpicked pests. They can also work over beds at season's end.

Keep out slugs by laying out copper stripping and use row cover to protect cabbage-family crops (front left).



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### ABOUT YOUR PROFESSOR

Melinda Myers is a horticulturist and certified arborist, television/radio host, and columnist, and an author with more than 30 years of horticulture experience. She was previously an associate professor at the University of Wisconsin Extension Service. She has received numerous awards for her work from the Garden Writers Association and the American Horticultural Society.

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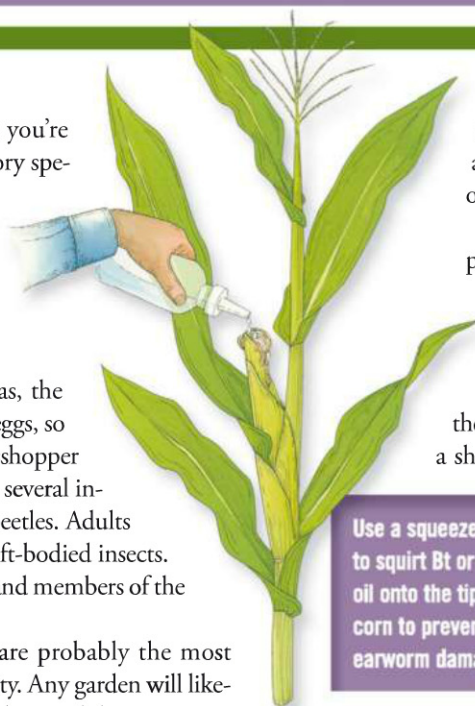
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**Praying mantis.** The largest insect you're likely to see in your garden, this predatory species is always on the prowl, eating any other insect that moves, including crop-munching grasshoppers.

**Soldier beetle (aka leatherwing beetle).** You'll spy elongated, half-inch-long soldier beetles among flowers or in thick vegetation. In some areas, the larvae are key predators of grasshopper eggs, so attracting soldier beetles can provide grasshopper control. Soldier beetle larvae eat moths, several insects, and the eggs and larvae of other beetles. Adults feed on aphids, caterpillars and other soft-bodied insects. Goldenrods, single-flowered marigolds and members of the daisy family are soldier-beetle magnets.

**Spider.** These eight-legged critters are probably the most abundant pest predators on your property. Any garden will likely already host several dozen types of spiders, and the most common garden spiders don't spin webs. For example, wolf spiders live in shallow underground burrows, wandering the soil's surface by night, or simply waiting by their burrow for unsuspecting prey. Perennial herbs that grow into lush bushes often make top-notch spider conservatories, and biodegradable mulches, such as straw



Use a squeeze bottle to squirt Bt or olive oil onto the tips of corn to prevent corn earworm damage.

and grass clippings, create an ideal habitat for advantageous wolf spiders. (Note that poisonous spiders don't generally favor gardens.)

**Tachinid fly.** Tachinid flies are gruesome parasites that glue their eggs onto an insect so that, when the egg hatches, the maggot can consume its host as food. Some species lay eggs on foliage that's food for insects, and then the eggs hatch in the insects' innards. Or, the flies inject eggs into another insect's body with a sharp ovipositor. Garden pests controlled by tachinid flies include armyworms, cabbageworms, cutworms, grasshoppers, Japanese beetles, leaf rollers and squash bugs. Attract tachinid flies by growing plants that bear umbels of tiny flowers. Buckwheat, carrots, cilantro, dill, Queen Anne's lace and sweet clo-

ver are among the crops that fit this bill.

**Trichogramma wasp.** These gnat-sized wasps lay their eggs inside the eggs of other insects, where the young trichogramma then develop as internal parasites, breaking the host's life cycle. Common hosts include eggs of cabbageworms, codling moths and

## Top 15 Worst Garden Pests

Pest	Most Susceptible Crops	Best Organic Controls
Slug	Beans, cabbage-family crops, lettuce and other greens, strawberries, seedlings of all types	Copper strips, diatomaceous earth, handpicking, iron phosphate bait, poultry
Squash bug	Summer and winter squash	Good garden cleanup, handpicking, neem, poultry, row cover, vacuum
Aphid	Beans, cabbage-family crops, peas, potatoes, tomatoes	Beneficials, oil, soap, strong sprays of water
Cabbageworm	Cabbage-family crops	Bt, handpicking, row cover, spinosad
Squash vine borer	Summer and winter squash	Growing resistant varieties, row cover, Bt injections
Japanese beetle	Beans, grapes, raspberries	Birds, diatomaceous earth, handpicking, poultry, row cover, trap-cropping
Tomato hornworm	Peppers, tomatoes	Beneficials, Bt, handpicking
Cutworm	Cabbage-family crops, pepper and tomato seedlings	Birds, collars, diatomaceous earth
Grasshopper	Beans, cabbage-family crops, carrots, corn, lettuce, onions	Handpicking, poultry, row cover
Cucumber beetle	Cucumbers, melons, squash	Handpicking, neem, vacuum, yellow sticky traps
Corn earworm	Beans, corn, peppers, tomatoes	Bt, neem, vegetable oil
Whitefly	Eggplant, okra, peppers, sweet potatoes, tomatoes	Beneficials, horticultural oil, insecticidal soap, reflective mulches, sticky traps, vacuum
Flea beetle	Cabbage-family crops, eggplant	Cultivation, row cover, yellow sticky traps
Colorado potato beetle	Potatoes	Handpicking, neem, poultry
Leafhopper	Beans, beets, eggplant, lettuce, potatoes	Diatomaceous earth, insecticidal soap, row cover

European corn borers. Trichogramma wasps are too tiny to observe in the garden; however, scientists have found that flower nectar from buckwheat and sweet alyssum enhanced wasp reproduction in lab experiments.

**Wasp (stinging types).** Wasps can be great garden allies because they consume huge numbers of leaf-eating caterpillars and irritating flies, which they feed to their growing larvae. Take caution if yellow jackets or hornets show up, and mark wasp nests so you can avoid disturbing them. Paper wasps are less aggressive than yellow jackets or hornets, and are happy to nest in bottomless birdhouses placed around the garden.

## Physical Controls

**Cleanup.** Practice good garden sanitation for certain crops at season's end to disrupt the life cycle of pests that feed on those crops. After your cucumber and squash plants are spent, remove plant debris from the garden and chop it into small pieces before composting it. Do the same with asparagus, which can host asparagus beetles, and with broccoli and cabbage stumps, which can harbor cabbage aphids. If you have problems with pests that overwinter as adults, mow down any weedy areas in fall.

**Copper strips.** Slugs receive an unpleasant electrical jolt if they crawl over copper. Garden centers sell copper stripping that you can place around particular crops or even use to encircle entire garden beds to keep slugs out. The strips should be at least a few inches wide so slugs can't traverse them unscathed.

**Cutworm collars.** Push cylindrical "collars"—which can be made from small cans, yogurt cups or toilet paper rolls—into the soil around tomato, pepper and other transplants to protect the young plants from cutworm damage.

**Handpicking.** Ultra-low-tech but effective for organic gardeners, handpicking is just what it sounds like: Spot pests and squish them or brush them into a pail of soapy water (or collect them for your chickens). Keeping a close eye on your crops and knowing how to identify pests are the keys to this method. Pests that haven't become overwhelming in number and are big enough to spot easily, such as slugs, tomato hornworms and other worm-type pests, are prime candidates for handpicking.

**Poultry.** Insect-munching fowl will devour practically any insect that moves, including ticks, grasshoppers, Colorado potato beetles, slugs and more. Ducks are reportedly sharp slug-spotters, whether you let them work over the garden in spring and fall or enlist a pair as your assistants throughout the season. Chickens work best in winter, because their scratching can damage crops during the growing season. (Go to <http://goo.gl/APWGuG> for reader reports about how to most effectively control pests with poultry.)



Snare cucumber beetles by hanging a couple of yellow sticky traps on your cucumber trellis.

**Row covers.** A lightweight row cover or tulle netting will keep some crops pest-free. Cover your cabbage patch in this way, along with other cabbage-family crops, to keep cabbageworm moths from laying eggs on your plants. Use hoops or blunt stakes to hold up the covers. Remove covers after crops, such as squash, begin to flower, so that pollinators can reach the flowers.

**Vacuum.** Some gardeners report successfully controlling squash bugs and other pests by sucking them up with a shop vacuum. Got poultry? Empty the vacuum bag into their pen and everybody wins—except the pests, of course.

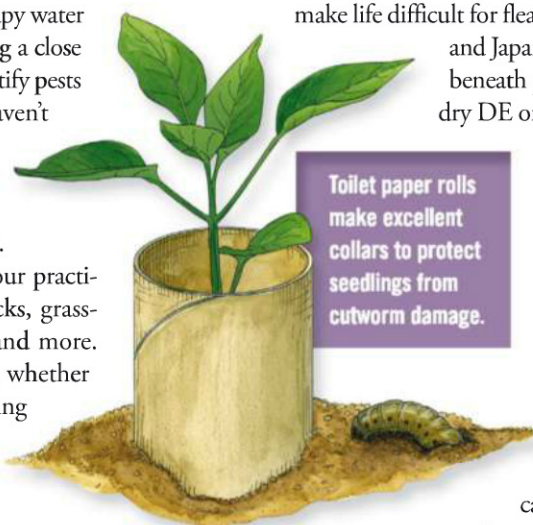
**Yellow sticky traps.** Hang flat, sticky traps near cucumber plants to catch cucumber beetles. To snare flea beetles, place traps near eggplants and other crops suffering from flea beetle pressure. These pests are attracted to the color of the traps and will get caught in the goo.

## Organic Insecticides

**Bt (*Bacillus thuringiensis*).** This naturally occurring bacterium kills caterpillars when they eat leaves that have been sprayed with it. Armyworms, cabbageworms, corn earworms, diamondback moths, grape leaf rollers, melon worms, tomato fruitworms, tomato hornworms, and various webworms and budworms are candidates for Bt treatment. Butterfly larvae may also be killed by Bt, so don't use it on butterfly host plants, such as parsley. Additional strains of Bt include one that kills mosquito larvae and one that is toxic to Colorado potato beetle larvae. Sunlight degrades Bt after a few hours, so apply it late in the day. Reapply after heavy rain.

