Build Your Ark!

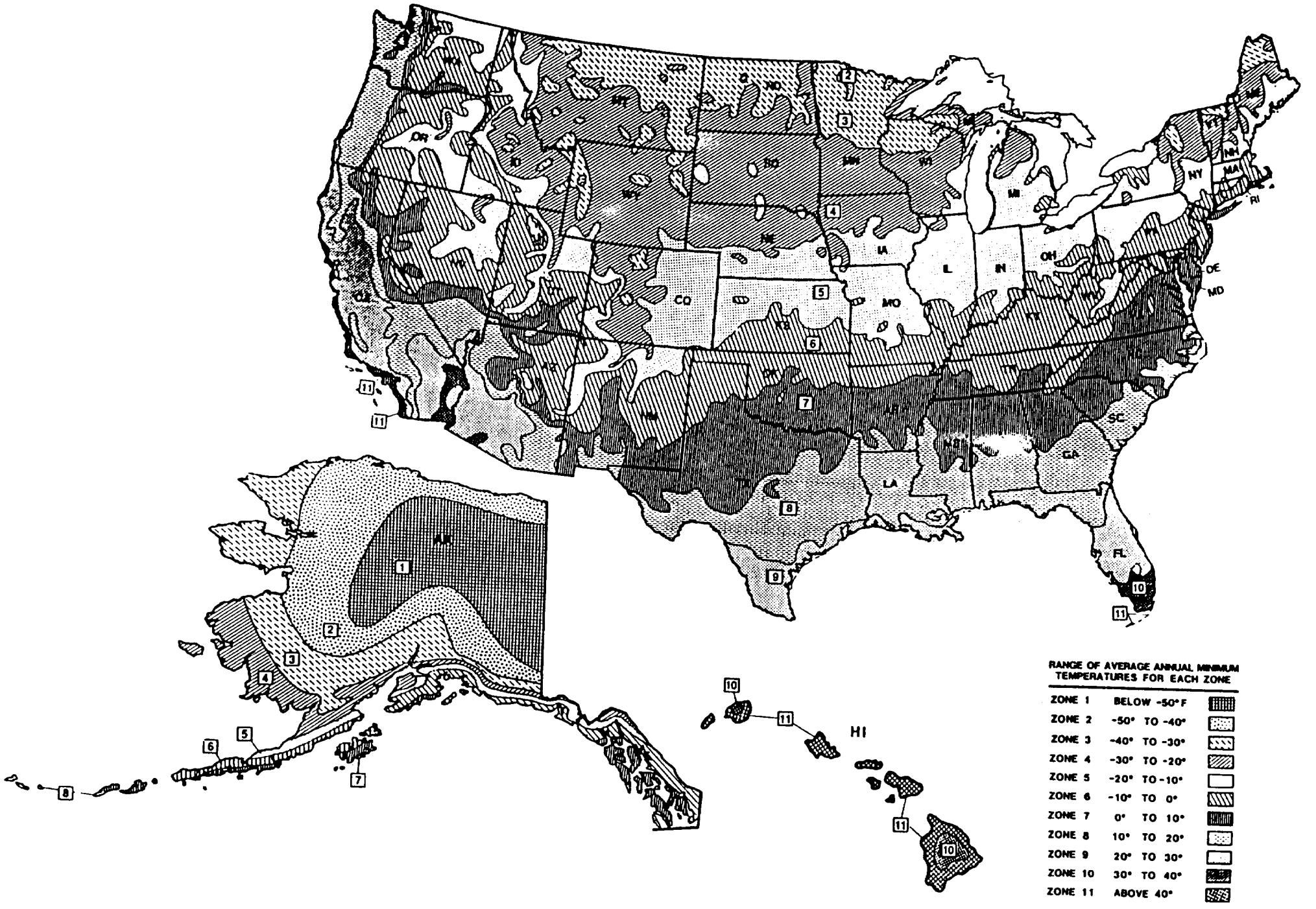
How to Prepare for
Self - Reliance
in Uncertain Times

Book I: Food Self-Sufficiency

Unemployment
Recession
Economic Depression
Downsizing
Crop Failures
Retirement Fund Collapse
National Debt Default
Terrorist Attack
Global Famine
Government Shutdown
Stock Market Crash
Monetary Crisis
Social Unrest
Super Hurricane
Earthquakes

by Geri Welzel Guidetti

USDA PLANT HARDINESS ZONE MAP



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"Make yourself an ark.....And of every living thing of all flesh, you shall bring two of every sort into the ark, to keep them alive with you.....Also take with you every sort of food that is eaten, and store it up; for it shall serve as food for you and for them."

God to Noah, Genesis

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Preface

I don't know about you, but I'm beginning to worry about the future -- a lot. No matter where you look or go, no matter what you watch or listen to, it seems that clouds loom on a horizon that should be brilliant with possibilities. The dawn of a new millennium should dazzle us with opportunities, make us giddy with the prospect and promise of getting it right this time -- of doing it better in the next thousand years -- of actually growing and evolving into a species deserving of the blessings of a rich planet.

Instead, every day forces us to confront the legacies of past and ongoing abuses of the Earth, abuses which now threaten our survival and the survival of life, itself, on the planet. The waters in the great aquifers that irrigate the grains that feed us are diminishing at alarming rates. Lands once thick with humus-rich, life-sustaining topsoils formed over millions of years, have been thinned and depleted in fifty years by the "miracle" of modern agriculture.

Clouds that bring the water necessary for life also bring acids that rain death on Appalachian, Canadian, European and other forests around the globe. Deadly weather extremes linked to our addiction to fossil fuels signal massive physical instabilities that threaten crops, wildlife and people. Oceans once teeming with unfathomable abundance now struggle to restore fish populations decimated by overfishing and human pollution.

As the world's population approaches six billion people in 1996, as the physical and biological systems of our planet stagger toward increasing instability, we stand on the brink of a global obsession with food. According to The World Watch Institute, if the human population were to maintain a growth rate of 1.6% a year, an additional 78,000 metric tons of grain would be needed *per day* just to maintain *current* grain consumption per person. But consumption is increasing.

As China and other emerging economic giants continue their explosive economic growth, newly-moneyed citizens have increased their consumption of both grain and meat animals, the latter fed by grain. For the third straight year in a row, the world's grain harvests have been below levels of consumption. As a result, the global grain supply is at an

all time low -- 49 days worth. That is a frighteningly small "cushion" in the event of widespread or global drought, floods, plant diseases, insect plagues, wars or other causes of crop failure.

The prospects for increasing global food production to meet the needs of a burgeoning world population are grim. In both developing and developed countries, including the United States, cropland continues to be converted to residential and industrial uses. At the same time farm land is being lost, current grain crops have reached their genetic potentials for yield. No longer responding to increasing additions of fertilizer, they cannot be counted on to fill the enormous food gap.

If current, intensive research efforts to create new, higher-yielding varieties are successful, the new varieties will require even greater amounts of fertilizer to support these yields on increasingly depleted soils. Developing countries with the highest birth rates, with the greatest proportion of citizens of reproductive age, will be the least able to afford expensive synthetic fertilizers.

In the U.S., where the population is expected to increase by more than 95 million people over the next forty years, we will be hard-pressed to feed our own citizens; it is highly unlikely that we will have an abundance to export -- exports that much of the world has come to depend on. While many will argue for keeping what we have to "feed our own", the complex interdependencies of international economies and the emergence of new global superpowers will dictate otherwise. The realities of the U.S. debt, much of it owed to countries who will need our food, will dictate otherwise.

U.S. exports of food will come from food stocks we actually *need*, dramatically driving up prices which echo the realities of ever-increasing demand for ever-decreasing supplies. At the very least , in the course of most of our lifetimes, food will become very expensive, further widening the gap between the rich and poor, further increasing the social stresses and pathologies rising out of chronic struggles for survival. Without change, the stage is set for national and global instability centered around food.

For those of us living in highly-developed, industrialized countries in the second half of the twentieth century, the possibility of actual food shortages, of widespread famine, seems implausible. We

have reaped the bounty of the Green Revolution, of agricultural achievements unmatched by those of any era in recorded human history. For many of us, the daily human struggle has shifted from finding enough food to eat to curtailing our gluttony. For most of us, and certainly for our children, the realities of food insecurity are going to hit us harder than we might imagine.

Most people in industrialized countries such as the United States live in or near large metropolitan areas to be close to their jobs. These city and suburban areas generally have little or no open agricultural land left; it has all been converted to residential or other non-farm uses. Nearly all of the food necessary to support the often millions of people inhabiting these areas is shipped over great distances by a complex infrastructure and energy-intensive transportation systems.

We have become entirely dependent on agricultural, processing and delivery systems to provide every component of fundamental human survival. Water pours, almost magically, out of every faucet we turn on, any toilet we flush, without a thought about how it gets there, about what would happen if, suddenly, it wasn't there. It just *is*.

Our bread comes in plastic bags from the bread aisle, our milk from the dairy case, our sugar from the baking supplies aisle, and our salsa and chips from the snacks section of our local supermarkets. Meats are lined up in immaculately kept, refrigerated cases and wrapped in pristine plastic films that keep them and our fingers clean. We complain when they run out of pre-formed burger patties. Chickens are cleanly plucked, perfectly dressed, and come in fryer, roaster or capon options.

Here we are, surrounded by every toy, whistle and bell that our technologically and industrially advanced societies can entice us to buy, every machine and technology to make our lives and jobs easier , yet we are completely dependent for our food and water on a virtual handful of people to whom we have happily relinquished control of all of the systems for production and delivery of the essentials of life. What's more, we have grown to expect that the systems will always *be* there, ready to meet our every need, our every want , when we want them. They won't always be there. In fact, we are very vulnerable.

As this book goes to press, the so-called Blizzard of 96 has just crippled the East Coast of the United States. The bread, milk and snack

aisles of all of the local grocery stores are empty. All of the other food aisles are decimated. There is no lettuce, little fresh produce of any kind. Deliveries of products from other areas of the country cannot make it into our cities, as ground travel is paralyzed. Fist fights have broken out in supermarkets on Day 3, post-blizzard -- fights for a just-arrived, minimal shipment of milk from a local dairy. A large retail food chain that serves New York and New Jersey has reportedly hired armed guards to control the results of flaring tempers and panic.

On Day 4, the roofs of four southern Pennsylvania and northern Maryland dairies have collapsed under the weight of additional snows. Many Holstein milking cows are dead. Milk will have to come from other states, they say. On days 8 and 9, there is still not much fresh produce. A sign hung above the long produce bins says, "Due to severe weather in both California and Florida, produce will be in short supply and expensive. We're sorry for any inconvenience." Two weeks post-blizzard: store stocks are still recovering. Produce is still in short supply. Prices are still very high. The sign is still hanging.

On Day 5, post-blizzard, when a county plow made its first pass over our street, I went to a very large supermarket that serves clients that come largely from middle class, upper-middle class and affluent communities. I stood with a shopping cart in aisle after aisle, watching and listening to folks' reactions to depleted stocks of their favorite "essentials". Below is a verbatim transcription of a few of the notes I made that day.

"No bread...I can't believe there's no bread." Complaining woman in her thirties.
"Well, Ma'am, we're sorry, but the delivery trucks can't get through. But we *do* have some flour left to *make* bread." Store Manager.
"Oh...is that how they make it....flour? But I don't *do* that." Woman, confused.

"I can live without everything else, but I can't live without my chips." Man with basket containing 25 - 30 large bags of potato chips. He removed every bag off the shelf into his cart as I watched.

"I came out for coffee....gotta have my coffee. (He held two 20 ounce cups of hot coffee from deli-department.) Have a microwave at home , so I can reheat it when I get there. Don't have a coffee machine...always buy cups of coffee....gotta have my coffee." Young man, early twenties.