**Diatomaceous earth (DE).** A powder made from fossilized remains of aquatic organisms called "diatoms," DE has sharp edges that cut into insects' bodies and cause them to die of dehydration. DE is less effective when wet, yet can still be used in the garden to make life difficult for flea beetles and newly emerged cutworms and Japanese beetles. In dry weather, DE spread beneath plants will repel slugs. Lightly sprinkle dry DE on the soil's surface where Japanese beetles, slugs, or other pests will come into direct contact with the dry particles. Renew after rain or dew.

**Horticultural oils.** When applied directly to pests, horticultural oils interfere with respiration, causing insects to suffocate and die. These oils help control aphids, whiteflies and other pests, but can also kill beneficial mites and injure the leaves of some plants. Frequent use can reduce yields even when the pest is under control. Best applied in cool weather, horticultural oils are valuable allies in organic orchards, where they can control pests that overwinter in bark crevices.



Toilet paper rolls make excellent collars to protect seedlings from cutworm damage.

**Insecticidal soap.** Fatty acids in insecticidal soaps break down the protective cuticles of soft-bodied pests, such as aphids, which will then quickly become dehydrated and die. Soap sprays have no residual effect and only kill insects that are sprayed directly. Thoroughly wet both sides of leaves and the insides of all crevices. Repeat applications may be needed every week as new aphids or whiteflies hatch and form colonies. To make soap sprays at home, mix 1 tablespoon of dishwashing liquid per quart of water. Purchased insecticidal soaps are purer, however, and less likely to injure foliage. Frequent soap sprays may reduce the yields of some crops. Use soft or rainwater when diluting soap concentrates.

**Iron phosphate slug bait.** Sprinkle slug-bait granules evenly throughout your garden beds, and slugs will eat it instead of your plants, then crawl off to die. The bait is nontoxic to pets and humans. Sluggo is a popular brand of this type of bait.

**Neem.** When applied to insects and the plants they eat, neem oil, which is derived from an Asian tree, causes many insects to feed less, grow more slowly, molt less and stop laying eggs. Neem works best on young insects, particularly those that grow rap-

Attract beneficial insects  
and use physical controls  
before you resort to  
organic pesticides.

idly, such as Colorado potato beetles, Mexican bean beetles and squash bugs. Neem can also control aphids and leaf-eating caterpillars.

**Pyrethrum.** One of the oldest known pesticides, fast-acting pyrethrum is also the strongest insecticide allowed under U.S. National Organic Standards, so use it only after you've

exhausted other methods. Insects, including beneficials, typically become paralyzed as soon as they come into contact with pyrethrum, which is made from the dried flowers of the daisy *Tanacetum cinerariifolium*. Aphids, armyworms, Colorado potato beetles, cucumber beetles, cutworms, leafhoppers, squash bugs and whiteflies can often be brought under control with pyrethrum.

**Spinosad.** A biological pesticide, spinosad is derived from the bacterium *Saccharopolyspora spinosa*, which produces a substance that works as a neurotoxin in many (but not all) insects. Susceptible insect species become excited to the point of exhaustion, stop eating, and die within two days. Spinosad controls all types of caterpillars, Colorado potato beetle larvae and blister beetles, and works best on pests that consume a lot of leaf tissue. 🌿

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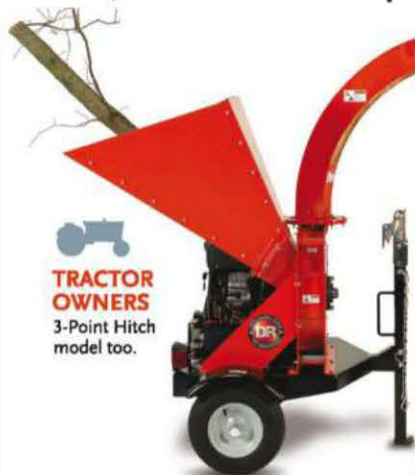


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# The Best-Ever DIY SOLAR FOOD DEHYDRATOR

Pull the plug on grid-dependent food preservation with this super-efficient unit.

By Dennis Scanlin

**F**or nearly 20 years, I've led research teams as founder and coordinator of the Appropriate Technology Program at Appalachian State University. We've conducted many original experiments to produce a design for the best food dehydrator you're likely to find anywhere. Yes, this dryer is supersized—about 6 feet tall and 7 feet long—but it's on wheels and thus moves easily. It can dry large amounts of food quickly and is a must-have

for off-grid living. If you have a big garden or buy bulk produce, this solar dehydrator will help you keep up with food preservation all summer and into fall. If you live in a cloudy or humid region, you can add heat from light bulbs to improve its operation. Anyone with basic woodworking skills can tackle these plans.

## How It Works

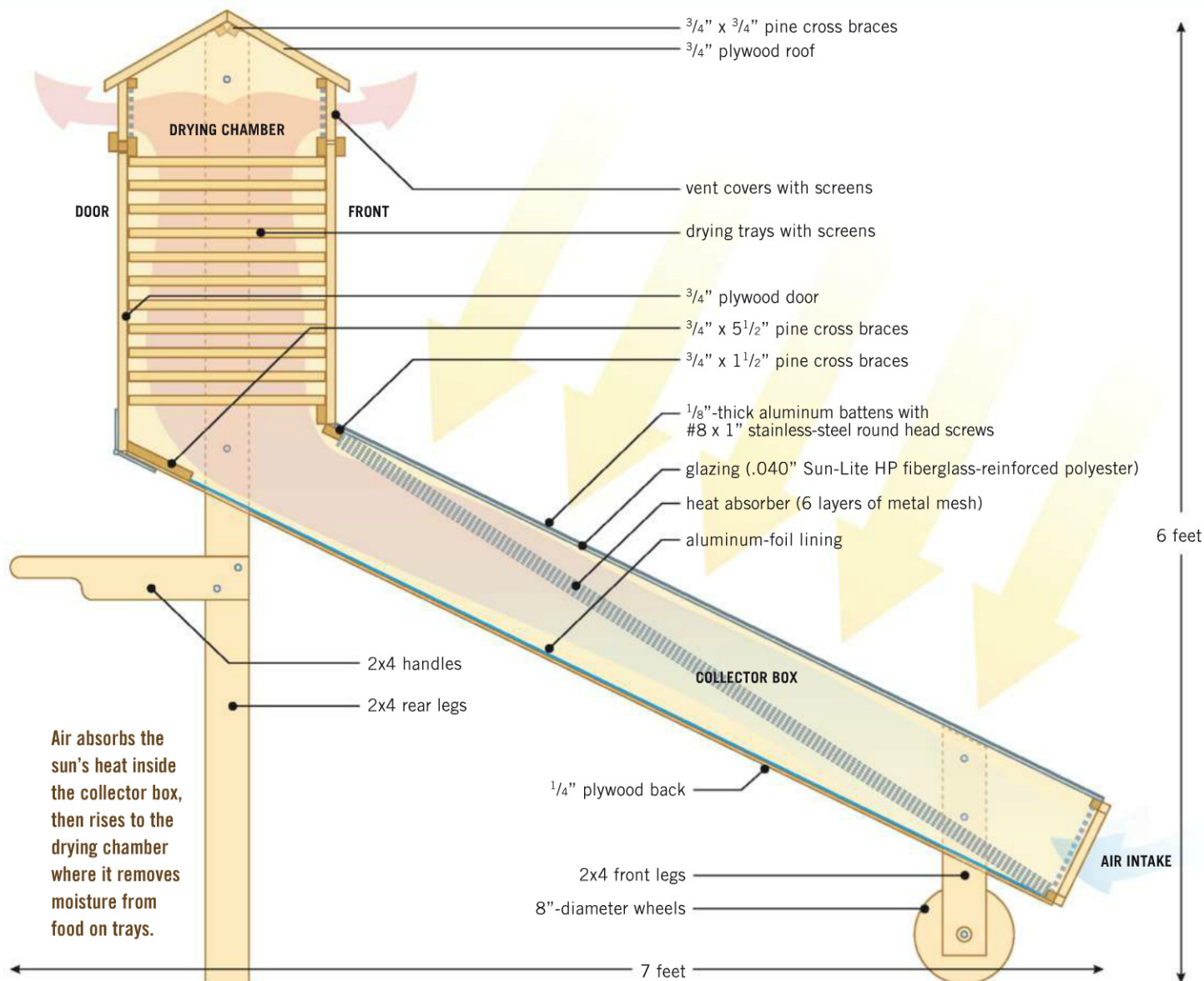
Drying is an excellent way to preserve food, but exposing fruit and vegetables to direct light can cause vitamin loss. This design relies on indirect solar power, meaning the drying food is not exposed to the sun but instead to solar-heated air. Our dryer takes advantage of the natural process of rising hot air to operate efficiently without any electric fans.

As you can see in the detailed drawing on Page 68, the design includes a long, angled wooden box covered with clear plastic glazing and an open bottom end for air intake. Inside, the box holds diagonal layers of black metal screen. The vertical drying chamber on top has a back door to access food-drying trays inside.

The sun's radiation passes through the plastic top of the collector box to the absorber screens, which retain heat. Air entering through the intake is warmed as it passes over the absorber screens, and then flows into the drying chamber. There, the heated air draws out the food's moisture before exiting through vents just below the roof. The rising warm air creates negative pressure at the bottom of the collector box, which draws in more outside air to replace the air that left through the top vents. Air will continue to heat and rise as long as the sun is shining or the dryer has access to another source of heat.



The author stands behind his solar dehydrator—a highly tested design that'll dry 10 pounds of food in only two sunny days.



The drying chamber of this dehydrator supports 11 trays that hold up to a total of 10 pounds of thinly sliced food—about 35 to 40 medium-sized apples, for reference. It can dry this amount of food in two sunny days, or about half that amount in one sunny day because of better ventilation and reduced food mass. The temperature inside the chamber can easily soar to more than 140 degrees Fahrenheit. (The complete free plans

## First-Rate Features

Our tests found these dehydrator features to be the most effective and cost-efficient:

- **Long, sealed collector box** enhances airflow.
- **Dark drying chamber** preserves food's vitamin content.
- **Adjustable vent system** regulates airflow and temperature.
- **Aluminum-foil reflector** increases temperature inexpensively.
- **Single layer of glazing** is affordable and effective.
- **Six layers of metal lath screen** absorb and transfer solar energy.

for this food dryer are online at [www.MotherEarthNews.com/Food-Dehydrator-Plans](http://www.MotherEarthNews.com/Food-Dehydrator-Plans).)