"What do you *mean* you don't have dinner rolls? I don't want bread, I don't want milk...all I want is my dinner rolls. It's the only kind of bread I'll eat." Angry woman in her early fifties to the bakery department attendant. The latter just explained that the ingredients to make the dinner rolls had not been delivered since the blizzard hit four days ago.

"Dear, do you know if Coffee-Mate can be poured on fruit? I *have* to have cream on my fruit in the morning with my cereal." Elderly woman to check-out girl.

"No milk!! What am I supposed to tell my kids? They *live* on milk." Astonished man to Store Manager who is walking the floors to help upset customers.
"Well, Sir, we're sorry, but there are a few boxes of powdered milk left over here."
"They have *powdered* milk?? What do you do with *that*?"

"But you *have* to have Kellogg's Raisin Bran; it's on sale this week. Don't you honor your sales?" Angry woman to grocery clerk.

"I can't believe this! Look how they're pushing at each other. People are like animals!" Woman, shaking her head after being pushed out of the way while coming through an aisle jammed with people rifling through cans on half-empty shelves. Looks scared.

Other images of Americans faced with a sudden loss of food and water are still vivid after several years. Just hours after the Northridge Quake in Southern California a few years ago, a television reporter and cameraman for a national news network walked through one of hundreds of damaged residential communities looking for stories. While

feeding their impressions live to a national audience via satellite, they were summoned by the owner of a neat little suburban home that was now without power. With his two little children in tow, the man gestured toward his refrigerator. "Look, look!" he said angrily to the television camera and reporter. Opening the door to his large refrigerator he repeated, "Look, look!" Inside, the camera focused on the sole contents of the family's refrigerator -- three cans of Coke. "This is all we have, and they're warm 'cause of the power outage. We always go to the store for dinner, and now the stores are closed. What are we gonna do? Somebody has to help us. Tell the President!"

I found myself flooded with questions. Why on earth would the parents of two young children, people living in earthquake-prone Southern California, keep no food in their home? Is this a widespread problem? Do they really believe that their government will always be capable of responding instantaneously to a natural or manmade disaster, to make them comfortable, to feed their children their next meal, to *save them?*

What if the devastation was so enormous, as would be the case with the expected "Big One", that government and disaster relief agencies were too overwhelmed to respond effectively? We have already seen this happen when Hurricane Andrew leveled whole counties in Florida. I'll never forget the angry woman shouting at a television reporter, "Where's George Bush?? We're starving down here!"

What would happen if an earthquake hit the fertile San Jaquin Valley, fracturing the land and destroying the complex irrigation network responsible for producing the lion's share of the Nation's fresh vegetables and rice? Or if the roads to and from this area were cut off for weeks? For months? How would our government effectively respond to *two* natural disasters occurring simultaneously -- a super-hurricane on one coast and an earthquake on the other? Do you think the stores would reopen that night? In a few days? How do you think a society armed to the teeth with deadly weapons would respond to acute food and water shortages extending past a few days? Pondering such horrors could depress a person!

I can't help but feel that many people are beginning to sense their

vulnerability. There is a palpable uneasiness in those I talk to, read about, watch on television. They are concerned about their jobs, the economy, the environment, their medical insurance, violent crime, and the stress they feel as they try to juggle the demands of careers, kids and homes. There is a growing distrust of and disenchantment with the government and the representatives they elected to look after their best interests. There is a growing sense, too, that no matter who they elect, the problems are too complex, the deficit too large, and the process too corrupt to change the short-term outcome.

They feel less confident that there will be a safety net to catch them if they falter, to ensure them of a secure future. They sense that all is not right with the world, and they're worried. Their response? Many are cutting back on spending and are trying to sock money away in case things don't work out -- in case they will have to be more self-reliant.

While most would translate the word *self-reliance* as something like *having a good enough job and enough money to pay for all of the things you need to live,* I think many are aware that all the money in the world cannot buy you food ,water, clothing or shelter when none is available to buy. The natural disasters of the past several years brought that lesson home for a lot of frightened people.

Self-reliance is about more than making money, though that certainly helps in times of plenty. Self-reliance means that you can provide for all of your needs and those of your family , relying solely on your own abilities and resources. In the case of food, it means being able to produce, gather and safely store it should you not be able to rely on paying others to do it for you. I believe that a time is coming when we may not be able to rely on others to do it for us, whether we have money or not. I believe we had better learn to do it ourselves and, most important, to teach our children how to do it, to improve our chances for survival as individuals, families, communities and as a species.

Writing this book posed many dilemmas for which there were no easy solutions. How do you present, in one book, enough information....

- on the need for learning the skills and technologies of food self-reliance when whole volumes can be written on these topics, alone?
- on self-sustaining, organic gardening techniques that will allow

truly self-reliant food raising over the long haul, if necessary?

- on the need to grow open-pollinated, non-hybrid plant varieties to ensure that seed can be saved from one year to the next, an essential ingredient for food self-reliance, and the names and sources of these threatened varieties?
- on the garden pests and diseases one is likely to encounter in food-raising efforts and how to handle them?
- on the culture and harvest of all of the most popular and nutritious garden vegetables?
- on the cultivation of some popular grains should it be necessary or desirable to grow them?
- on human nutrition that families could make knowledgable decisions on what and how much to grow to provide for all of their needs and maintain excellent health should they find themselves on their own?

There were no easy solutions to these challenges. No single book could handle each topic *completely*. There are hundreds of books written on organic gardening and nutrition, alone. What I have done is to provide as much detail and depth as you will likely need to do a good job of growing a food garden that will provide for all of your nutritional needs in a setting requiring complete self-reliance, if necessary.

You will find sections on soil-building, composting, pH, mulching and more. You can decide on the types of rows or beds you will dig and choose from hundreds of varieties of open-pollinated vegetables, fruits and grains. You can calculate how much you need to grow to meet your family's needs, and check to see if you've covered all of the vitamins, minerals and fiber necessary for good health. You can consult the illustrations of most of the bothersome insect pests you are likely to encounter and choose from among the natural solutions to these problems.

You will find a listing of every retail seed house in the United States and Canada that offers open-pollinated seed varieties. You can send for their informative catalogs, many of them free, now.

One thing you might want to keep in mind before you begin: the best of garden plans usually begin on paper. There is something very special about plotting and planning a summer garden in the dead of February; it is an act of faith that the bitter winds and snows of winter will, indeed, pass and that the human species will once again have an opportunity to try to raise enough food to see it through the *next* winter.

One need only observe the ants, squirrels, gophers and beavers in the fall, frenetically gathering up their stores of food in preparation for what they know is coming. It is the natural order of things on this planet -- the way it was meant to be. "Make hay while the sun shines," wrote Laura Ingalls Wilder. She should also have written, "Make plans when the snows come."

Garden plans committed to paper will make better use of small garden spaces and better organize big ones. Read ahead for hints on growing two or even three crops in the same space in the same garden season. Drawing up detailed plans nearly always result in higher yields and the identification of potential problems *before* a single seed hits the ground. What's more, planning a garden is lots of fun!

My best wishes for an enjoyable, rewarding and productive self-reliance food garden, and my prayers for a safe and secure future.....

Geri Welzel Guidetti

PRAYING MANTID

Some of the developmental stages of a common mantid: *a*, egg mass attached to stem; *b*, newly hatched nymphs; *c*, large nymph; *d*, adult female feeding on grasshopper. (All stages about natural size.)

From the Ground Up

The most important components, beyond climate, of any self-sufficiency gardening program are the soil or ground in which you will grow your garden and the plant and animal populations that you encourage to or discourage from living there. To be effectively self-reliant, whether by choice or necessity, your goal should be a healthy, well-balanced garden environment which is self-sustaining, that is, does not require the purchase of commercial soil amendments, pesticides, herbicides or beneficial insects. That may seem an impossible goal in a culture programmed to *buy* solutions to all of our problems, but it is not impossible if you will work intimately *with* Nature, using what is commonly known as organic gardening techniques, to build a healthy, non-toxic garden environment.

In most areas of the world, this will not be an instant achievement but a gradual evolution. To be certain, the earth's ecosystems are out of balance, largely due to the impact of human activities on the planet. Where, for example, bird populations once effectively controlled extensive crop damage by insects, pesticides are used in their place. Globally, bird populations are diminishing. The urbanization and suburbanization of the United States and other developed countries, as well as the deforestation of Second and Third World countries, are literally squeezing and starving out those which remain. We need to bring back the birds and encourage them to live in and near our gardens. On a local scale, this is not only possible to do but easy as well. Within two to three years of managing a garden organically, it will be filled with beautiful bird species that effectively hunt insect pests that would otherwise destroy your crops or cut your yields.

Widespread use of chemical pesticides by traditional agriculture over the last 45 - 50 years has resulted in more than blemish-free fruits and vegetables. Increasing genetic resistance to pesticides by the targeted insects, and the coincidental killing of these insect's natural predators, has created the need for ever greater applications of ever more powerful chemicals to control them. This "solution" has had negative impacts on the health of all living organisms, from the "lowly" earthworms that

perforate, aerate, fertilize and "till" the soil to the humans who work in the fields and eat its harvest. In an organic garden, the earthworms and beneficial insects flourish, *positively* impacting soil health as well as the health and well being of the birds and humans that it feeds.

Another unfortunate impact of expanding pesticide use by commercial farmers, lawn care companies and residential homeowners has been the dramatically diminishing populations of wild and commercially managed honeybees. As people around the world switch to more powerful, broad spectrum pesticides, honeybee populations have been decimated. Compounding the problem, expanding urbanization and residential development have led to concerted efforts to destroy wild bee colonies near or in residential areas. This is certainly understandable given occasional bee stings and allergic reactions. Yet, a balance must be achieved. Bees are key players in pollinization, that process that brings the male pollen cells to the female flower parts, resulting in the formation of fruits and vegetables. For many food crops, no bees means no food.

In 1995, and in several prior years, there was an acute shortage of bees in many states. Hives had to be imported, in some cases over thousands of miles, to try to save crops. In fact, the bee shortage greatly impacted expected harvests of the California nut industry in 1995, and its impact is now being reflected in the soaring prices of nuts. In other states, tree fruits were similarly affected. Given the natural, northward spread of the Africanized or so-called killer bees, in the United States, temporarily importing hives from Texas and Arizona where they have been found may no longer be advisable.

New Realizations

Building a self-sustaining garden environment that can support the goal of food self-sufficiency may require some adjustments in thinking. Insects, for example , can pose challenges for the "spray first, ask questions later" crowd. You may have to cultivate an attitude of "wait and see" to determine what the insects are, what they are *doing* in your garden, how many are there and what damage or benefit they might be

responsible for. Before long, you will begin to recognize and respect the web of dependencies and interactions that exists between them, other animals, the plants and physical elements of your garden. This realization reinforces the importance of your role in maintaining the *balance* of this system.

Another realization is that you rarely, if ever, see a year in which every single vegetable and fruit variety you plant produces optimally. After tending food gardens and mini-farms for over 25 years, I have respectfully begun to label each year by the vegetable or fruit which performed with remarkable abundance. For example, 1993 was "The Year of the Carrot". A raised bed of Royal Chantenay carrots which, by the way, I plant the same way year in and year out, yielded tender monsters averaging a full four or more inches in *diameter* at their tops! Each slice nearly filled a saucer. Dinner guests nearly fell off their chairs when they saw a platter full of these disks and then begged to see the whole carrots from which they came.

That same year brought only a mediocre tomato crop, good spinach, excellent broccoli, terrible potatoes and fair lettuce. This summer, by contrast, was "The Year of the Tomato" -- 74 quarts of tomato sauce canned or frozen, a hundred pounds or more of fresh tomatoes eaten in salads and another hundred pounds or so given away -- you get the idea. It was also a year of outstanding lettuces of over one hundred varieties, dynamite blackberries, lousy potatoes and carrots, great peppers, poor spinach. Bottom line -- you might count on it being a good to excellent year for at least half of your garden, mediocre for another quarter and disappointing for the last quarter. It is the natural way of things in a system where you are working with natural cycles -- rainfall, temperature, storms, insects, diseases -- doing the best you can to intelligently assess situations as they arise and to make the very best use of the time and conditions you are given.

Compare this reality to what you see in the supermarket. You would never know from the produce counters that there was a tomato crop failure in California, a spinach crop failure in Canada and one involving corn in Nebraska. An enormous, fuel and transport dependent food industry allows us to import tomatoes, spinach and corn from other areas, even from foreign countries, to ensure an uninterrupted supply of our favorite

fruits and vegetables regardless of season or misshap. We hardly notice the "bump". If you are faced with the need or have the desire to be food self-sufficient, you *will* notice the bumps, and you will learn to store the bounty in boom years to compensate for those seasons not equally blessed.

A last change in thinking that you may undergo is the expectation that all of your vegetables and fruits will be as uniform and as perfect in appearance as the supermarket varieties. In many cases, yours will be far superior in appearance and flavor. What's more, they will be free of harmful chemicals. But others may bear the bite of a grasshopper or a hole drilled by a caterpiller before the birds could get him. A cantaloupe may have been hollowed out by a sneaky gopher working well into the night, and the tops of some of your carrots may have been nibbled on by field mice in the fall. Again, this is the natural order of things. Grow enough for yourself and a bit extra to feed the creatures that share the earth with you.

As you break ground for your first self-sufficiency garden or expand the hobby garden you currently tend, you will encounter both the strong and weak points of your land as it exists now. Unless you were fortunate enough to buy or otherwise begin with a piece of horticultural paradise, you will likely want to improve something that isn't perfect for the many crops you will be raising. Though you are shooting for a self-sustaining garden as soon as possible, you might have to buy some lime (see section on pH) this year and next, or some compost to increase the humus and hold water until you make your own compost. You may need to work to get the nitrogen or phosphorus levels up. You might even choose to haul in some good, clean topsoil to cut a few years off the process, and build some deep, rich beds right over a sadly-lacking subsoil left by the building contractor. But sooner than you think, your garden will begin to maintain its own balance under your watchful eye.

On the following pages you will find a concise listing of the basic plant nutrients that must be provided by the soil as well as information on soil pH. Tests and amendments that will address deficiencies are also found here. Though whole books exist just on the topics of compost, raised bed gardening and other important gardening skills, the basics will be covered here and references given for further reading. All in all, I hope they

will give you a very good foundation that will launch you toward a more self-reliant and secure future.

Basic Plant Nutrients

•**Nitrogen (N) :** Needed for healthy, green, leaf and stem growth. If fed to excess, fruiting or flowering plants may develop lush green or leggy green growth with no flowers or fruit, that is, the plants stress vegetative instead of reproductive growth. Soils deficient in nitrogen often produce stunted and yellow-green growth. Spinach plants and other leafy, nitrogen lovers, do poorly in nitrogen deficient soils.

Organic Fertilizer Sources with Percent Nitrogen Present:

Blood Meal	7 - 15%
Cotton Seed Meal	6 - 9 % (for acid-lovers)
Composted Manure*	0.5%
Composted Leaves	0.5 - 1.5%
Bone Meal	5%

•**Phosphorus (P) :** Stimulates root growth, aids seed formation, hastens maturity. Root crops, like carrots and beets, use lots of phosphorus.

Organic Fertilizer Sources with Percent Phosphorus Present:

Bone Meal	25 - 35%
Composted Manure*	0.3%
Composted Leaves	0.1 - 0.4%

•**Potassium (K) :** Strengthens stem and leaf growth; contributes to root, flower, fruit and seed development. Especially needed by beets, onions and potatoes.

Organic Fertilizer Sources of Potasssium with Percent Potassium:

Wood Ashes	5 - 11%
Granite Dust	7 - 8 %
Composted Manure*	0.5%
Composted Leaves	0.1 - 0. 8%

* Never apply raw, uncomposted manure to plants. Turn fresh manure into garden in fall to winter over or compost first.

Fertilizers that are sold commercially list a standard ratio of the nitrogen, phosphorus and potassium (potash) percentages on the front of the bag. Known as the NPK ratio, it tells you the relative amounts of each of these plant nutrients at a glance. Keep in mind that more is not necessarily better and may even be counterproductive for some of these nutrients. See, for example, the note on nitrogen on the previous page.

Also keep in mind that "quick fix", non-organic, commercial fertilizers that carry high NPK ratios will give plants a quick boost but will do nothing to build humus for water and nutrient retention or to provide food for soil microbes and earthworms. Soils nourished with synthetic fertilizers eventually lose their rich diversity of microbial life, their ability to retain water and their earthworms. They become pale, thin, less permeable to plant roots and progressively less suitable for growing food. In America's Great Plains states, old farm records indicate that rich, black or brown topsoil was up to 12 feet deep! Today, as a result of the chemical-based Green Revolution, topsoil has been reduced to 6 - 8 inches in vast areas. It took millions of years to build and a mere 50 to exhaust and destroy. Chemically maintained soils will never be self-sustaining.

Truly natural, organic fertilizers are slow-release and long-lasting, unlike the instantly soluble synthetics. After the plants have taken up what they can of a synthetic fertilizer, a soil deficient in water-retaining organic matter permits the excess to percolate right through to the water table below. This is the source of all of the high nitrate contamination of wells in America's heartland. Nitrates have significant health risks, especially for babies.

Mulches

Mulches are materials of all sorts that you can use to completely cover the soil surrounding your plants or even the paths on which you walk. Why would you want to do this? Mulches have many advantages that you should consider.

Mulches...

- Retain moisture in the soil, minimizing the need to

water. Essential in droughts or droughty areas.

•Moderate soil temperature, protecting plant roots from extreme heat or cold

•"Smother" weed seeds and young weed plants, minimizing or eliminating the need to weed

•Add slowly released fertilizer through their natural decompostion, reducing the need to fertilize

•Prevent the emergence of some insect pests such as the Colorado Potato Beetle

•Nurture and protect earthworms

•Provide a soil-free cushion for low-hanging vegetables, minimizing or preventing rotting

•Prevent splashing of soil on vegetables during heavy rainfalls

•Greatly improves soil tilth and increases humus content

A few possible drawbacks of mulches:

•In slug- or snail-prone gardening areas, mulches protect and nurture them, increasing the likelihood of damage to vulnerable crops

•If placed too close to stems of plants can encourage the natural rotting of the stem after heavy rain periods and very high humidity. Keep an inch or two away from stems if mulch is often wet.

•If placed on soil too early in season, can prevent soil from warming up. Wait until soil is warm.

•Mulches can be excellent havens for plant-munching mice, gophers and voles. If plants begin disappearing

or are damaged, sneak a peek under the mulch. You might want to pull it back until critters move on.

•As mulches decompose, they are often acidic. No problem...if you have acidic soil, or if you want to grow vegetables that like alkaline conditions, apply lime under the mulch or use compost, instead, as soon as you can make enough of it.

•In a droughty year, a light rainfall may not penetrate the full *thick* mulch. Pull it back temporarily. In a wet year, the same effect will work in your favor -- preventing more water from reaching the soil.

What's the bottom line? Mulch as much as you can. Your garden will become self-sustaining much more quickly and you will work a lot less hard over the long run. In areas with ample rainfall, you may not even have to water all summer long. This can be critical on properties dependent on domestic wells for all of their water needs.

Organic Mulching Materials

•Compost	•Wood Chips*
•Wheat Straw	•Oat Straw
•Grass Clippings	•Composted Sawdust*
•Chopped Leaves	•Newspaper (no color)

* If wood chips are used, their natural decomposition over a long period of time can cause temporary nitrogen deficiencies in the soil. Add blood meal, composted chicken manure or other nitrogen-rich fertilizer if you choose this mulching option. Sawdust will create the same problem if not composted well before mulching. Important!!! Do not use sawdust from pressure treated decking wood. It contains poisons such as arsenic!

Be sure that you don't use hay -- it contains seeds -- instead of straw. You could end up with a garden full of alfalfa, timothy, clover or other cow and horse goodies instead of human veggies. You'll only make *that* mistake once!

Raised Beds or Rows? Decisions, decisions.

Most of the pictures we see of commercial farms show row upon perfectly-spaced row of corn, beans, peppers, etc. grown in monoculture, that is, in single crop varieties. Nearly all of these farms are tended by men in their machines, applying herbicides to eliminate weeds, plant seeds, and spray synthetic fertilizers and pesticides. Enormous, mechanical overhead sprinklers or flood irrigation ditches provide water that quickly percolates through humus-poor soils which require still more irrigation. At harvest time, other machines may roll through the same rows, mechanically harvesting vegetables or grain. It is this chemical-, water- and energy-intensive technology which has supported the massive and impressive harvests that have fed not only the United States but much of the world as well. We now know that the present technology will not be able to sustain current and future levels of productivity to feed the growing global demand for food.

The design of such planting and harvesting schemes is based on the need to plant, spray and harvest mechanically. Planting in rows is generally not the best use of garden space. All of the space devoted to footpaths is taken out of production. Paths between rows must be wide enough to accomodate walking and kneeling and to leave enough untrampled soil around plant roots to prevent compaction. Paths this wide "eat up" a good portion of a garden's square footage. If you have a finite amount of space in which to grow your food, you will definitely want to consider planting in raised beds.

Though somewhat more labor-intensive in their initial preparation, they make a far better use of space, producing much more food per square foot. Well-prepared, intensively-planted,

raised beds produce fewer weeds due to the shading of other plants as well as the relative ease of applying and maintaining mulches. When dug or built to be deep, especially if made by the "double-digging" technique made famous by John Jeavons (see below), plants may be grown much closer together than the traditional spacing given on seed packets. This is because plant roots are free to penetrate much more deeply into the soil to retrieve nutrients than are those planted in thinner-soiled, flat rows. There is less lateral competition for limited surface nutrients as a result.

Other benefits of raised beds include their better use of limited supplies of water or soil amendments like compost, lime or fertilizers. In very rainy, fungus-prone climates, raised beds dry out faster, lessening the probability of roots sitting in water-logged soil and rotting. In the spring, beds warm up much faster than flat rows, and plantings can usually be made a couple of weeks earlier. Raised beds built to dimensions which allow easy access to all plants within them are easy to tend. One could literally sit on the edge or corner of a bed and reach in to harvest, weed or otherwise tend crops.

Since we do not walk on raised beds, compaction of soil is almost non-existent. Plant roots and earthworms penetrate soil depths easily. Organic matter keeps the soil lofty, providing microscopic root hairs with the tiny pockets of air essential to plant growth. And again, because we don't walk on them, well established raised beds don't need tilling, another big step toward a self-sustaining garden. Deep tilling does kill earthworms and destroys their habitat. It takes some time for them to recover, so the less tilling you need to do the better.

Building Raised Beds

There are many ways to build raised beds though the principles underlying them are about the same. You mark off the dimensions of your beds, allowing about three to four feet between them to allow for kneeling, standing or sitting to tend the bed. Stakes strung with taut string works well for this. Add lots of good compost or other organic soil improvements (see

previous section) to the existing soil within the marked boundaries and then turn all of it in, digging as deeply as possible. Always work with your face to the row you have just dug, backing up and digging a row at a time so you never need to step on the loose soil you have already turned.