## Why This Design Is the Best

I've built many solar dehydrators over the years and enlisted teams of students to study all the variables. We've made adjustments to improve the performance, simplify the construction, reduce the cost, and increase the durability and portability of food dehydrators. Following are several of the most effective strategies our tests have established for producing the best dehydrator.

**Vents and airflow.** Temperature, airflow, humidity and food density will all affect a dehydrator's performance. Ideally, you'll want high temperatures and heavy airflow, but because changes in one factor also affect all the others, the best food dryers must achieve a balance among these variables.

You can control the temperature and humidity inside this food dryer by regulating the airflow with its adjustable vents. The vents are essential for effective operation: As air enters at the bottom and heats up in the collector box, the warmed air must rise into the

drying chamber where it will absorb moisture from the food before exiting through the upper vents. When you close the vents, the air movement stops—and so does the fast, efficient drying of food.

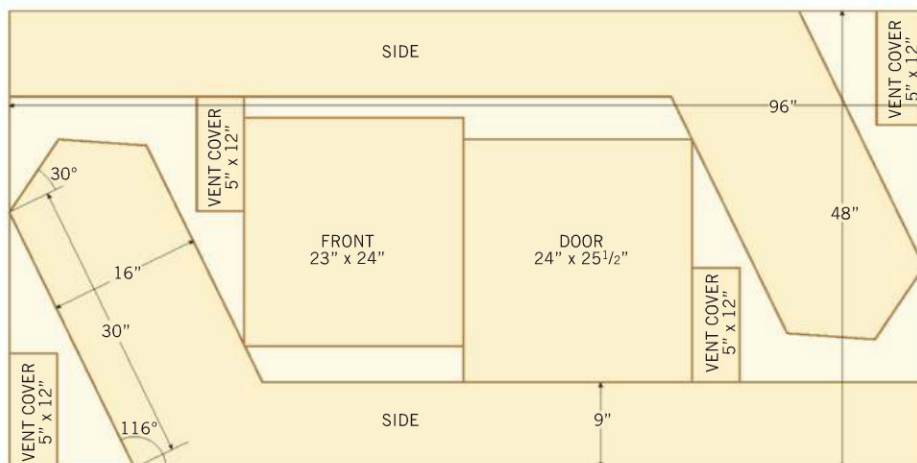
Fully opened vents cause the airflow to increase and the temperature to decrease. Temperature is more significant than airflow in affecting the rate at which food dries, so we partially close the vents to increase the temperature. In general, more airflow (fully opened vents) is important during the early stages of food drying, while higher temperatures (partially closed vents) are more effective in the later stages of drying.

**Reflectors.** No official scientific standard determines the ideal drying temperature for food. The most common preferred range is between 110 and 140 degrees. Higher temperatures destroy harmful bacteria, enzymes, fungi, insect eggs and larvae, but food begins to cook at 180 degrees, and temperatures that are too high can cause vitamin C loss.

To bring the temperature into the ideal range, we tried adding external reflectors to cast more solar energy into the collector box. For the best performance, though, we discovered that the dryer with reflectors had to be relocated several times throughout the day, and its angle had to be adjusted as the sun moved across

the sky. Based on our experiences, external reflectors usually aren't worth the trouble.

Installing a reflector inside the collector box is an easy way to boost the temperature without the hassle of an exterior reflector. Gluing aluminum foil to the bottom interior of the collector box (underneath the absorber screen) will increase the temperature inside by more than 20 degrees. With its vents closed, our dryer with an interior reflector can surpass 200 degrees on sunny, 75-degree days. By opening the vents 1 to 2 inches, we can bring the range down to a more reasonable 120 to 155 degrees.



Find this cutting diagram and more at [www.MotherEarthNews.com/Food-Dehydrator-Plans](http://www.MotherEarthNews.com/Food-Dehydrator-Plans).

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Circle #19; see card pg 97

**Glazing.** The top of the collector box must be covered with glazing so the sun's energy can penetrate and be soaked up by the absorber screen inside. The best material is a fiberglass-reinforced polyester (FRP) known as Sun-Lite HP. This glazing is thick, durable and translucent, and is used in many solar technologies. You can purchase it in a variety of sizes from [www.Solar-Components.com](http://www.Solar-Components.com), and easily cut it to fit the top of your dehydrator.

We found that adding a second layer of glazing increases temperatures inside the dryer by approximately 10 degrees. But the price of the glazing material—about \$2.50 per square foot—doesn't improve performance enough to justify the added expense.

**Absorber.** This is a technical name for some simple materials installed beneath the glazing to absorb the sun's heat and transmit it to the surrounding air. Our trials show that the best absorber is made of either charcoal-colored aluminum window screen or the type of metal lath used in plaster work. Screen is cheaper and easier to work with, but some of our tests showed that lath produces significantly higher temperatures, which justifies the added expense. At least 20 additional tests demonstrated that including six layers of steel lath, painted black and set on the diagonal, is ideal.

## Build It Yourself

You can construct this solar dehydrator using locally available materials—exterior-grade plywood, FRP glazing, metal screening

## ONLINE RESOURCES

**Preserving Food Using a Homemade Dehydrator:** <http://goo.gl/9JJtK8>

**Making Sun-Dried Tomatoes in a Solar Food Dehydrator:** <http://goo.gl/DU5VCF>

**Drying Herbs in a Solar Dehydrator:** <http://goo.gl/8FEkms>

**How to Preserve Food Using Sun Drying and Natural Methods:** <http://goo.gl/737LL5>

or lath, and miscellaneous parts. New materials will cost about \$300, or you could recycle supplies already on hand. Most home workshops will already stock the necessary equipment. Find complete lists of materials, tools and step-by-step instructions at [www.MotherEarthNews.com/Food-Dehydrator-Plans](http://www.MotherEarthNews.com/Food-Dehydrator-Plans). Expect construction time to take 20 to 40 hours, depending on your woodworking expertise.

My students and I have developed this solar food dehydrator design that works extremely well and isn't costly to build. I encourage you to build the dryer to our specifications and put it to work to stock your home larder with nutritious, sun-dried food. 🌱

Dennis Scanlin is a Professor of Technology and Environmental Design at Appalachian State University in Boone, N.C. For the past 30 years, he has coordinated the university's Appropriate Technology Program in which he and his students have built and tested countless renewable energy systems.

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# Small Steps Can CHANGE OUR WORLD



Take a cue from a 7-year-old: Sometimes simple actions are all it takes to make a difference.

**D**o you ever feel like the whole world is crazy and wonder what you and your lone voice can do to create real, positive change? We're all sometimes tempted to go into a corner and have a pity party because the insanity seems overwhelming and no one else seems to notice.

Before you give up hope, though, let me tell you about Jack, an Australian buddy of mine. Jack knows how to change the world. He's 7 years old and lives in the province of Queensland. His parents own a small permaculture farmstead. They make their living by organizing and hosting educational seminars to acquaint farmers and ranchers in Australia with the best Earth-friendly production practices available on the planet. Jack's parents are good people.

At school one day, Jack's teacher created incentives in a new reading initiative by handing out lollipops to the highest achievers. An extremely bright boy, Jack earned his lollipop and then took a moment to look it over. Growing up in an Earth-aware, nutrition-focused, self-reliant family, he had doubts that this thing in his hand was something he should indulge in.

He took it home and asked his mom and dad whether the lollipop was OK to eat. His dad, being a wise man skilled in the Socratic method, responded simply, "What's in it?" (Why couldn't I be such a wise parent? His dad's answer is non-judgmental

and challenges the child to seek knowledge on his own. Brilliant.)

What ensued was Jack's almost obsessive Internet search for lollipop ingredients. After he found those, he then searched for health benefits—or, as it turned out, harms—from those ingredients. To his horror and dismay, his research revealed that lollipops contain coloring and additives that could give him cancer.

A couple of days later, he went to the teacher—not his parents, mind you—and said, "I don't want to eat

something that could give me cancer. I don't want this lollipop." Taken aback, the judicious teacher responded, "OK, I won't give you one. I'll find another reward for you."

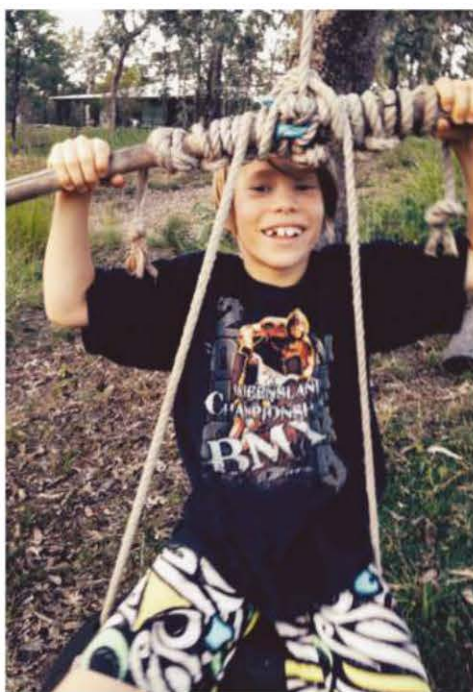
Knowing he'd scored a victory, Jack felt good. He'd stood up for his convictions and created a protective hedge for himself. That evening, though, as he contemplated what had happened, he realized he didn't feel good about it anymore. (Now, mind you, he arrived at this conclusion by himself, without parental goading.)

The next day, he went back to the teacher (I hope all of you wonderful elementary school teachers out there are enjoying this). "It's OK that I don't have to eat something that might cause cancer," he said, "but these other kids are my friends, and I don't want them to get cancer 40 years from now."

Yes, tears are fine at this point.

That afternoon, Jack's mother received a call from the school principal. By this time, the children in the class had begun to murmur. (Did I mention that Jack is precocious? You'd probably figured that out by now, but I thought I'd better make that clear.) Even if Jack's classmates might have thought he was a bit wacko, Jack had courage and conviction—and, obviously, a heart that wrapped itself around his classmates.