If your soil test results indicated your native soil is so poor or deficient that it will take years to turn around, consider buying a truckload of good topsoil and build beds directly on top of the poor soil. Once again, dig as deeply as possible and turn to create as deep and loose a bed as you can.

A third, superior but very labor intensive, method is the double-digging method.Working one row at a time, remove all of the topsoil a full shovel deep and one foot wide. For the first row, pile the removed soil just outside of the marked bed boundary. With a heavy spading fork, dig into and loosen the subsoil across the row to a full fork's depth, twisting the fork's tines as you go, to break the subsoil into clumps. Step back one row. Shovel the topsoil of the second row over the lossened subsoil of the first. Loosen the subsoil of row 2 with your fork as before. Step back and shovel topsoil of row 3 over subsoil of row 2, etc. When you reach the last row within the boundaries of your bed, loosen its subsoil and cover with the topsoil you reserved in a pile from row 1. If you are fortunate enough to have a large supply of compost already made, you can add that to each row as you are returning its topsoil. Likewise, if your soil test demonstrated the need for a pH amendment for the plants you want to grow there, this is the time to add it. Then stand back and watch those plants explode!

Compost

If there is one word you get to read over and over again throughout all of the organic gardening literature published since the 1920s, it is *compost*. You would think that it was a miraculous cure for anything that might ail a garden and the secret ingredient of great gardens. Well, it *is* most of both of these things and more as well.

But what, exactly, *is* this stuff? Compost is the natural product of decomposition of all living things on the planet. The leaves that fall to the forest floor are broken down by fungi and

bacteria into rich, black humus-rich compost. Dead squirrels, deer, rabbits and all of the excrement of their lifetimes become compost. Infinite trillions of mice, rats, honeybees, ants, even mosquitoes, eventually end up as compost. It is the natural order of things. The death and decomposition of all that was previously living goes on to give life to those to come and to nourish who still live.

For over 2000 years of recorded history, men and women recognized this natural cycle and intervened to feed organic material back to the soils where they hunted, gathered and farmed. Until the 1900s, that is. As the earth's population exploded and we searched for bigger, faster yields of food to feed more people living in less space, as the growth of agriculture as an industry evolved, we substituted chemicals for compost. As a result, America's soils are becoming dangerously low in organic matter, a fact that is now being acknowledged by U.S. and global agricultural agencies.

Below are some of the benefits compost provides to soils:

- Naturally buffers soil pH extremes, eventually eliminating the need for pH-adjusting amendments
- Improves soil porosity, allowing oxygen to diffuse into soil and creating air pockets for microscopic root hairs
- Provides food for earthworms and beneficial soil microbes
- Restores broad spectrum of soil microorganisms
- Slowly releases nutrients essential to plant growth
- Increases soil's water retention; very important in droughty seasons
- Decreases landfill pollution, solving organic solid waste problem
- Contains humic acid and other root and plant growth stimulants

- Makes self-sustaining garden soils possible
- Makes an outstanding garden mulch
- Results in healthier, more pest-resistant plants
- Is free and easily produced on-site
- Provides home-based, self-sufficient waste recycling

Compost Piles, Bins and Barrels

Organic materials to be composted can be thrown into a pile in or near the garden, enclosed in three-sided plastic, cinderblock , wood or wire bins, tossed into trash cans punctured with holes, or spun in rotating barrel composters. There have been at least hundreds of composting methods developed by industrious gardeners and farmers over the ages. Despite the differences in technique and enclosures, they all produce compost. To find which best suits your preferences, read a book on composting. Some of them even have plans for home-built bins. The best I've found is The Rodale Book of Composting, by Rodale Press, edited by D.L. Martin and G. Gershuny. It is in most libraries and now available in paperback. It's a goldmine of information -- from the carbon/nitrogen ratios of compostable materials to building plans and much, much more -- on an important topic.

Composting Fundamentals

- Generally, the smaller the pieces of beginning materials, the faster the finished compost, e.g. shredded leaves versus whole, sawdust versus wood chips
- Piles should be turned for aeration to encourage aerobic decomposition by bacteria and fungi
- Low nitrogen components like straw should be balanced

with some higher nitrogen components like hair, manures or fresh grass clippings.

Compostable Organic Materials Listed in Order of Nitrogen Content -- from High to Low

- Feathers
- Dried Blood
- Hair
- Leather Dust
- Dried, Ground Crabs
- Cottonseed Meal
- Dried Jellyfish
- Sardines
- Bonemeal
- Fresh Pigeon Manure
- Cowpea Hay
- Alfalfa Hay
- Rabbit Manure
- Coffee Grounds
- Fresh grass clippings
- Clover
- Chicken Manure (fresh)
- Clover
- Raspberry Leaves
- Corn Stalks and leaves
- Apple Tree Leaves
- Oak Leaves
- Cherry Tree Leaves
- Crabgrass
- Milk
- Horse Manure (fresh)
- Cow Manure (fresh)

Green Manures

One of the initial challenges you may face when growing your first large food garden is finding the materials for and making enough compost to feed all of the plants you grow. If you live in the suburbs or are gardening on a community food garden plot in the middle of the city, you may not have access to manure or enough compostables to do the job. There is an excellent solution called green manure.

Green manure is nothing more than a crop you grow specifically to till or turn into the soil -- like manure -- where you will be growing your next food crops. Popular green manures are the high nitrogen legumes such as crimson clover, alfalfa, white sweet clover, red and ladino clovers. Even edible beans like soybeans can be grown as green manures. Plants that aren't legumes but which can also be grown as green manures are annual (*not perennial*) ryegrass, buckwheat and oats. All of these green cover crops add rich organic humus to soil when they decompose, encourage earthworms, provide protection of the soil from winter erosion if planted in fall and discourage weed growth. The legumes also add significant levels of nitrogen to soils.

If you already have a garden area or know where you will be growing a garden next year, plant a green manure cover crop in late summer, let it die back in winter and turn in in early spring. Allow it to decompose for a couple of weeks in warm soil before planting your food crops. A quick green manure crop like annual ryegrass or buckwheat can be planted in early spring and turned under before planting summer heat-lovers like eggplants and peppers. Buckwheat will grow in infertile soils and so densely that weeds are choked out, providing a quick step toward soil enrichment.

Seeds for green manures are available from most seed companies. Johnny's Selected Seeds, Pinetree Garden Seeds and Stokes Seeds are just a few. All of these are listed in the Seed Source index in this book. Note that some companies list their green manure seeds under cover crops or ground covers. Be careful, though -- seed houses that specialize in flowers will often list ornamental flowers or other leafy ornamentalsunder this category. You're looking for agricultural ground covers.

Soil pH

A measure of a soil's acidity or alkalinity is called its pH. Technically speaking, it indicates the concentration of hydrogen ions in the soil, and this concentration affects the availability of nutrients to a plant's roots. This is important to gardeners, especially to those who live in areas where soil pH is significantly too high or low to grow many food crops successfully without a pH adjustment.

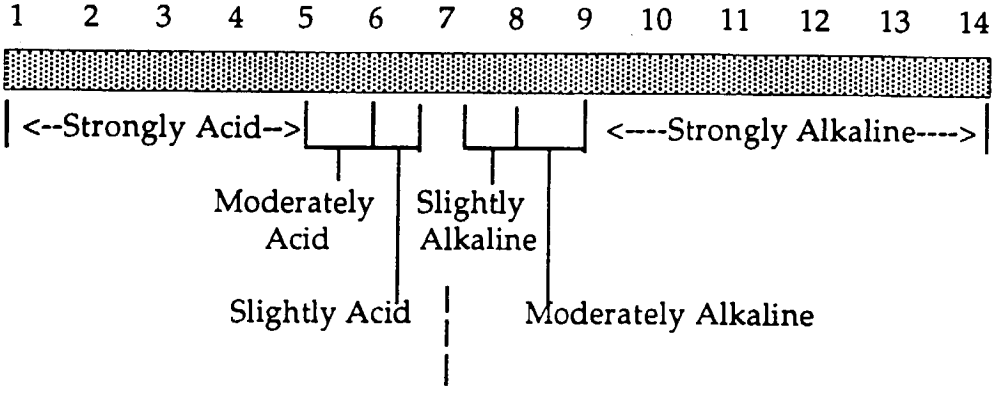
If you live in an area that receives high annual rainfall, like the Eastern United States and Canada as well as the Pacific Northwest and northwestern Canada, chances are you have slightly to moderately acid soil. This is due to the leaching of the more alkaline calcium and magnesium salts out of the soil with so much rain. If you live in an area of very low rainfall, a semi-arid area prone to droughty summers, for instance, you probably have a fairly alkaline soil. Areas which receive light to moderate rainfall and are naturally covered with prairie grasses such as the central plains of both the United States and Canada, generally fall in the neutral pH range.

To be certain of your soil's pH, a simple soil test kit can be purchased at any nursery supply store, through garden catalogs or through your local farmer's co-op. Most kits will also test for nitrogen, phosphorus and potassium, important plant nutrients. Another option is to bring a soil sample into your regional Cooperative Extension agent's office for testing. In fact, in many states in the U.S., these agents will allow you to mail in a sample and provide complete directions on how to sample your soil and pack it for testing. The fee is generally nominal, usually around $5 to $10.

Of course, there are private laboratories which will run extensive soil tests for you, but these are usually more expensive. If you have soil that is only marginally productive, or if you are buying land on which you hope to raise most of your food, it could be a good investment. Just be certain that the lab you choose has extensive soil and agricultural testing experience and can advise you of soil amendments and quantities needed to correct any deficiencies they may find. Having the analysis data is useless unless you know what to do with it. I would suggest you start with your County Extension Agent and go from there. Not only do they know the soils in your area, but their testing recommendations are usually excellent.

The pH numbers you will see in your home test kit or professional test results are based on a very simple pH scale measured

from 1 - 14, with a reading of 1 being the most acidic and a 14 the most alkaline. A 7, lying half-way between these two, is neutral.



pH 7.0 - Neutral

Within the next few pages is a list of most garden vegetables and fruits and their preferences for pH range. In planning your food garden, it is wise to group plants which thrive within the same pH range together in the same bed or row to make soil preparation and any pH adjustment, if any is needed, easier.

To adjust a soil which is too acid for the plants you want to grow, you need to add an alkaline amendment. The three common materials are wood ashes, calcitic limestone or dolomitic limestone. The latter two are often simply referred to as lime and the process of adding them, liming or sweetening the soil. Yet, each of the three have distinct advantages and disadvantages.

Wood ash from a wood burning stove or fireplace is a powerful and fast-acting alkalizing agent, but can be too alkaline when a small adjustment is all that's needed. Ashes will raise the pH of an acid soil so quickly and effectively that it is possible to overshoot your pH target and create an imbalanced soil chemistry. It is generally recommended that wood ashes be applied at no more that 25 lbs. per 1000 square foot of garden. If the adjustment you are trying to achieve is small, add it at half that rate at first, turn it in, test the soil and add more only if necessary.

Two of the advantages of using wood ashes are first, that it is free of cost if you burn wood or can get ashes from someone who does. In a situation where self-sufficiency is a must, they are an excellent

resource. Second, wood ash, unlike limestone, contains potassium, phosphorus and many of the trace elements present in the wood from which they came. These elements are good for the soil and your vegetables. But the high level of calcium carbonate, the same alkaline compound in calcitic and dolomitic limestone, is instantly soluble in the soil and will raise the pH immediately and possibly too much. Apply sparingly and, to be safe, not two years in a row in the same beds. Check the pH of the soil before applying it to see if it is really needed.