Jack's mother calmly offered the principal Jack's research. The next day, Jack toted his printed-off research file to the principal's office. Two months later, the principal issued his official ruling: "The evidence is not conclusive."



**All kid, all the time, Jack Kruse was not too busy to take a stand for his own and his classmates' health.**



Front-yard gardens and backyard chickens create true food security and a sense of accomplishment (left). Energy-miser strategies, such as this clever DIY “refrigerator” of cool sand and crockery, help make a difference (right). The accumulation of small acts grows into mountains of positive change.

At this point, Jack’s mother, like a true tigress, stepped in. She asked the principal one simple question: “Why would you risk it?” He didn’t have an answer, and the next day issued his final position: “We will stop giving lollipops to our students.”

You can applaud now.

In full disclosure, I don’t think eating one lollipop will give you cancer. I don’t even think eating at McDonald’s one time will kill you. It’s the habit that’s the problem. It’s the convictionless, go-with-the-flow orthodoxy that we must arrest. Jack, a 7-year-old, was not cowed by teachers, principals or peer pressure. His lone, small voice and willingness to take a stand changed an entire school’s policy.

## What Are Your Lollipops?

Wouldn’t you want Jack to be your buddy?

The thing I love about this story is how Jack’s action grew, one little piece at a time. Most of us are intimidated by the sheer magnitude of the things that are messed up in our country. From tax policy to foreign policy, from agricultural subsidies to monocrops and aquifer depletion, the issues are monstrous. They’re complex. And it seems like more

people have their hands in the pie of deficit-funded governmental largesse than have their hands tending gardens and their minds on their own business.

The whole situation can be depressing and emotionally debilitating. We actually might be more encouraged if we didn’t look at the whole situation, and instead narrowed our focus to details closer at hand. In his book, *The 7 Habits of Highly Effective People*, Stephen R. Covey admonishes us to be content to make a difference within our “sphere

of influence.” Little in life will disempower us faster than the perception that an issue is too big to tackle. (Though, to be sure, some people speak from a pretty big stage and have a larger pond in which to create ripples.)

A radio program interviewed me recently and the first question the interviewer asked concerned the Farm Bill. What did I think of it? I admitted I didn’t even know what was in the Farm Bill, and hadn’t read it. It’s too big for me, too complicated.

I don’t think anything gets solved with the Farm Bill, anyway. Directing funds from one group of people to another group of supposedly better recipients will only push the good guys toward corruption. Switching the corruption from Group A to Group B won’t fundamentally change anything.

I only have 24 hours in a day, like everyone else. What’s my best return on that time? Some people are policy wonks and thrive on signing petitions, marching and organizing rallies. God bless ’em.

But I think a lot can be said for the notion of simply opting out of the messed-up system. Quit taking the lollipops.

What does opting out look like in the grown-up world? Does it look like a bunch of fuzzy-hairs



Children gain lifelong skills and attitudes from working on a homestead—and baby goats are way more fun than video games.

holding hands and sitting cross-legged on the beach singing “Kumbaya”? Does it look like a tent city perched on the Capitol lawn?

I’m convinced that most people who rail against the system aren’t offering or role-modeling a credible alternative. What does a rebel look like in our modern America? What does a 47-year-old Jack do?

## Small Changes Can Have Big Impacts

Here are some ideas to get you thinking. First, get into your kitchen. Do you know how many problems have been created in this country because Americans abdicated domestic culinary responsibilities? From TV dinners to Lucky Charms, the lion’s share of the entire adulterated diet is symptomatic of our having left the kitchen. Lest anyone jump to conclusions, this is not a sexist statement. When people ask, “What can we do?” my first answer—regardless of the sex of the person asking—is, “What you can do is get into your kitchen.”

Our kitchens have never been more techno-glitzzy and gadgetized. Let’s leverage that technology to prepare, process, package and preserve whole, local, compost-grown food. Instead of public outcry and resistance, you can help defund the food-adulteration complex by choosing to provide for yourself and to opt out of that complex entirely.

Secondly, how about you grow a garden? Did you know the United States has 46 million acres of lawn? And we now have 45 million acres devoted to housing and feeding recreational horses. That’s more than enough land to feed the entire country if we adopted bio-intensive-gardening guru John Jeavons’ methods. Ultimate food security can never come from a warehouse; it comes from a larder in-house. And having a well-stocked pantry doesn’t require that


you live on 40 acres. Have a vacant lot next door? Turn it into an urban farm.

Thirdly, create self-reliant homesteads, complete with cisterns, solariums and backyard chickens. Living in such an environment gives our children chores to do, and that alone would solve a number of our domestic and juvenile-emotional issues. Kids want to engage meaningfully in the adult world. If their only skill is playing games, it’s no wonder they grow up confused and childish. Work isn’t abuse—it’s the greatest legacy we can imagine, and it helps create responsible, nurturing, persevering, dependable youths.

Finally, I’d suggest seeing how little you can earn rather than how much. Money, stacks of goods made in China? They don’t ultimately satisfy. Engaging with the Earth’s most visceral functions, building familial and social relationships, bettering your own character and cerebral capacity—these are way better than a pile of coins. Oh, all that money might be alluring for a time, but

sooner or later you face the brevity of life and have to ask what matters.

What matters will become clear when your inner Jack reveals himself. Leaving a legacy of nutritious gardens and a pantry of homemade food instead of lollipops and plastic wrappers is noble, sacred, rebellious—and ultimately a deeply helpful act.

Now, go change your world. 

When people ask, “What can we do?” my first answer is, “You can get into your kitchen.”

Self-proclaimed “lunatic farmer,” Joel Salatin is an author as well as a catalyst for the local-foods movement. His family owns Polyface Farm in Virginia’s Shenandoah Valley. He has written several books about food and farming issues. You can purchase a selection of his books at a 25 percent discount until July 31, 2014; see Page 80.

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# Choose the Best Chicken Feed

*What kind of feed should I give to my chickens?*

The feed that's right for your chickens depends on the age of your birds, whether you're raising meat chickens or layers, and whether the birds are fast-growing hybrids or slower-growing heritage breeds. Most chicken feeds are available as "mash"—a fully ground and mixed ration that looks like coarse flour—though you can also find granulated or pelletized feed. You'll choose from these main types:

**Chick starter.** Just as human babies don't begin life on an adult diet, chicks also need their own special food just after they emerge from the egg. Chick starter is like infant formula for poultry—higher in protein than feed for mature birds. You should feed your chicks a chick starter for their first three weeks or so, after which you should switch to a grower ration.

**Grower ration.** Poultry grower formula contains slightly lower protein and is higher in fat compared with chick starter.

Layers should stay on grower ration until they reach 12 weeks of age for fast-growing breeds, such as leghorns and hybrids, and 15 weeks for slower-growing, dual-purpose breeds. After that, they should eat layer feed.

Switch meat chickens (aka fryers and broilers) from grower ration to finisher (keep



**Your birds' proper nourishment depends on their size, type and age. Chickens aren't picky about what they peck, so spent crops and kitchen scraps make great supplements.**

reading) at 6 to 7 weeks old for hybrids, 8 to 9 weeks for traditional meat breeds, such as the Cornish, and 10 to 12 weeks for dual-purpose heritage breeds.

After about three weeks on grower ration, add scratch grains to your chickens' diet, as well as small amounts of kitchen scraps (more details in final two paragraphs).

**Finisher.** Finisher feeds are formulated to fatten meat chickens quickly in the final weeks before butchering, as fast growth re-

sults in a more tender and profitable bird. Finisher feed contains lower protein than grower ration does, but it's higher in fat and fiber. Chickens eat finisher feed until they're butchered. This time span is highly dependent on the breed and ranges from about eight weeks for fast-growing hybrids to as long as 22 weeks for some of the larger, dual-purpose breeds. Fryers are usually butchered at 9 to 12 weeks, and broiler chickens are butchered between weeks 15 and 22.



## What to Do With Garlic Scapes

*What should I do with the loopy stems growing on my garlic plants?*

Remove garlic scapes—the curly, flowering stems that emerge midseason on hardneck garlic types—so the plants can put all of their energy into growing bulbs. If you don't remove them, the size of your harvest could drop by as much as 30 percent.

Use a sharp knife to cut off the scapes at the base of the curl, but don't discard this tasty bonus crop. Use garlic scapes just as you would garlic cloves or scallions. The raw scapes have a strong flavor and produce

a delicious pesto; simply purée a handful or two of the chopped stems with olive oil, nuts and grated cheese. Cooked scapes are less pungent; chop and add them to soups, sauces and stir-fries for a subtle garlic taste. For more about cooking with garlic scapes, including a recipe for sautéed scapes, go to <http://goo.gl/Af6Thr>.

If a few scapes manage to grow unnoticed and form heads of small, pink-purple bulbils, you can use those, too. Rub the heads between your fingers to separate the individual bulbils, and then sprinkle them atop pizza, salads, eggs or other dishes to add a slightly nutty texture. The bulbils dry easily, too.

—Vicki Mattern

**Layer feed.** When your layers reach 12 to 15 weeks of age, you can choose from a couple of different commercial layer feeds. One approach is to feed a complete-feed mash that's about 16 percent protein, or feed a higher-protein mash that's about 20 percent protein and then supplement with scratch feed.

**Scratch feed.** Scratch is a blend of grains you can toss onto the ground or a deep bed of hay or straw, which the birds will pick through. Scratch grains equip chickens not only with high-energy grains and seeds, but also with an opportunity for scratching—hence its name—which is a natural behavior chickens love.

**Grit.** Chickens need grit for their gizzards—a muscle in their digestive systems that grinds up grain and other food. Free-range birds can usually unearth grit (gravel and pebbles) as they roam, but confined chickens will need your help. You can purchase chicken grit at a feed store, or you can scavenge your own and place a small bucket inside the confinement area. Some owners offer crushed limestone rock as part of the grit. (Limestone is also useful in dust form. You can place it in large, shallow pans for the birds' dust bathing, as some anecdotal evidence suggests chickens may ingest sufficient calcium from the dust to strengthen their eggs' shells.)

**Pasture.** Allowing your birds to range freely on your property permits them to consume a natural diet of fresh greens, insects and worms. MOTHER EARTH NEWS stud-

ies have shown that eggs from free-range chickens are generally more nutritious than those from birds raised in industrial confinement systems—eggs from hens raised on pasture contain four to six times more vitamin D than eggs from commercially raised hens (go to [www.MotherEarthNews.com/Eggs](http://www.MotherEarthNews.com/Eggs) to learn more). Unfortunately, the threat of predators may make the free-range option difficult for those who don't have a chicken tractor. If your birds are not pastured, remember that they depend entirely on you to provide them with a full spectrum of nutrients.

**Kitchen scraps and garden crops.** Chickens, like us, are omnivores. Your birds will relish all kinds of kitchen leftovers as well as odds and ends from the garden—beet tops, broccoli, kale, turnips and other tasty scraps. You can also cut and feed cover crops, such as Austrian peas, buckwheat and winter rye, to your flock. Even fresh lawn clippings of grass and clover make prime poultry food.

Family flocks fed largely from the kitchen still need some supplements that a human diet can't provide. Layers should have access to oyster shell—a calcium supplement that helps keep their eggs' shells strong (see also "Grit," at left)—and, at a minimum, all adult birds require scratch. A container of free-choice layer feed will round out your hens' diet, but they won't need to eat much of it if fed from the kitchen and garden.

—Carol Ekarius

## Find Sustainably Harvested Wood

*Where do I locate sustainable wood for my home building projects?*

Certified sustainably grown wood isn't always easy to track down. The certification label could reside on the product's wrapping paper, shipping document, or an invoice that the distributor sees but that you may not have access to.


You can source sustainable wood with a little digging, however. Two major organizations certify sustainably produced wood: the Sustainable Forestry Initiative (SFI) and the Forest Stewardship Council (FSC). SFI is

a North American organization; FSC works globally. Each has a searchable online database that identifies lumber, engineered wood, decking, siding and other wood products that have met the organization's standards for sustainability. You'll find the SFI database at <http://goo.gl/WLrdsf> and the FSC database at [www.Marketplace.FSC.org](http://www.Marketplace.FSC.org). You can then locate dealers that carry the certified brands.

Another approach is to ask your local lumber distributor to direct you to the sustainable wood products it stocks. If a label isn't clearly visible on the product and you want to verify the product's certification status, you can ask the distributor for the product's

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identification number and then check it on the SFI or FSC website.

If your retail distributor doesn't already carry sustainably harvested wood, ask for it! That kind of grass-roots demand is one of the best ways to increase its availability and support sustainable forestry, says Valerie Luzadis, president of the U.S. Society for Ecological Economics.

Both the SFI and FSC certification programs officially organized shortly after the 1992 Rio de Janeiro Earth Summit, which put forth a set of principles to guide the sustainable management of forests worldwide. The SFI and FSC certification programs differ, and those differences have led to considerable debate about which system is more rigorous. Over the years, each organization's certification standards have become tougher, and additional updates are in the works. A 2011 Dovetail Partners report examined the differences between the programs' certification standards. Peruse the complete report at <http://goo.gl/Mcjem6>.



**The Forest Stewardship Council has certified more than 330 million acres of forest around the world.**

If you're planning to build a home or undertake some other large project, seeking out certified lumber is ecologically wise and impactful. A March 2012 *Journal of Forestry* report that measured certification's effects on forest-management practices concluded that both systems have improved the environmental, social and economic sustainability of forests by establishing geographic information systems, controlling exotic invasives, monitoring chemical use, planning with biological diversity in mind, and more. You can read the report at <http://goo.gl/Hnn6Yr>.

—Vicki Mattern

## Ditch the Itch: Get Rid of Poison Ivy Plants

*I found out the hard way that my garden is infested with poison ivy. What should I do to evict this rash-causing weed?*

Getting rid of poison ivy in your yard is tough—there's just no easy way to do it. One of the most effective techniques to banish it is to pull it and pull it and pull it. Wear special gloves that you never use for anything else and use a pair of long-handled pliers. The ivy's stems run mainly near the surface of the soil and up onto nearby trees. Large lengths will come up when you pull. If the stems are thick and won't budge, then you'll have to cut them and paint the remaining portion with an herbicide. Repeat this pulling process as needed each year.

Before you begin pulling poison ivy, apply the FDA-approved product called Ivy Block ([www.IvyBlock.com](http://www.IvyBlock.com)) to your hands and arms to protect your skin. After you're finished, carefully remove your gloves, wash your clothes, and wash your hands with Tecnu Extreme Medicated Poison Ivy Scrub ([www.TecLabsInc.com](http://www.TecLabsInc.com)). You can find these products online or at a drugstore.

—Cheryl Long, Editor-in-Chief



**Pesky poison ivy often likes to climb up trees.**

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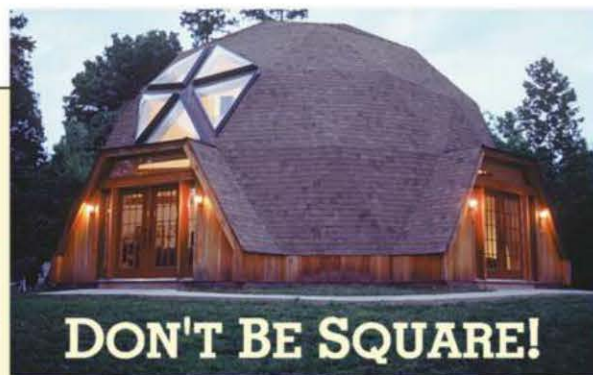
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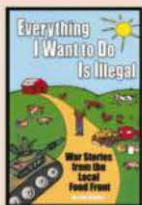
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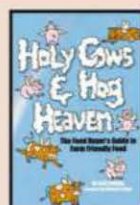
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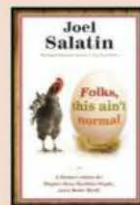
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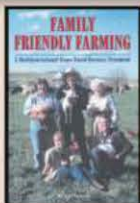
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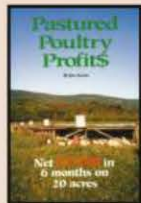
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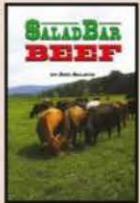
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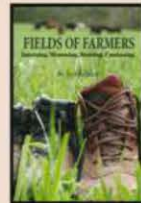
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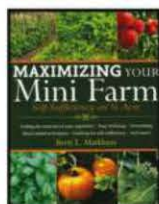
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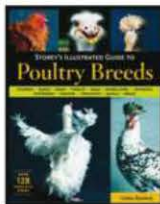
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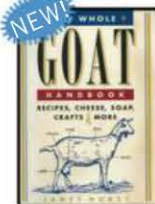
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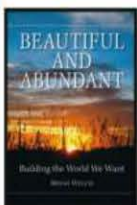
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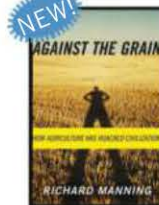
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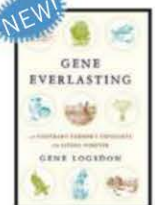
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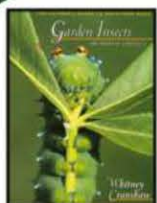
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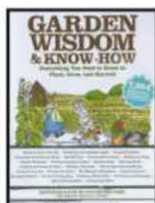
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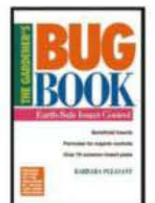
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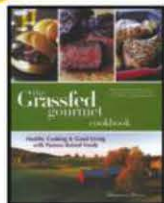


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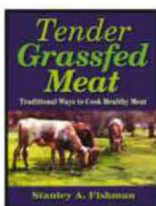
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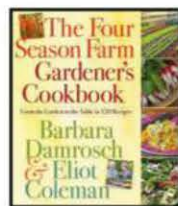
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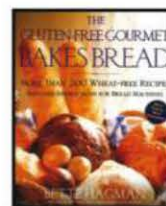
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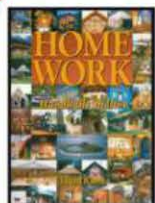
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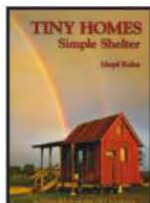
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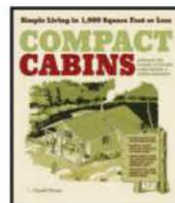
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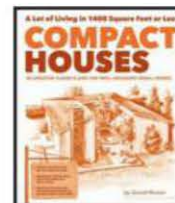
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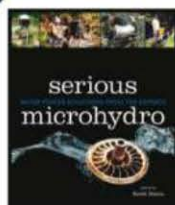
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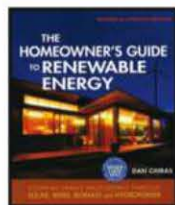
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# Best Tools for BIG GARDENS

Learn the pros and cons of the implements you need to successfully—and affordably—manage a large-scale food garden.

By Joel Dufour

Illustrations by Keith Ward

Imagine you finally have some land and you're going to start gardening in earnest. I'm talking serious food production here: growing a significant portion of your own food, and possibly even selling surplus produce at the local farmers market. After your garden grows to a certain size, however, your generic hardware-store tools will become woefully inadequate. These tools will wear out too quickly and they're poorly designed, so they'll wear you out quickly, too. For big gardens, you need serious tools!

## Mechanized Equipment

While smaller gardens—5,000 square feet or less—can be managed by hand tools alone, larger gardens usually require some level of mechanical aid. The typical North American “lawn and garden equipment” market offers a plethora of single-purpose machines, such as garden tillers, walk-behind or riding mowers, chipper-shredders, and so on. This equipment works, but there are two major drawbacks. First, each machine has its own engine, which increases costs and maintenance work. Second, in my experience, most “consumer-grade” equipment offered at big-box stores is designed with just enough durability to outlast the warranty period, and then it needs major service or is completely worn out. You'll do better if you spend a little more money for “professional-grade” models.