Ground calcitic limestone is composed of calcium carbonate and is a slow-release compound. Highly acid soils (low pH) should have between 7-9 lbs./100 square ft. of lime applied in the fall to raise the garden's pH for next spring. Mildly acidic soils, on the other hand, would require about 5 lbs. for the same 100 square feet. Check package directions before applying. A disadvantage of this amendment is that it must be purchased and, therefore, would not contribute to your complete self-sufficiency. You might choose to use limestone when it is available and you can afford it, and switch to wood ashes in leaner, more self-reliant years. It's nice to know that there is an option.

Ground dolomitic limestone is similar to calcitic in that it is slow-release and, therefore, requires less caution than ashes. It does, however, contain magnesium as well as calcium. It would make most sense to use in soils that were deficient in magnesium as well as acidic. Soils with already high levels of magnesium would not benefit from more. If you don't know that your soil *is* magnesium deficient, buy calcitic ground limestone.

Also keep in mind that a well maintained, organically nurtured soil with lots of mulch and compost added year after year will tend to promote a more balanced, regular pH no matter where you live. All of those composted leaves, straw, vegetable and fruit wastes you return to the soil replenish the calcium and magnesium heavy rainfalls tend to deplete over time.

If your soil is too alkaline, the solution is to add acidic amendments along with the normal compost, mulches and green manures. Gypsum, which is a source of calcium sulphate, aluminum sulphate or powdered, elemental sulphur are all acidic amendments. There are no set rules for amounts to add -- it all depends on how alkaline your soil is and how acidic the amendment is. Again, check with the lab who tested your soil or the literature that came with your test kit, and the directions for application on the bag of amendment. Peat moss is an option that adds organic matter as well as acid, but is

very expensive and, therefore, not a practical choice for the large, self-sufficiency garden.

Optimal pH Ranges for Common Vegetables and Small Fruits

Moderately Acid Soil (pH 4.0 - 6.0)

Blueberries
Blackberries
Cranberries
Raspberries
Rhubarb
Sweet Potatoes
Watermelons

Slightly Acid Soil (pH 6.0 - 7.0)

Beans
Collards
Corn
Eggplant
Endive
Grape
Kale
Pea
Pepper
Pumpkin
Soybean
Strawberries
Squash
Tomato

Neutral to Alkaline Soil (pH 7.0 - 7.5)

Asparagus
Beet
Broccoli
Brussels Sprouts
Cabbage
Cantaloupe
Carrot
Cauliflower
Celery
Cucumber
Lettuce
Onion
Spinach
Sunflower

Approved Organic Pesticides & Fungicides

Below is a handful of very effective pesticides and fungicides that are approved for use by nearly all organic produce certification programs. Many of them are derived from natural plants. Some can be grown or made at home with common household ingredients or garden plants, a feature that is especially important to self-sustaining gardens and self-reliance. Others can be purchased at most good garden stores and nurseries.

Public interest in safer, non-toxic , non-synthetic and non-polluting pesticides and fungicides has resulted in more offerings of these products than have ever been available. If you can't find these products where you live, there are several excellent companies that now offer complete, highly educational catalogs of products dedicated to sustainable and organic agriculture and gardening. Two of these are:
Peaceful Valley Farm Supply, PO Box 2209, Grass Valley,CA 95945;Phone: (916) 272-4769 and Gardens Alive!, 5100 Schenley Place, Lawrenceburg, IN 47025; Phone: (812) 537-8650.

An excellent reference book on this topic is *The Organic Gardener's Handbook of Natural Insect and Disease Control,* Edited by Barbara Ellis and Fern Marshall Bradley, published by Rodale Press, Book Reader's Service, 33 East Minor Street, Emmaus, PA 18098.

Soap, Insecticidal: For many years before the advent of modern agricultural chemistry, home gardeners used soapy water to kill insects on plants. It is still highly effective against aphids, earwigs, scales, thrips, whiteflies, mealybugs and more. Buy the concentrate and follow package directions or make your own solutions starting with one teaspoon/gallon of water and upping the concentration as high as one tablespoon per gallon if bugs don't die within 15 minutes of application. Test on a few plant leaves and let stand overnight to be sure the plant isn't sensitive. Caution: Use Ivory Liquid *soap, not detergent* or soak chunks of Ivory or Fels Naptha soap in warm water to get your solution. Dilute and test for activity against target insect pests. Especially effective against young

aphids. Soap can be combined with many other insecticides to increase their effectiveness.

Sulphur: As a dust or spray, sulphur has both insecticidal and anti-fungal activities. It will kill aphids, red spider mites, russet mites, thrips and leafhoppers. It is also effective against powdery mildew, brown rot and scab on fruits and vegetables. See container or catalog for application details.

Rotenone: A naturally-occurring resin in many species of plants, rotenone is highly poisonous to insects with chewing mouthparts such as the harlequin bug, cucumber beetle, squash bug, scales, mites, flea beetles, Japanese beetle, spittlebug and more. It is less effective against sucking insects like aphids or young caterpillars. Because it is a stomach poison that must be ingested by the insects to work, it does not kill most beneficial insects. It is, however, toxic to birds and fish, so should not be used where run-off will carry it to a local pond in such quantity that it contaminates large areas of the garden where birds feed. There are less toxic options, below.

Pyrethrin: Unlike rotenone, pyrethrin is effective against both chewing and sucking insectsand can be combined with both rotenone and soap to get an even greater response. Because it is a nerve toxin, it can kill some beneficials such as lady beetles, so use only when necessary to control a particularly bad outbreak of aphids, bean beetles, stink bugs, potato beetles, celery leaf tiers, cabbage loopers, mealy bugs red spider mites, whiteflies, thrips and more.

Here is another, effective insecticide that you can grow and make at home. The active compounds, called pyrethrins, are contained in daisy-like flowers called pyrethrum daisies. You can get the seeds from Park Seeds, listed in the Seed Company reference in this book. You want the perrennials called *Tanacetum coccineum* or *Tanacetum cinerariifolium.* In some catalogs, Tanacetum is listed under the older Chrysanthemum species name, so would be C. coccineum and C. cinerariifolium.

Daisy heads are picked, dried and ground up for powder or dust, or fresh flowers can be soaked in 70 percent isopropyl rubbing alcohol overnight to make a liquid extract containing pyrethrins. One gallon of water added to 1/4 cup of alcohol extract made from 2 cups of flowers will give you a good spray solution. One caution: Keep flowers and extract away from children and pets who might eat them. They can be toxic to mammals. And don't use the family blender to grind them. Use a mortar and pestle or even a simple stone as a grinder of dried flowers placed on a larger, flatter stone.

Neem: Neem is an extract of the seed of the Neem Tree from India. It is remarkable in that it has many modes of action depending on the insect. For some it affects their stomachs, stopping feeding. For others, like cucumber beetles, it is a powerful repellant. In still others, it works prevents the molting that leads to maturation of the insect, thus preventing egg laying for future generations. Use it for aphids, tomato hornworms, cabbage loopers, whiteflies, webworms, thrips, corn earwoms, flea beetles, potato beetles, bean beetles and more. Other big pluses to the use of this compound is that it is non-toxic to beneficial insects, humans, birds, earthworms or the plants on which it is applied when used as directed. The active ingedient is called azadirachtin. If you are buying brand-name neem preparations, look for concentrations of azadirachtin of between 0.09% to 0.25%.

Bt or *Bacillus thuringiensis:* If ever you encounter a serious infestation of caterpillars of nearly any kind -- cabbage loopers, imported cabbage worm, gypsy moth larvae, corn earworm, army worm, web worm, tent caterpillars, European corn borer and many others, think Bt. This bacterium is deadly to most caterpillars and the larvae of many moths while being harmless to humans and beneficials, including bees. When caterpillars ingest some of the bacteria you have sprayed on leaves, they stop feeding within hours and literally starve to death and drop to the soil within days. What's more, even if birds ingest infected caterpillars, the birds will be unaffected. There are well over 30 varieties of Bt now identified and many are effective against tough insect pests such as the

larvae of Colorado potato beetles and fungus gnats. Another gives up to 99% control of mosquitoes when applied to ponds or other areas where water stands. Read the label for targeted pests. Some of the commercial preparations contain more than one Bt variety and are, therefore, effective against a wider range of insects. This is one insecticide you can use without worry about the environment or toxicity, and a little goes a long way. Some brand-names: Safer Bt Caterpillar attack, Dipel, Javelin and Gnatrol.

Milky (Spore) Disease: Two naturally occurring bacteria, *Bacillus popilliae* and *Bacillus lentimorbus,* cause a disease in young Japanese and other beetle grubs developing in soil treated with these organisms. Harmless to all other wildlife feeding on treated lawns or gardens, the bacteria replicate inside the grubs, filling them with milky white liquid. When the grubs die, the bacterial spores live on in the soil making it unnecessary to treat soil frequently in most temperate areas. In very cold areas, it may be necessary to repeat applications annually. It is a highly effective treatment against a devastating pest and is the best solution in areas plagued by Japanese beetles. Of course, it is most effective if farmers and others in your area are also using milky spore. For beetles arriving from others' properties, use Japanese beetle pheromone (sexual attractant) traps, but place them far from your garden and fruit trees so they don't attract beetles *to* your crops.

Dormant, Superior Horticultural Spray Oils: For many years farmers sprayed heavy petroleum oils on their dormant, wintering fruit trees to effectively smother insects, their eggs and larvae hidden in crevices and under bark. Because these oils were so toxic to leaves and cut off the tree's above-ground air exchange, they could only be applied when the tree was domant, hence the name dormant oil. Today's horticultural oils are far lighter and so low in toxic substances that they can be used in summer to smother pest infestations on plants. Aphids, scales, mites, leafminers, immature whiteflies, some caterpillers, psyllids, sawflies and leaf beetle larvae succumb to these oils. A typical, good summer or winter oil will have a 95 - 99% purity. This information is on the label. Sunspray's Ultra-Fine Spray oil, for example, is 98.8% paraffinic oil with

an emulsifier to allow its dilution in water. Used according to the label, on the crops specified, it should have no toxic effect on the plants in summer or winter applications.

Sabadilla: A powerful insecticide, sabadilla should be considered a weapon of last resort for a couple of reasons. First, it kills honeybees, and these essential good guys are already on the decline as discussed in a previous chapter. If you choose to use it, be sure to keep it out of flowers, if possible. Second, it can cause severe allergic reactions in those sensitive to it , and you won't know it unless you've been exposed to it before. Negatives aside, sabadilla controls harlequin bugs, aphids, striped cucumber beetles, leafhoppers, thrips, cabbage loopers, green stink bugs, squash bugs, and tarnished plant bugs. Another postitive *and* negative is the fact that it breaks down rapidly in sunlight. On the plus side, this assures that toxic residues don't remain in the garden past the first day. On the minus side, it also means that you would have to reapply it to assures effective control over the course of a lengthy pest infestation. Most commercial brands use the name, sabadilla, in their label but one, called Veratran D, is selective for thrips. Sabadilla is made, by the way, from the ground up seeds of a South American plant that resembles lillies.

Ryania: The stems of a shrub, *Ryania speciosa*, which grows in Trinidad, are powdered to produce this insecticide. Targeting the stomachs of moth and butterfly larvae, it spares beneficials but "hits" such pests as European corn borers, citrus thrips, codling moth, aphids, Japanese beetles, bean beetles and squash bugs. Read the packages of ryania products. Some contain rotenone and pyrethrins, vastly expanding the list of targeted pests. Some big pluses: stored in cool, dark and dry conditions, it has a shelf life of three or more years. Some drawbacks: it is toxic to mammals and aquatic life. Read labels for precautions.