Another option is to go for broke and jump into a four-wheel tractor with a power take-off (PTO) and a host of implements. This option overcomes the problem of needing a different small engine for each task, and, if you purchase equipment of a reputable brand, durability won't be an issue because any tractor with a PTO is usually built well enough for agricultural service. The downsides of a four-wheel tractor are greater upfront costs, less maneuverability, and even lack of exercise for the user. These downsides can be justified if you have enough land to cultivate.

My own homestead is a good example of this quandary. In addition to managing a quarter-acre organic garden, we mow an acre of lawn and 5 acres of brush, maintain a quarter-mile gravel driveway, chip and shred as needed, and haul stuff (firewood, compost, rocks—you name it) around the property. The work on my land could easily justify either of the two equipment scenarios previously mentioned. I don't have enough acreage to condone the cost of a four-wheel tractor, nor am I willing to sacrifice maneuverability or exercise. I also tired many years ago of repairing and replacing poorly made, single-purpose machines that were built to be “consumable.” What other options do I—and others in a similar situation—have?



## Walk-Behind Tractors: The Best of Both Worlds

Unlike North America, many European countries have the tools to support large-scale gardening. These countries have a class of large-garden tools that effectively fills the void between four-wheel tractors and single-purpose machines: walk-behind agricultural equipment.

The idea of walk-behind farm equipment is not new to North America; it has just been largely forgotten. From the 1920s to the 1960s, scores of walk-behind tractors (also called “walking tractors,” “two-wheel tractors” and “hand tractors”) were produced in the United States. These machines comprised an engine, two wheels, transmission and handlebars, plus a variety of attachable implements for garden or small-farm tasks.

While this equipment concept has dwindled in North America, Europeans have recognized that walk-behind agricultural equipment has the durability and versatility of a tractor, but in a walk-behind configuration that takes less space to maneuver and less money to purchase. European countries have continued to improve their walk-behind tractors (and accompanying attachments) over the past 70 years. One brilliant breakthrough was the design of a reversible handlebar system, so the implement mounting can change from the rear of the tractor to the front. Italy currently produces more walk-behind tractors than any other European country (16 brands) and available attachments include tillers, plows, a variety of mowers, chipper-shredders, snow-removal equipment, log splitters, cultivators, transport wagons, hay rakes, hay balers,

seeders, power harrows and spaders.

The list goes on, with more than 40 implement types available.



Walk-behind tractors are one of the most versatile tools for large plots. A huge variety of available attachments can help you accomplish nearly any farm or garden task imaginable, from tilling soil and seeding to cutting cover crops and baling hay.

Asian countries have developed walk-behind farming equipment as well, but it tends to be less versatile than the European equipment and there are fewer implements available. Also, the Asian brands don't currently have any stocking importers established in North America, so even though a Chinese walk-behind tractor might cost less, spare parts and post-sale support do not currently exist in this country. Buyer beware!

## What's the Cost?

While walk-behind machines are roughly the same size as typical lawn and garden equipment, the difference in construction and durability is clear. Walk-behind tractors have commercial gas or diesel engines and all-gear powertrains. They can easily last as long as any full-sized agricultural tractor, meaning well into the

next generation of gardeners. A walk-behind tractor with attachments for general lawn and garden tasks will run in the range of \$4,000 to \$7,000. This is a far cry from what you'd pay for the four-wheel equivalent, and not much more than you would spend on several single-purpose machines—actually less, when you take into account the longer life expectancy of a quality walk-behind model.

At a certain point, you may be working more acreage than is practical for a walk-behind tractor, and a four-wheel farm tractor will become necessary. My family experimented with this limit on the farm I grew up on, and I'd say that if your garden is larger than 3 acres, it's time to look into buying four wheels.

## The Modern Wheel Hoe

A classic tool that straddles the gap between walk-behind, motorized tractors and hand tools is the wheel hoe. This human-powered, wheeled cultivator has made a reappearance in recent years. It's more versatile than ever because of an increased number of accessories now available (cultivators, sweeps, stirrup hoes, hilling plows and even a good seeder). Hoss Tools is the leading U.S. manufacturer; find more information at [www.HossTools.com](http://www.HossTools.com).

An old-time tool, the wheel hoe can significantly ease weeding chores.



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Circle #33; see card pg 97

## Durable Hand Tools

Some may ask, "If I have excellent mechanized equipment, do I still need to fool with hand-held gardening tools?" As an organic gardener for more than 35 years, my answer is a resounding "yes!" I apply a lot of mulch in my garden to cut down on weeds, but still find plenty to do with hand tools. In fact, cultivating and weeding with hand tools are my favorite parts of gardening, except for eating the food. The work is quiet and reflective. To make it an enjoyable experience, however, you have to find top-notch hand tools. If the hoe you're wielding strains your back, if the garden fork keeps bending or the spade won't stay sharp, then frustration can easily overtake pleasure. Unfortunately, most of the tools that are typically available in big-box stores (and even, for the most part, smaller hardware stores) are poorly made, mass-produced consumables that don't even glance in the direction of ergonomics. Once again, we have to look at alternative sources.

In this genre as well, the Europeans really dominate the market. A gardening culture and an

old-world mindset about durability have paired to produce some of the best hand tools available.

Because European tools are made to last longer, producers usually put more thought into the ergonomics of tool design. If a hoe that will last 50 years is poorly designed, who would work with it? The only weeding hoes I've found with long enough handles to suit my tall height come from Holland, and the ergonomics of German chopping hoes (also called "eye hoes" or "grubbing hoes") are the best I've discovered.

## Solid Steel Designs

Steel tools are stronger and they stay sharp longer than tools made from other materials. Steel isn't just steel, of course, and Europeans have known this for the many generations they've been producing quality garden tools. Steel can be stamped, rolled, cast, forged or hardened, all with different durability results. The best tools are made of forged steel because it's denser and more resilient. Forging is an

The swan-neck weeding hoe is designed to be used like a broom.



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Circle #28; see card pg 97

expensive process (some European manufacturers forge by hand), but the result is impressive.

I haven't found any North American manufacturers that are doing anything directly comparable to the forged tools from abroad, although some good manufacturers in the United States produce broadforks, ergonomic shovels, pruners/loppers, swan-neck hoes, and hoes made from recycled disk blades (called Rogue Hoes), which aren't quite as durable as forged, but are less expensive. I have also found fine tools in Japan and Korea. Okatsune pruners, shears and loppers are top-notch,

and Hida Tool in California carries excellent Japanese tools. To locate these companies, see "Garden Tool Sources," at left.

## Where to Look

The good news is that you don't have to take a trip to Europe to acquire this kind of equipment. Several brands of Italian walk-behind tractors have been imported over the past 40 years, and while they are certainly not available in mainstream stores, select dealers will have them in stock. At least two brands—BCS and Grillo—currently have U.S.-based importers that stock a full supply of parts and offer customer support.

While you probably won't find the best wheel hoes or hand tools at your local hardware store, you can acquire them online. Top-notch, durable tools cost more, but in my experience, the investment is well worth it. Whether buying hand tools or motorized equipment, by investing in superior garden tools, you'll get more done, you'll feel better doing it—and you'll have more fun! 🌱

Joel Dufour has owned his garden-equipment business, Earth Tools ([www.EarthTools.com](http://www.EarthTools.com)), since 1993. He lives near Frankfort, Ky., with his wife and two daughters in an off-grid, 900-square-foot home they built by hand.

## GARDEN TOOL SOURCES

### Broadforks

[www.GullandForge.com](http://www.GullandForge.com)  
[www.MeadowCreature.com](http://www.MeadowCreature.com)  
[www.ValleyOakTool.com](http://www.ValleyOakTool.com)

### Pruners/loppers

[www.Barnel.com](http://www.Barnel.com)  
[www.HidaTool.com](http://www.HidaTool.com)

### Rogue hoes

[www.RogueHoe.com](http://www.RogueHoe.com)

### European hoes

[www.EarthTools.com](http://www.EarthTools.com)

### Shovels

[www.GreenHeronTools.com](http://www.GreenHeronTools.com)  
[www.SpearHeadSpade.com](http://www.SpearHeadSpade.com)

### Stainless-steel trowels

[www.WilcoxAllPro.com](http://www.WilcoxAllPro.com)

### Walk-behind tractors

[www.BCSAmerica.com](http://www.BCSAmerica.com)  
[www.EarthTools.com](http://www.EarthTools.com)

### Wheel hoes and seeders

[www.HossTools.com](http://www.HossTools.com)  
[www.ColePlanter.com](http://www.ColePlanter.com)

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Circle #56; see card pg 97

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Circle #47; see card pg 97

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Circle #55; see card pg 97

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# Rammed Earth Garden Beds

**R**ammed earth garden beds are made by compressing a damp mixture of approximately 70 percent sand, 30 percent clay, and a small amount of cement into an externally supported form or mold, creating a solid, earthen wall after the frames are removed. One of the benefits of rammed earth is that its high thermal mass absorbs heat during the day and releases it at night. My technique for building rammed earth garden beds makes use of local raw materials, is resistant to temperature changes and is remarkably cost-effective.

Construct rammed earth garden beds by using two frames—a box inside of a box with a 3½-inch gap between the walls. Pack this gap with the earth mixture, then remove the frames, leaving earthen walls that are ready to hold your garden soil.

## Materials

3 sheets of 4-by-8-foot plywood  
4 pipe clamps, each 60 inches in length  
Twelve 2-by-4s  
1 bag of Portland cement  
12 hardwood wedges  
1 hand tamper (or optional power tamper)  
Mix of local sand and clay

Start by constructing the framework. Cut all three of the 4-by-8-foot plywood



Rammed earth garden beds absorb heat during the day and release it at night.

sheets in half, resulting in six pieces of 2-by-8-foot plywood. Set two of the newly cut pieces aside. Cut the remaining plywood boards into the following sizes: two at 2-by-4 feet, two at 24-by-41 inches, and two at 24-by-89 inches. Save the leftover wood for a future project.

The external, larger box uses the two panels that are 2-by-8 feet and the two panels that are 2-by-4-feet, held together with the pipe clamps. The internal form uses the two 24-by-41-inch boards and the two 24-by-89-inch boards, braced with the twelve 2-by-4s. After the two frames are assembled, you will have two

big boxes sitting on the ground, with a 3½-inch gap between their walls.

Mix the sand and clay with 8 percent Portland cement and very little water. Layer the mixture between the framed walls, 8 inches deep at a time, and then tamp it down tightly. Repeat this process until the rammed earth is 3 inches from the top of the form. At this point, add a layer of concrete to the top to finish the process. The following day, strip away the wooden form and then fill the rammed earth garden bed with soil and top with mulch.

Al Nichols  
Penticton, British Columbia



This gate can be easily opened with one hand.

## Easy-Open Gate Latch

My hands are often full when I'm doing work around my homestead, and opening a gate with one hand is tricky. I invented a one-handed gate latch that's easy to make.

The gate-latch hardware includes a large cold shut, a lap link, a heavy-duty eye screw, a three-eighths-inch bolt and a short piece of chain. You could also substitute a chain link for the lap link, but it will cost you more. (If you don't know these terms, ask for help at your local hardware store.)

Attach the cold shut to the end of the chain with the lap link, bolt the chain to your post or gate, and put the eye screw on

the opposite gate. The cold shut, left open on the end of the chain, will drop into the eye screw and keep the gate shut, even when wind is blowing fiercely.

David Proudfoot  
Belington, West Virginia

## Mulch Mania

Mulching with cardboard and newspaper is a classic method for suppressing weeds and grass. However, I found out the hard way that finding and breaking down dozens of cardboard boxes is tedious. Plus, weeds and grass grew between my cardboard sheets by mid-June.

One day I lucked out and scored two big appliance boxes—one from a hot-water heater and one from a refrigerator—and both were thicker than the smaller boxes I had previously used. The boxes didn't allow any light to penetrate, and it took much less time to lay them out. Often, stores have to break down their own cardboard and some even pay for its removal, so this could be a win-win for both parties!

*Belea Keeney  
Apex, North Carolina*

## Pilot Light Projects

For those of us who haven't gotten around to building a solar food dehydrator, I've discovered a great substitute—your gas oven with just the pilot light on. So far, I've dried apples, grapes and onions this way. It's also good for keeping crackers crisp and salt shakers running smoothly, plus it's the perfect temperature for making yogurt.

*Ted Hale  
Bangor, Maine*

## Listerine Bug Repellent

We mix 2 tablespoons each of Listerine and dishwashing detergent with a liter of water. We spray this treatment on a small wooden branch and place it on the table as a bug repellent; it keeps insects away from our food.

*Margret Kelly  
Cornubia, Queensland, Australia*

*If you try this, please let us know whether it works for you. —MOTHER*

## Tea Time for Seedlings

An effective, simple and nontoxic way to keep seedlings free of damping-off disease is to use chamomile tea. I place one chamomile tea bag in 4 cups of boiling water and allow it to sit for 24 hours or more to ensure that I have a strong brew at room temperature. I pour the tea into a plant mister and spray the seedlings as soon as they sprout and each time I water them. I continue this application until the seedlings have developed their second set of leaves. You can also pour chamomile tea into the liner you set the seedling tray into so you can water seedlings from below.

If you were too late to start misting your seedlings in this way, and you see mildew forming at the base of your seedlings, all is

not lost. The chamomile tea melts the fungus away before your eyes!

*Jesse Vernon Trail  
Vernon, British Columbia*

## Wrangle Your Wigglers

I vermicompost with red wiggler worms. They turn out wonderful compost in a fraction of the time it would take compost to decompose without their help. Separating the worms from the final product is tedious, however. The typical method involves forming the compost

into several small, cone-shaped piles, placing a light above the piles, letting the worms burrow deeper into their pile, scraping off the top layer of compost, then repeating and repeating until you have enough filtered compost.

My solution to this task is to divide the bin with a permeable partition, such as quarter-inch, woven-wire mesh stapled to a wooden frame. I let one side of the bin compost almost completely. I then begin putting fresh material, such as kitchen scraps, on the other side. Most of the worms migrate to the

## Surprising Critter Comrades

*We asked our Facebook friends to share stories of unusual animal friendships. The heartwarming tales below represent just a few of those we received. To read many more accounts of surprising friendships from all corners of the barnyard, go to <http://goo.gl/sAhgmL>.*

**We had a farm dog who would let the cats sleep over, under and around her** when she thought you weren't watching. She would lick and nuzzle the cats as if they were her own, right up until she saw you. She would then spring up, bark, and act as if you didn't see her being nice. I loved that dog! —*Mike Lowe*

**My childhood horse, Topic, had a pet cat.** Every night when I fed Topic, the cat would sneak into his stall and curl up in the hay while Topic finished his grain. When we lost the cat to disease, I buried him in the horse pasture. Topic stood over the grave and ended up digging the cat back up. I reburied the cat, but Topic spent hours standing over his friend's grave. —*Ellen Rachel Zawada*

**We had a rooster who looked after a litter of kittens.** He protectively perched on a railing above them at night, and laid with them and followed them around during the day. He also ran off any of the other animals if they got too close. —*AshTree Noel*

**We had a Jersey cow, in milk, who adopted an orphaned lamb.** The bottle-fed lamb saw me milk one morning, started sniffing around, and then latched on to the Jersey. If the two ever got

separated, they would call to each other until reunited. To this day, the ewe prefers cows to other sheep. —*Teresa Furches Cook*

**We've seen broody hens raise ducklings.** My dad would occasionally put abandoned, fertile duck eggs under the hens, which were always great moms to the ducklings. I did feel a little sorry for the mama hens when the ducklings inevitably made for the water, though. The little things would be happily swimming in a drainage ditch while their adoptive mothers paced and squawked in alarm from the water's edge. —*Ellen Polzien*

**After one of my cats, Tommy, died, I put him into my traditional pet basket—a nice shoebox with a towel—and I headed out to the garden in a light rain to bury him. My three other cats followed along behind and stood by as I buried Tommy.** —*Cheryl Long*



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"fresh" side within a matter of days, while a few remain in the composted side to complete the job—and to ultimately end up back in the garden!

*Brand Phillips  
Honolulu, Hawaii*

## Nontoxic Drain Cleaner

Washing soda and vinegar make a great nontoxic solution to clean out slow drains. If applied regularly, this treatment can keep

slow-drain problems from developing into a huge mess.

First, run scalding hot water into the sink and allow it to drain fully. Pour approximately a half-cup of washing soda directly down the drain. Next, slowly pour about 1 cup of white vinegar down the drain, allowing the washing soda to bubble up. Add a little more vinegar until the washing soda has completely dissolved and you don't hear any more fizzing coming from the pipes. Flush the drain again

## Glazed Zucchini Cake With Blueberries Recipe

I love an ingredient that can lead a double life. Savory by day, sweet by night, zucchini is such an ingredient. Plus, there is always an abundance of zucchini in summer. Last year, I wanted to make zucchini bread, but I also wanted cake with a glaze. This recipe for Glazed Zucchini Cake With Blueberries was the result. *Yield: One 10-inch springform cake or one 9-by-13-inch cake.*

### Cake

- 3¼ cups flour
- 2 tsp cinnamon
- 1/2 tsp nutmeg
- 1 tbsp double-acting baking powder
- 1½ tsp salt
- Zest of 1 lemon
- 2 cups sugar
- 2 eggs, beaten
- 1/2 cup vegetable oil
- 1/2 cup unsweetened applesauce
- 3 cups zucchini, grated
- 1 pint blueberries

### Lemon glaze

- 1½ cups powdered sugar
- 4 tbsp lemon juice
- 1 tbsp lemon zest



**Zucchini and blueberries make a fine pair.**

Preheat oven to 350 degrees Fahrenheit. For the cake, sift flour, cinnamon, nutmeg, baking powder and salt, combine well with lemon zest. In a separate bowl, beat sugar, eggs, vegetable oil and applesauce until well combined, then add zucchini. Carefully combine the dry and wet ingredients; do not over-mix. Stir in blueberries. Pour batter into a greased springform pan or a greased 9-by-13-inch baking dish. Bake for 1 hour or until a knife pulls out clean from the center.

For the lemon glaze, mix powdered sugar, lemon juice and zest until well combined. Use a fork to poke several small holes into the top of the cake, and then pour the glaze over the cooled cake. Serve and enjoy!

*Lauren Widing  
Linden, Michigan*

For more recipes that feature fresh, seasonal ingredients, be sure to check out [www.TheHarvestFoodBlog.com](http://www.TheHarvestFoodBlog.com). To discover additional ideas about how to use (and grow!) summer squash, turn to Page 18. —MOTHER



### An ingenious homemade herb shaker.

with hot water, and plunge as needed to disperse any gunk dislodged by the treatment.

Repeat this procedure once a month and you'll never need toxic drain cleaners again.

*Theresa Sinclair  
Johnson, Vermont*

### Homemade Herb Shaker

The plastic shaker tops from Parmesan cheese containers screw perfectly onto regular-sized canning jars. This setup works great for homemade dried herb and spice blends. If the holes are too big for your dried herbs, line the lid with a piece of clean window screen.

*Lou Anne Zander  
Genoa City, Wisconsin*

### Protect Yourself From Ticks

Take a pair of socks that are worn at the toe, and cut the toes off straight across. Next, put these altered socks on over your regular pair of socks, but pull them up high so the cut toe is located over the elastic ankle band of your good socks. Now you can tuck your pant legs in the top of the cut-off pair. This way, ticks won't have access to your skin, plus you won't stretch out the tops of all your good socks.

*Dan Metscher  
Enid, Oklahoma*

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Circle #64; see card pg 97



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(CONTINUED FROM PAGE 11)

haymaking equipment—in this issue (Page 82), but it was written by Joel Dufour, who is the founder and owner of Earth Tools, the company you recommend! We agree; Earth Tools is a great company, and we were pleased to have Joel on hand to write this piece and even give a presentation about high-quality garden tools at the MOTHER EARTH NEWS FAIR in Asheville, N.C., in April.—MOTHER

## 1 Chicken, 3 Meals

I have a family of four, and I'm always looking for ways to make excellent meals that are also economical. MOTHER EARTH NEWS is a great source of inspiration. The following is one of my favorite easy, multiple-meal strategies for stretching my grocery dollars.