Copper: Used for hundreds of years, copper controls fungi and some bacterial plant maladies. It can be safely used on many fruits and vegetables to prevent downy mildew, peach leaf curl, septoria leaf spot, early blight, late blight, leaf blight, brown rot, botrytis blight, cane spot,

scab, yellow rust, anthracnose, cercospora leaf spot, leaf gall, gray mold neck rot and more. It is a powerful fungicide, but it is also toxic and irritating to humans and pets and toxic to fish and other aquatic life. It is a mineral and, as such, does not break down but persists in the soil. Too much copper added over many years may created mineral imbalances.

If you live in an area noted for horrendously high humidity in summer, you will likely be battling fungi. Before resorting to copper, try planting in full sun, spacing plants farther apart for better air circulation and drying to prevent major infestations. If you are still plagued by fungus, try copper in the form of Bordeaux, a copper/lime combination. This form of copper is less toxic to soil and water life. And remember, if fungus shows up on one plant, it will spread to other susceptible plants throughout the garden. Copper fungicides will prevent the growth of fungal spores on the clean plants but will not cure the growing spots of fungus on the original, infected plant parts. Keeping a sharp eye out for these diseases and doing "preventative medicine" will minimize the risk of major crop losses to fungi.

Lean on Your Hoe

There is an old farm proverb that says something like, "A good farmer does more good for his crops by leaning on his hoe than by using it." This is a wise observation. A person who regularly spends time looking, watching and studying his or her garden will notice change, infestation, the invasions and battlesof garden friends and foes. He or she will soon learn when they need to do something and when it is best to leave things be. A case in point. Years ago I had a large food garden in Oregon. I was also working out of the home at the time, so garden time was limited on weekdays. One morning, before leaving for work , I made my usual early morning garden check and found,to my horror, that my beautiful, 50 foot bed of bush green beans had become infested with black bean aphids. The underside of literally every bean leaf in the lush bed was covered with colonies of sap-sucking black aphids. Panic! What was I going to do? Well, if I stopped by the nursery on the way home from work I could buy an organic "cure" for the problem and, maybe, I reasoned, I could still save them. Off I went and rushed home that night

with canisters of both rotenone and pyrethrin. I quickly mixed up the first sprayer of insecticide --dinner and family would have to wait-- and ran out to the garden. I lifted up the leaves of the first plant to spray and was shocked to find no aphids. In their place were 2 ladybugs (lady beetles). Down the row I moved...more ladybugs...and decimated aphid colonies.

By the next day, the aphid population had literally been devoured by an infestation of ladybugs. Away went the sprayer. As a result of that observation, I tend to take a wait-and-see attitude about all bug problems. I have learned that most of them are kept under control by Nature, herself, in an organically- maintained, self-sustaining garden. Be it labybugs, birds, praying mantids, green lacewings or a host of other garden friends, there are lots of checks and balances in a healthy garden environment. Learn to distinguish between them. If in doubt, don't kill it. Find out what the bug is first, and make a judgement about the damage it is doing or is likely to do in the numbers present.

On the following pages are plates of the most common food crop pests, and a couple of beneficial insects, in all stages of their life cycles. The drawings are beautiful illustrations done for a United States Department of Agriculture text on insects published in 1952. The text is long since out of print. I am very grateful to have been granted permission by the USDA to republish the drawings in this book. There is a wealth of information here. One of the most important distinctions these illustrations have over modern sources is their accurate depiction of the insects in their natural habitat -- on and within the plants they plague. It should make identification easier.

Saving Your Own Seeds

One of the main reasons for growing open-pollinated or non-hybrid fruit and vegetable plant varieties is to enable you to save your own seed from year to year. This eliminates the need to buy seed commercially, thus decreasing your dependence on others for your food and increasing your self-sufficiency. This is increasingly important because open-pollinated varieties are rapidly disappearing from commercial seed catalogs, ensuring for seed companies that you and I will come back to them, year in and year out, to buy their proprietary hybrid and protected plant varieties. This may seem defensible in good times when there are no significant crop failures, droughts, floods, fuel or fertilizer shortages, economic crises, etc., and when you have the money to buy all of the seed you need to grow your food. It might well become a problem if any of the above were to occur.

Saving seed from open-pollinated plants can be a fairly easy undertaking or it can be more challenging, depending on the types of plants you choose to grow and how close to your property similar plants are being grown by someone else. Some plants cross easily with others and will yield seed which carries traits of both. The plants you get from those crossed seed will not be identical to either parent. In some plants, like tomatoes, such crosses are infrequent and, when they occur, still tend to produce usable tomatoes. In others, like squashes belonging to the same species groups, crosses occur readily and result in seeds that rarely produce squashes of quality equal to that of either parent.

There are ways to minimize or prevent the crossing of varieties by wind, bees or other insects. One is to grow only one type of squash of each species, one kind of onion, eggplant and so on. But if your neighbors within a mile of your property are growing other varieties of these plants, bees will certainly cross-pollinate a few or more of them anyway. Another technique is to cage plants you want to collect seed from. Cages must be screened with material that won't allow pollinizing insects to enter. Another, more labor intensive but more reliable technique is to hand pollinate plants from which you plan to save seed. These techniques are fairly easy to learn and can be very interesting and rewarding.

While the knowledge and skills you need to successfully save all of your own seed cannot be provided in a book of this scope, whole books have been written on the subject, many of them more technical than you might want or even need. One, written for gardeners and easily understood, is Suzanne Ashworth's book, *Seed to Seed: Seed Saving Techniques for the Vegetable Gardener.* It is published by Seed Savers Publications, Rural Route 3, Box 239, Decorah, Iowa 52101. This is the publishing house of the Seed Savers Exchange, the organization committed to the rescue of endangered vegetable and fruit varieties, preventing their extinction. Send for the book if you are serious about becoming food self-sufficient. You will never need another book on the topic.

The Seed Savers Exchange, by the way, is open to new members interested in this important work. All members receive three excellent publications a year, including their annual yearbook. This volume, in 1995, was nearly 400 pages long and filled with 17,683 listings of heirloom or endangered grains, vegetable seeds, potatoes, fruits and wood cuttings (scions) of fruit trees. All of these can be had from their 1,031 listed members for not much more than the cost of postage to ship them. It is an incredible resource. You will find thousands of varieties you likely never knew existed.

You may even decide to become a listed member, that is, one who decides to offer seed to others. Your name, address and what you are growing for preservation, and offering to share, will be listed in the yearbook. As a listed member, seeds and cuttings you want to try are priced even lower than those for unlisted SSE members. Either way, you receive excellent resources and access to thousands of plant varieties for a low membership fee. To join, write: The Seed Savers Exchange, 3076 North Winn Road, Decorah, IA 52101.

Retail Seed Companies in United States and Canada

Abundant Life Seed Foundation: PO Box 772, Port Townsend, WA 98368. Open-pollinated, untreated seeds adapted to Pacific Northwest. Catalog $2

Aimers Seeds: 81 Temperance St., Aurora, Onatario L4G 1R1, Canada. Native wildflowers of region plus vegetables.

Ken Allan: 536 Macdonnell St., Kingston, Ontario K7K 4W7, Canada. Organically produced vegetable seeds. SASE and $1 for catalog to U.S., 50 cent Canadian stamp for Canada.

Alberta Nurseries & Seeds Ltd.: Box 20, Bowden, Alberta T0M 0K0, Canada. Specializes in seeds for short-season areas. Free catalog.

Alfrey Seed: PO Box 415, Knoxville, TN 37901. Unique and rare pepper varieties. Price list and illustrations for SASE.

Allen, Sterling and Lothrop: 191 U.S. Rt. 1, Falmouth, ME 04105. Vegetable seeds adapted to northern New England. Catalog $1.

Archias' Seed Store: 106 East Main St., Sedalia, MO 65301. Open-pollinated vegetables, berries, flowers, spices, more. Catalog $1

Aurora Farm: Barbara Scott, Rt. 1, 63-9, Creston, British Columbia V0B 1G0, Canada. Open pollinated and biodynamic heritage seeds. Catalog $2.50.

Baxter Seed Co., Inc.: PO Box 8175, Weslaco, TX 78596. Broad, general selection. Price list free.

Bea's Service: PO Box 8422, Calabasas, CA 91302. Beans, Indian Corns of the Southwest and peppers. Catalog $1.

Berlin Seeds: 5371 County Road 77, Millersburg, OH 44654. Greenhouse and nursery products, including seed. Catalog free.

Belche Herb Co.: PO Box 1305, Schenectady, NY12301. Herbs. Catalog $3, refunded with order.

Becker's Seed Potatoes: R.R. 1, Trout Creek, Ontario P0H 2L0, Canada. Only ships potatoes to Canadian customers. Catalog free.

Boone's Native Seed Company: PO Box 10363, 501 Cleveland St., Raleigh, NC 27605. Untreated seeds of chile peppers, open-pollinated and heirloom tomatoes. Catalog free.

Leonard Borries: Rt. 4 Box 79, Teutopolis, IL 62467. Open-pollinated corn by the pound or bushel. Write for price list.

Bountiful Gardens: 18001 Shafer Ranch Rd., Willits, CA 95490. Seeds, herbs, rare varieties, green manures, European heirlooms. Main catalog, free. Rare Seeds catalog, $2. Bulk price list, $1.

Burgess Seed and Plant Co.: 905 Four Seasons Rd., Bloomington, IL 61701. Vegetable seeds, popular and unusual varieties. Catalog $1.

W. Atlee Burpee Co.: 300 Park Ave., Warminster, PA 18991. Introduces its own, new varieties and sells broad selection of many popular vegetable, fruit and flower seeds, plants and more. Catalog free.
Burrell Seed Growers Co.: Box 150, Rocky Ford, CO 81067. Extensive melon collection a specialty. Catalog free.
Butterbrooke Farm: 78 Barry Rd., Oxford, CT 06478. Open-pllinated, hardy vegetable seed cooperative. Membership info., prices for SASE.
Country Heritage Nursery: PO Box 536, Hartford, MI 49057. Broad nursery selection. Catalog free.
Comstock, Ferre & Co.: 263 Main St., Wethersfield, CT 06109. Sells 320 vegetable varieties, herbs, annuals and perennnials in large or small quantities. Catalog $3 but will credit with first order.
The Cook's Garden: PO Box 535, Londonderry, VT 05148. Very large lettuce collection as well as vegetables and culinary herbs. Catalog $1.
CORNS: Carl & Karen Barnes, Rt. 1, Box 32, Turpin, OK 73950. Open-pollinated popcorn, dent and flint corns. Price list and information $1.
Cross Enterprises: 109 9th St., Bunker Hill, KS 67626. Organically grown amaranth, beans, sunflowers, grains, seeds for sprouting.
Dabney Herbs: PO Box 22061, Louisville, KY 40252. Heirloom herb seeds a specialty. Retail catalog $2.
Daisy Farms: 91098 60th St., Decatur, MI 49045. Asparagus, strawberry, raspberry, rhubarb, horseradish and more plants and roots. Price list free.
William Dam Seeds Ltd.: Box 8400, Dundas, Ontario L9H 6M1, Canada. Untreated seeds of European and other vegetable varieties. Free catlog to Canada, $2 to United States.
Deep Diversity: 1212 Parkway Drive, Santa Fe, NM 87505. Organically grown vegetable, herb and medicinal plant seeds. Also specializes in seeds of rare and endangered plant species. Catalog,$4, describes plants, other information. Seed list, $1, offers no descriptions.
De Giorgi Seed Co.: 6011 N St., Omaha, NE 68117. Variety. Catalog free.
Dill's Garden Glant: 400 College Rd., Windsor, Nova Scotia B0N 2T0, Canada. Seed for giant pumpkins. Price list free.
Dominion Seed House: Box 2500, Georgetown, Ontario L7G 5L6, Canada. Short-season and other varieties for Canadian customers only. Catalog $2.
Down on the Farm Seed: PO Box 184, Hiram, OH 44234. Open-pollinated, untreated seed.
Early's Farm & Garden Centre: 2615 Lorne Ave., Saskatoon, Saskatchewan S7J 0S5, Canada. Broad selection garden seeds. Catalog $2.

ECHO Seed Sales: 17430 Durrance Road, North Fort Myers, FL 33917. TRopical and subtropical fruits and vegetables. Sends free seeds to Third World farmers with portion of sales profits. Catalog $1.

Ecogenesis Inc.: 16 Jedburgh Road, Toronto, Ontario M5M 3J6, Canada. Organic gardener's dream...a company that specializes in insect and disease resistant vegetable seed varieties. Open-pollinated and untreated seed. Retail catalog, $2.

E & R Seed: 1356 E 200 S, Monroe, IN 46772. Broad selection. Catalog free.

Evergreen Y.H. Enterprises: PO Box 17538, Anaheim, CA 92817. Oriental vegetable seeds, 150+ varieties. Catalog $2.

Farmer Seed & Nursery Co.: Reservations Center, 1706 Morrissey Drive, Bloomington, IL 61704. Cold-hardy plant varieties especially suited to the north. Catalog free.

Fedco Seeds: PO Box 520, Waterville, ME 04903. Untreated vegetable seed adapted to cold climates. Catalog $2.

Fern Hill Farm: PO Box 185, Clarksboro, NJ 08020. Specialty--"Dr. Martin Pole Lima", a huge variety. Send SASE to request order form.

Henry Field Seed & Nursery: 415 N. Burnett St., Shenandoah, IA 51602. Broad selection of standard vegetable seeds. Catalog free.

Field & Forest Products Inc.: N3296 Kozuzek Road, Peshtigo, WI 54157. Shiitake mushroom spawn. Catalog $2, refundable with first order.

Filaree Farm: 182 Conconully Hwy., Okanogan, WA 98840. Garlic specialists with more than 100 varieties for sale and 400 in trials. Catalog $2.

Fish Lake Garlic Man: RR 2, Demorestville, Ontario K0K 1W0, Canada. Garlic specialists, stressing large, easily peeled cloves raised organically. No out-of-Canada checks. Cash or money orders from abroad, $2 for price list. Inside Canada, SASE for price list.

Fisher's Garden Store: PO Box 236, Belgrade, MT 59714. Specializes in short-season and high altitude vegetables and flowers. Catalog free.

Florida Mycology Research Center: PO Box 8104, Pensacola, FL 32505. Mushroom spores, cultures and supplies. Books for growing instruction. Write for catalog.

Floating Mountain Seeds: PO Box 1275, Port Angeles, WA 98362. Organically grown, open-pollinated, heirloom vegetable, flower and herb seeds. Write for catolog.

Fox Hollow Herb & Heirloom Seed Co.: Open-pollinated and heirloom herbs, vegetables and flowers in sample, standard or large seed packets. Catalog $1.

Fred's Plant Farm: PO Box 707, Dresden, TN 38225. Sixteen

varieties of sweet potatoes and yams. Some heirlooms. Catalog free.

Fungi Perfecti: PO Box 7634, Olympia, WA 98507. Mushrooms raised organically, culture, spawn, equipment, information. Catalog $3.

Garden City Seeds: 778 U.S. Hwy. 93 N., Victor, MT 59840. Untreated and organically grown hardy vegetable varieties adapted to the North. Catalog $1.

Gallina Canyon Ranch Beans: Elizabeth Berry, Box 706, Abiquiu, NM 87510. Heirloom bean seeds. SASE and $1 for price list.

Gaze Seed Company Ltd., PO Box 640, St. John's, Newfoundland A1C 5K8, Canada. Free catalog within Newfoundland and Labrador. U.S. $1.

Giant Watermelons: PO Box 141, Hope, AR 71801. Cantaloupe and watermelon seeds a specialty, with resulting melons setting world records. SASE for price sheet.

Gleckler's Seedmen: Metamora, OH 43540. A goldmine of open-pollinated foreign and heirloom vegetable seeds including Native American squashes. Catalog free.

Glendale Enterprises: 297 Railroad Avenue, De Funiak Springs, FL 32433. Chufa and Velvet Beans sold by this small family business. SASE for brochure.

Golden Acres Farm: 260 Center Road, Fairfield, ME 04937. All seed, plants tested and adapted for growing in the Northeast. Catalog $1, refundable with first order.

Good Seed Co.: Star Route Box 73A, Oroville (Chesaw), WA 98844. Hardy shrubs, trees and heirloom seeds. Catalog $3.

Gourmet Gardener: 4000 W. 126th St., Leawood, KS 66209. Unique varieties, many imported from abroad. Mail for information.

Gurney's Seed & Nursery Co.: 110 Capital Street, Yankton, SD 57079. Vast selection of fruits, flowers, hardy vegetables and nursery stock. A large, user-friendly company with a huge, free catalog.

Harris Seeds: 60 Saginaw Dr., PO Box 22960, Rochester, NY 14606. Large selection vegetables and flowers, many unique to Harris. Catalog free.

Hardscrabble Enterprises Inc.: HC 71 Box 42, Circleville, WV 26804. Shiitake mushroom spawn, supplies. Price lists free. Culture instructions, information and price lists, $3.

Halifax Seed Company Ltd.: PO Box 8026, Station A, Halifax, Nova Scotia B3K 5L8, Canada. Canadian sales only. Catalog free in Atlantic Canada, $1 balance of Canada.

Heirloom Seeds: PO Box 245, West Elizabeth, PA 15088. Open-pollinated vegetable and flower seeds. Heirlooms from the 1700s and 1800s. Catalog $1, refundable with order.

Heritage Seed Co.: Rt. 4 Box 187, Star City, AR 71667. Heirloom,

organically grown allium (onion family) sets. Catalog free.

Heirloom Garden Seeds: PO Box 138, Guerneville, CA 95446. Culinary, historic, medicinal and rare seeds. Catalog $2.50.

High Altitude Gardens: PO Box 1048, Hailey, ID 83333. Open-pollinated, short-season plant seeds adapted to cold, high altitude, mountain environments. Catalog free.

Horticultural Enterprises: PO Box 810082, Dallas, TX 75381. Peppers, chiles. Free price sheet.

Horizon Herbs: PO Box 69, Williams, OR 97544. Organically grown medicinal and physically beneficial plants. Catalog $1.

Howe Sound Seeds: PO Box 109, Bowen Island, British Columbia V0N 1G0, Canada. Open-pollinated, late Victorian vegetable varieties at reasonable prices. Catalog $1.

J.L.Hudson, Seedsman: Star Route 2 Box 337, LaHonda, CA 94020. Rare and unusual plants, Zapotec varieties. Open-pollinated seeds. Committed to biodiversity. Catalog $1.

Ed Hume Seeds: PO Box 1450, Kent, WA 98035. Seeds especially adapte to Pacific Nortwest. Also varieties for short-season areas such as Alaska or for fall/winter planting in moderate winter areas. Catalog $1.

Island Seed Mail Order: PO Box 4278, Depot #3, Victoria, British Columbia V8X 3X8, Canada. Some heirlooms among other vegetable seeds. Catalog $2, deductible from a $20 or more order.

Johnny's Selected Seeds: 310 Foss Hill Rd., Albion, ME 04910. Large selection of vegetable seeds, many open-pollinated and heirlooms. Flower, herb and bulk quantity seed for farms. Much seed organically raised.

Jung Seeds & Nursery: 335 S. High St., Randolph, WI 53957. Seed and nursery stock adapted for northern climates. Catalog free.

Kalmia Farm: PO Box 3881, Charlottesville, VA 22903. Heirloom multiplier onions, potato onions, shallots and garlic. Catalog free if bulk-mailed or will mail First Class for one, First Class stamp.

Kitazawa Seed Co.: 1111 Chapman St., San Jose, CA 95126. Oriental vegetable seeds since 1917. Catalog free.

KUSA Research Foundation: PO Box 761, Ojai, CA 93024. Grain crops for gardens and mini-farms. $5 and long SASE for seed and literature catalog. Proceeds support continuing work of KUSA Research Foundation.

D. Landreth SEED Co.: 180-188 W. Ostend St., PO Box 6426, Baltimore, MD 21230. Broad selection. Oldest seed company in the United States, it was founded in 1784. Catalog $2.

L.F. Lambert Spawn Co.: PO Box 407, Coatesville, PA 19320. Mushroom spawn. Write for information.

Landis Valley Heirloom Seed Project: Landis Valley Museum,

2451 Kissel Hill Rd., Lancaster, PA 17601. Open-pollinated vegetables with Pennsylvania German history dating before 1940. Catalog: U.S. $2 Canada $2.75.

Charles B. Ledgerwood: 3862 Carlsbad Boulevard, Carlsbad, CA 92008. Seed and plants adapted to sub-tropical environments. Catalog $2.

Le Jardin du Gourmet: PO Box 75, St. Johnsbury Center, VT 05863. Shallots and seeds for gourmet cooking. Catalog $.50.

Liberty Seed Co.: 461 Robinson Dr. SE, PO Box 806, New Philadelphia, OH 44663. Annuals, perennials, vegetables, including All-America trial vegetables. Catalog free.

Lindenberg Seeds Limited: 803 Princess Ave., Brandon, Manitoba R7A 0P5, Canada. Seed adapted to short-season, prairie climates. Catalog free.

Mapel Seeds: PO Box 551, N. Grafton, MA 01536. Open-pollinated and older seed varieties. Catalog $1.

Earl May Seed & Nursery: 208 N. Elm Street, Shenandoah, IA 51603. Large selection. Sells to market gardeners and wholesale customers. Catalog free.

Mellinger's Inc.: 2310 W. South Range Road, North Lima, OH 44452. Seeds for herbs, vegetables, trees and unique plants. Four thousand country living items for sale as well. Catalog free within U.S.

Meyer Seed Co.: 600 S. Caroline St., Baltimore, MD 21231. Broad selection of vegetable and garden fruit seeds. Catalog free.

Moose Growers Supply: PO Box 520, Waterville, ME 04903. Seed potatoes and onion sets. Catalog $1.

Mushroompeople: PO Box 220, 560 Farm Rd., Summertown, TN 38483. Shiitake spawn, dowel plugs and sawdust. Instructional materials and consultation available. Catalog free.

Native Seeds/SEARCH: 2509 N. Campbell Ave. #325, Tucson, AZ 85719. Specializes in conservation of American Southwest native crop varieties. Seed list $1. Quarterly newsletter plus annual seed list, $20.

Nichols Garden Nursery: 1190 N. Pacific Hwy., Albany, OR 97321. Extensive selection of vegetables, herbs, books, helpful information. Rare and gourmet seed selection, too. Catalog free.

Noel's Garden Seeds: RD 2, Oxford, NY 13830. Open-pollinated seed varieties with emphasis on short-season adaptation and real flavor. Will send catalog for 2 First Class stamps.

Northwest Mycological Consultants: 702 NW 4th St., Corvallis, OR 97330. Shiitake, Oyster and other culinary mushroom spawns. Culture supplies and consultation available. Catalog $2.

Of the Jungle: PO Box 1801, Sebastopol, CA 95473. Rare ethnopharmacological plants and seeds. Medicinal herbs and oils.

Catalog $2.

Old Sturbridge Village: One Old Sturbridge Village Rd., Sturbridge, MA 01566. If you are trying to recreate an early 19th Century garden, this is the place. Specializes in vegetable seeds from that era. Catalog $1.

The Onion Man: Mark McDonough, 30 Mt. Lebanon St., Pepperell, MA 01463. Specialist in allium (onion family) species, including rare varieties. Write for catalog.