**Meal 1.** Stuff a chicken with your favorite herbs and a sliced lemon. Season it, and put it in a slow cooker on high for 6 to 7 hours (you don't need liquid). Cook a side of rice or



## Sourcing Healthy, Cruelty-Free Foods

Thank you so much for your website. I'm 15, I care very much about animal rights, and I've been vegan while trying to find a local farm that treats animals humanely. I think I've found one, and your articles "Free-Range vs. Pastured Chickens and Eggs" and "How to Decode Egg Cartons" (at [www.MotherEarthNews.com/Eggs](http://www.MotherEarthNews.com/Eggs)) have helped me so much.

I'm relieved I can finally free myself and my family from foods produced from animals raised on factory farms.

Nammy Kasaraneni  
San Jose, California

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Circle #48; see card pg 97

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Circle #46; see card pg 97

pasta, and make extra. Keep all of the bones from your meal. Keep any leftover meat you pick from the bones in an airtight vessel.

**Meal 2.** Put all of the bones back in the slow cooker with the chicken carcass (leave any herbs and lemon in the carcass). Add water, some onions, celery and any other vegetables you may have on hand. Simmer overnight on low. The next day, sauté a few cut-up carrots, celery, onions (any veggie you have will do!) and ginger in a pot. Fill that pot with some of your broth. Add the leftover pasta or rice from Meal 1 to make a nice, thick soup. Season, and garnish with fresh herbs. *Leave the extra broth in your slow cooker.*

**Meal 3.** Fill up your slow cooker with fresh water and let simmer again. The next day, add some cream of mushroom soup (or make your own creamy soup by adding butter and cream) and any leftover meat to the broth. Make small dumplings from flour and eggs, and drop them into the soup. Sprinkle with parsley. You can also add a 1:1 ratio of coconut milk to your broth to make coconut soup.

Three hearty meals and one happy family!

*Heike Boehnke-Sharp  
Sacramento, California*

### Winter Squash Storage Tip

I had a fantastic crop of butternut squash last year, and, as recommended in the article "20 Crops That Keep and How to Store Them" (August/September 2012), I put the surplus in plastic bins under a bed in a spare bedroom.

I made one big mistake, however: When I laid the squash in the bins and put the lids on in fall, it was apparently humid that day, and when the house cooled and the air dried in winter, the water vapor condensed inside the bins, leaving the squash soaking wet and sitting in a half-inch of water. I luckily lost only a few. Lesson learned: Cover your squash

### Write to Us!

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storage bins with loose pieces of paper or cardboard—not with tight-fitting plastic lids.

*Susan Laun  
Lake City, Pennsylvania*

## A MOTHER Homecoming

I followed MOTHER EARTH NEWS diligently for its first decade, devouring every issue, but then I went astray. I have amended my ways, however, and am back as an enthusiastic subscriber—and, boy, am I impressed!

I especially love Green Gazette, Country Lore and your fine cover stories. I feel a bit like the prodigal son returning to the fold!

*Richard Thorum  
Midvale, Utah*

## Top College Courses, Tuition-Free

I enjoyed the article “65 Self-Reliance Tips That Will Save You Money” (February/March 2014) and wanted to let readers know about another no-cost option for education. The website [www.Coursera.org](http://www.Coursera.org) offers free online classes from some of the most prestigious universities in the world—Duke, Princeton, Stanford, Yale and many others. You don’t get college credit, but if you like to learn, the website is worth checking out.

*Carla Wuerpel  
Jackson, Tennessee*

## ‘We Can’t Recycle Our Way Out of This’

I was deeply chagrined but not surprised by the negative responses you received to the

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AUGUST/SEPTEMBER 2014

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Circle #23; see card pg 97

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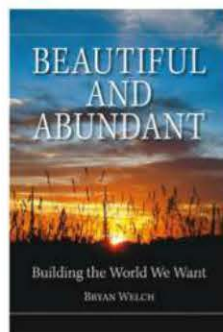


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article "Making a Green Choice: Childfree Living" (February/March 2014). Choosing to be childfree or limit the size of one's family to one or two children is not "anti-children," as is often the misguided reaction some people have to the concept.

Our planet has finite resources. Species are disappearing at an alarming rate because of human mismanagement and overpopulation. Human-created carbon emissions have already led to catastrophic climate change, which threatens our safety and way of life. Out of concern for future generations, we should consider curbing population size as a key means to remedy these problems.

We can't recycle our way out of this destruction. Overpopulation is one of the critical issues of our time, but it's also one of the topics most skirted by politicians, journalists and the general public. Anyone contemplating having children should take time to consider the dwindling availability of jobs, natural resources and food—and the general degradation of the quality of life—for his or her offspring.

I admire the author, Lisa Hymas, and MOTHER EARTH NEWS for having the courage to print this article.

Doreen Harris  
Scotia, New York

## 'Close to Bigotry'

To me, "childfree" sounded like an insult to people who do have children. Very close to bigotry! I couldn't care less whether the author of "Making a Green Choice: Childfree Living" and others like her do not have children. It is best if they do not!

Keith C. Kraushaar  
Riley, Kansas

## Passive Solar vs. Passive House

In our April/May 2014 issue, we ran a piece in Ask Our Experts that discussed the differences between passive solar design and Passive House standards. We received a letter from an architect questioning some points in the article, and we've put the letter online so anyone interested can further explore the topic. We'd like to hear your thoughts! Go to <http://goo.gl/tf27SG>. —MOTHER

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## Of the Same Mind

Thank you for printing "Making a Green Choice: Childfree Living." My boyfriend and I are in our early 30s, and everyone around us is having children. We appreciated knowing there are other like-minded individuals who read your publication.

*Crystal Nicklay  
Moorhead, Minnesota*

## Conquering Clay Soil

Regarding "How to Improve Clay Soil" (Ask Our Experts, April/May 2014): We've contended with clay soil for many years while farming here in North Carolina. Adding organic matter in the form of cover crops, dried leaves, grass clippings and manure is a lot of work, but it has resulted in great production from our vegetable crops.

One thing I will advise: Do not miss a year of amending. It only takes one year without organic matter for the soil to return to solid



## Bean There, Done That

I would like to add a bit of information to your article "Roast Coffee at Home for an Amazing Cup" (Real Food, April/May 2014). Ethiopian shops are another reliable source for high-quality green coffee beans. Ethiopian people hold their native coffee in high regard, and they often purchase their coffee beans green and roast them at home and in their restaurants.

Located mostly in urban areas, Ethiopian shops may be less accessible than an online source, but green coffee beans have a long shelf life, so try purchasing them in bulk from a shop when you visit your nearest city.

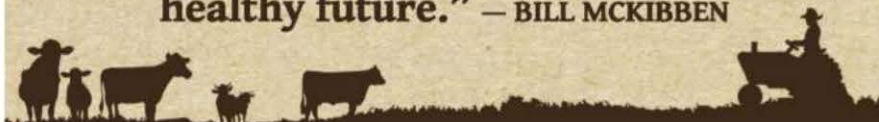
*Dave Hajoglou  
Lakewood, Colorado*

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clay again. I slacked off one year, and this made for far more work the following spring.

We add manure and cover crops in spring, tilling or turning them in. During summer, we mulch with grass clippings, which are great for the soil. In fall, when we do the majority of amending, we add fall leaves, manure and vegetable crop residue. We plant one more fall cover crop to till in right before winter, or we overwinter it and till it in the next spring. We have amazing loam that doesn't even resemble clay!

Susan Berry  
Stokesdale, North Carolina

## High-Altitude, Low-Cost Gardening

I have to chuckle with a bit of envy when I see pictures of cute little plots of perfect tomatoes surrounded by urban lawn. Our reality living a mile high in the Idaho Rockies is half-inch welded wire all around and underneath the garden to keep out small critters. Think Fort Knox meets covered wagon.

Is it worth the money? Yes! With just what vegetables I sold to neighbors the previous year, I covered all of my seed and supply expenses and part of the cost of my poly sheeting. We then ate all the 'Early Girl' tomatoes, peppers, cucumbers, peas and fresh herbs we could. In addition, we also had canned salsa and marinara sauce, pickles, dried tomatoes, and stored potatoes and squash.

The soil and amendments are all free—my son saves bags of grass clippings, leaves and compost, and I get straw and horse manure from a local hunting outfitter. In lieu of a compost pile, I throw kitchen scraps in a bucket I keep on the porch. In spring, I use scraps to fill a trench that I plant my tomatoes and squash into. This warms up the soil and feeds the plants when they need it most.

During winter, while we're getting around by snowmobile, I'm studying seed catalogs. This is definitely an act of faith, because, at the time, the ground is lying under about 5 feet of snow. Because of the cool, short season, I start my seeds in March in a southwest-facing window by the woodstove. Six to eight weeks later, I'm setting my babies out under covered hoops before the snow is gone. I'll still be harvesting juicy, ripe tomatoes in October when the snow flies again.

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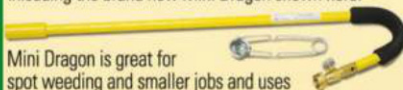


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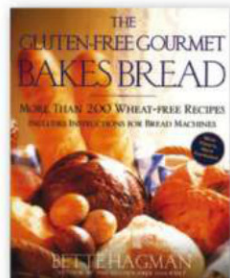
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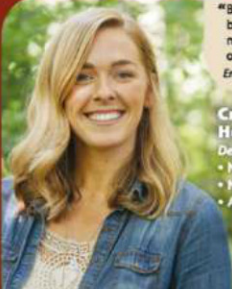


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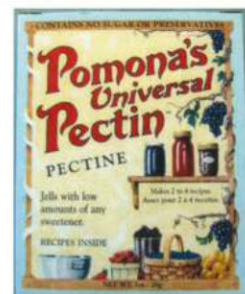
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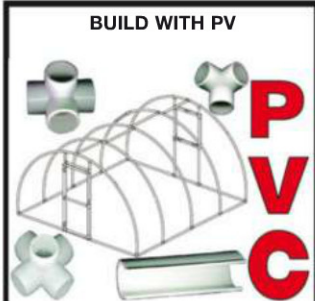
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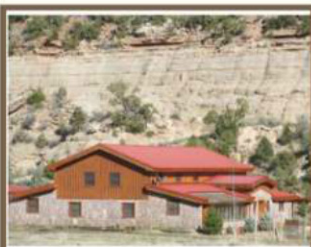
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