Ontario Seed Company, Ltd.: PO Box 144, Waterloo, Ontario N2J 3Z9, Canada. Canadian customers only. Open-pollinated, heirloom, untreated seeds. Catalog free.

Ornamental Edibles: Specialty Seeds by Mail, 3622 Weedin Court, San Jose, Ca 95132. International seed selection -- vegetables, edible flowers and herbs. Catalog $2. Specify retail packet catalog or retail bulk catalog.

Park Seed Company: PO Box 46, Greenwood, SC 29648. Full line of vegetables and small fruits, including exclusive, proprietary vegetable introductions, though most of these are hybrids. Full color catalog free.

Peaceful Valley Farm Supply: PO Box 2209, Grass Valley, CA 95945. All organic seeds. Full range of natural fertilizers, disease and pest control products, weed control. Compost supplies, floating row covers, books, etc. in free, 128 page catalog. Priced below retail.

Peaceable Kingdom School: Heirloom Seeds, PO Box 313, Washington, TX 77880. Open-pollinated, regionally adapted, organically grown seed. Includes Texas heirloom varieties. Price list free.

Peters Seed and Research: 407 Maranatha Lane, Myrtle Creek, OR 97457. Open-pollinated, unusual vegetables, many adapted to the north. Large, unique tomato collection. Catalog $2.

Pepper Joe's, Inc.: 1650 Pembrooke Road, Norristown, PA 19403. Organically grown hot pepper seeds. Catalog for SASE.

Pepper Gal: PO Box 23006, Ft. Lauderdale, FL 33307. Peppers -- hot, sweet and ornamental. Seed list SASE. Catalog $1.

Pinetree Garden Seeds: Box 300, New Gloucester, ME 04260. Stresses seed for home gardeners with emphasis on flavor. Offers smaller seed packets and lower prices. Excellent gardening book list. Catalog free.

Ned W. Place: 21600 Conant Road, Wapakoneta, OH 45895. Open-pollinated corn varieties. Write for information.

Plants of the Southwest: Rt. 6, Box 11A, Santa Fe, NM 87501. Native American crops, drought tolerant vegetable varieties, nut and berry trees. Focuses on Southwestern varieties. Color catalog, 100 pages, $3.50.

P & P Seed Company: 14050 Rt. 62, Collins, NY 14034. Giant

watermelons and pumpkins. Some watermelons can reach 300 lbs., pumpkins 800 lbs.! Price list for SASE.

Prairie Grown Garden Seed: Box 118, Cochin, Saskatchewan S0M 0L0, Canada. Open-pollinated vegetable and flower seeds grown without chemicals. Catalog for SASE within Canada, $1 for U.S.

Prairie State Commodities: PO Box 6, Trilla, IL 62469. Some open-pollinated field crops, including corn. Grasses, legumes. Catalog $1.

Rainforest Mushroom Spawn: Box 1793, Gibsons, British Columbia V0N 1V0, Canada. Catalog $2.

Raintree Nursery: Fruit and nut trees, many disease resistant, suitable for organic gardeners. Many bamboo varieties. Mushroom spawn, kits and instructions. Catalog free. Guidebook free.

Rawlinson Garden Seed: 269 College Rd., Truro, Nova Scotia B2N 2P6, Canada. Seeds adapted to cool climates. Catalog free to Atlantic Canada, Quebec and Ontario; $1 to U.S.

Redwood City Seed Company: PO Box 361, Redwood City, CA 94064. Seeds of endangered, cultivated plants. Book and pamphlet list directed to home gardeners. Catalog $1, retail. Wholesale catalog free.

Richters: 357 Hwy. 47, Goodwood, Ontario L0C 1A0, Canada. Huge herb selection -- 700 types. Gourmet vegetables, Korean, American and Siberian ginseng. Catalog free.

The Robson Corporation: One Seneca Circle, PO Box 270, Hall NY 14463. Open-pollinated beans and peas. Catalog free.

P.L. Rohrer & Brothers, Inc.: PO Box 250, Smoketown, PA 17576. Seed for gardeners and farmers. Catalog free.

Ronniger's Seed Potatoes: Star Route, Moyie Springs, ID 83845. Large selection of seed potatoes for home gardeners and small farmers. Many unusual varieties. Catalog $1.

Roswell Seed Company: 115-117 S. Main St., PO Box 725, Roswell, NM 88202. Vegetable and flower seed adapted to American Southwest. Catalog free.

Sanctuary Seeds: 2774 West 4th Avenue, Vancouver, British Columbia V6K 1R1, Canada. Untreated vegetable and medicinal herb seeds. Shipments to U.S. and Canadian customers only. Catalog $1.

Salt Spring Seeds: PO Box 444, Ganges P.O., Salt Spring Island, British Columbia V8K 2W1, Canada. Untreated, organically grown seed adapted to northern climates. Extensive selection of beans and grains plus many garlic varieties. Catalog $2 first time customers.

The Sandy Mush Herb Nursery: 316 Surrett Cove Rd., Leicester, NC 28748. Gourmet vegetables and extensive herb seed selection. Catalog $4.

Sand Hill Preservation Center: Heirloom Seeds and Poultry, 1878 23oth St., Calamus, IA 52729. Open-pollinated. Write for catalog.

S.C. Foundation Seed: 1162 Cherry RD., Box 349952, Clemson, SC 29634. Vegetables varieties developed by state agricultural experiment stations and United States Department of Agriculture breeders. Price list for SASE.

Seeds Blum: Idaho City Stage, Boise, ID 83706. 700+ heirloom, open-pollinated vegetable varieties. Catalog $3.

Seeds of Change: 621 Old Santa Fe Trail #10, Santa Fe, NM 87501. Certified organically grown vegetables, herbs and flowers, heirloom and traditional varieties. Catalog free.

Seeds West Garden Seeds: PO Box 27057, Albuquerque, NM 87125. Vegetable, flower and herb seeds from heirloom and drought tolerant varieties.

Semillas Solanas: Sunny Land Seeds, PO Box 385, Paradox, CO 81429. American Southwestern and South American native seeds. Catalog for SASE plus $1.

Seeds and Such: PO Box 196, West Linn, OR 97068. Heirloom seeds and gardening specialties. Catalog free.

Seed Savers International: 3076 North Winn Road, Decorah, IA 52101. Eastern European and Soviet Union's vegetable seed varieties plus a selection of Heritage Farm plant favorites. Catalog free.

Shepherd's Garden Seeds: 6116 Highway 9, Felton, CA 95018. Fine American, European and Asian vegetable seeds. Extensive and unique collections. Specialty cookbooks. Catalog free.

Shoulder to Shoulder Farm: Wild Garden Seed, PO Box 1509, Philomath, OR 97370. Unusual salad greens, native species, plants that attract and nurture beneficial insects. Catalog $4.

R.H. Shumway, Seedsman: PO Box 1, Graniteville, SC 29829. Open-pollinated vegetables including field corn. Heirlooms, traditionals. Catalog free.

Silver Springs Nursery: HCR 62 Box 86, Moyie Springs, ID 83945. Garlic adapted to cold climates. Price list for long SASE.

Southern Exposure Seed Exhange: PO Box 170, Earlysville, VA 22936. Untreated, open-pollinated heirloom and traditional vegetables with many adapted to hot, humid conditions common to the South and Gulf states. Also flowers, herbs, garlic and onions. Catalog $2.

Southern Seeds: PO Box 2091, Melbourne, FL 32902. Hot climate vegetable seed varieties. Catalog $1.

Southern Oregon Organics: 1130 Tetherow Road, Williams, OR 97544. Open-pollinated, naturally raised,untreated seed. Catalog free.

Sohn's Forest Mushrooms: 610 S. Main St., Westfield, WI 53964. Shiitake and Oyster mushrooms. Catalog free.

Southern States Cooperative: PO Box 5402, Saunders Station, Richmond, VA 23220. Retails a variety of vegetable seeds

especially suited to climates of the mid-Atlantic states. Catalog free.

Steele Plant Company: 212 Collins St., Gleason, TN 38229. Sweet potato, cabbage and onion plants. Catalog free.

Stokes Seeds, Inc.: Box 548, Buffalo, NY 14240. Extensive catalog offerings of over 2000 vegetables and flowers. Garden aids and accessories. Catalog includes growing information and is free.

Sunrise Enterprises: PO Box 1960, Chesterfield, VA 23832. Large oriental vegetable collection, flowers. Catalog $2, refundable with order.

Synergy Seeds: Box 323, Orleans, CA 95556. Seeds from plants that are family heirlooms. Catalog for SASE.

Terra Edibles: Box 63, Thomasburg, Ontario K0K 3H0, Canada. Focuses on heirlooms, space-saving vegetables, high- nutrition varieties. Catalog $1.

Territorial Seed Company: PO Box 157, Cottage GROVE< OR 97424. Organically grown vegetables and fruits. Open-pollinated, short-season varieties as well as those adapted specifically to climate of the maritime Pacific Northwest. Catalog free.

Thomas Jefferson Center for Historic Plants: Monticello, PO Box 316, Charlottesville, VA 22902. Vegetables grown by Thomas Jefferson in his expansive gardens. Catalog $1.

Threshold Seeds, Inc.: Box 701, Claverack, NY 12513. Open-pollinated, biodynamically raised vegetables and plant stocks. Catalog $2.

Thompson & Morgan: Dept. 181-3, PO Box 1308, Jackson, NJ 08527. Almost 3000 offerings of vegetables and flowers in a full-color catalog. Many unusual or rare varieties. Catalog free.

Tomato Growers Supply Company: PO Box 2237, Fort Myers, FL 33902. Hundreds of varieties of tomatoes and about 100 varieties of peppers. Heirlooms and open-pollinated offerings. Catalog free.

Totally Tomatoes: PO Box 1626, Augusta, GA 30903. Write for catalog.

T & T Seeds, Ltd., Box 1710, Winnipeg, Manitoba R3C 3P6, Canada. Cold-hardy vegetables, herbs, flowers and nursery stock. Catalog $2.

Turtle Tree Seed Farm: 5569 North County Rd. 29, Loveland, CO 80538. Open-pollinated, organic seed. Catalog free.

Underwood Gardens: Greenseeds, 4 N381 Maple Avenue, Bensenville, IL 60106. Open-pollinated, heirloom, untreated seeds. Catalog $1.

University of Hawaii Seed Program: Dept. of Horticulture, 3190 Maile Way, Rm. 112, Honolulu, HI 96822. Vegetable seeds adapted to tropical climates. Price list free.

Vermont Bean Seed Co.: Garden Lane, Fair Haven, VT 05743. The world's most extensive pea and bean seed selection, vegetables, herbs

and flowers. Catalog free.

Vesey's Seeds, Ltd.: York, Prince Edward Island C0A 1P0, Canada. Vegetables and flowers adapted to short-season climates. Catalog free.

Western Biologicals: PO Box 283, Aldergrove, British Columbia V0X 1A0, Canada. Mushroom cultures, spawn and kits. Instructional materials including free information flyer. Catalog free.

Christopher E. Weeks Peppers: PO Box 3207, Kill Devil Hills, NC 27948. Hot peppers. Price list for SASE.

Willhite Seed Inc.: PO Box 23, Poolville, TX 76076. Large watermelon and cantaloupe seed collection. This company introduces its own melon seed varieties. Catalog free.

Wildseed Farms, Inc.: 1101 Campo Rosa Rd., PO Box 308, Eagle Lake, TX 77434. Culinary herbs, Maximilian sunflower and wildflower seeds. Catalog free.

Wood Prairie Farm: RFD 1 Box 164, Bridgewater, ME 04735. Certified organically grown and Maine-certified seed potatoes. Catalog free.

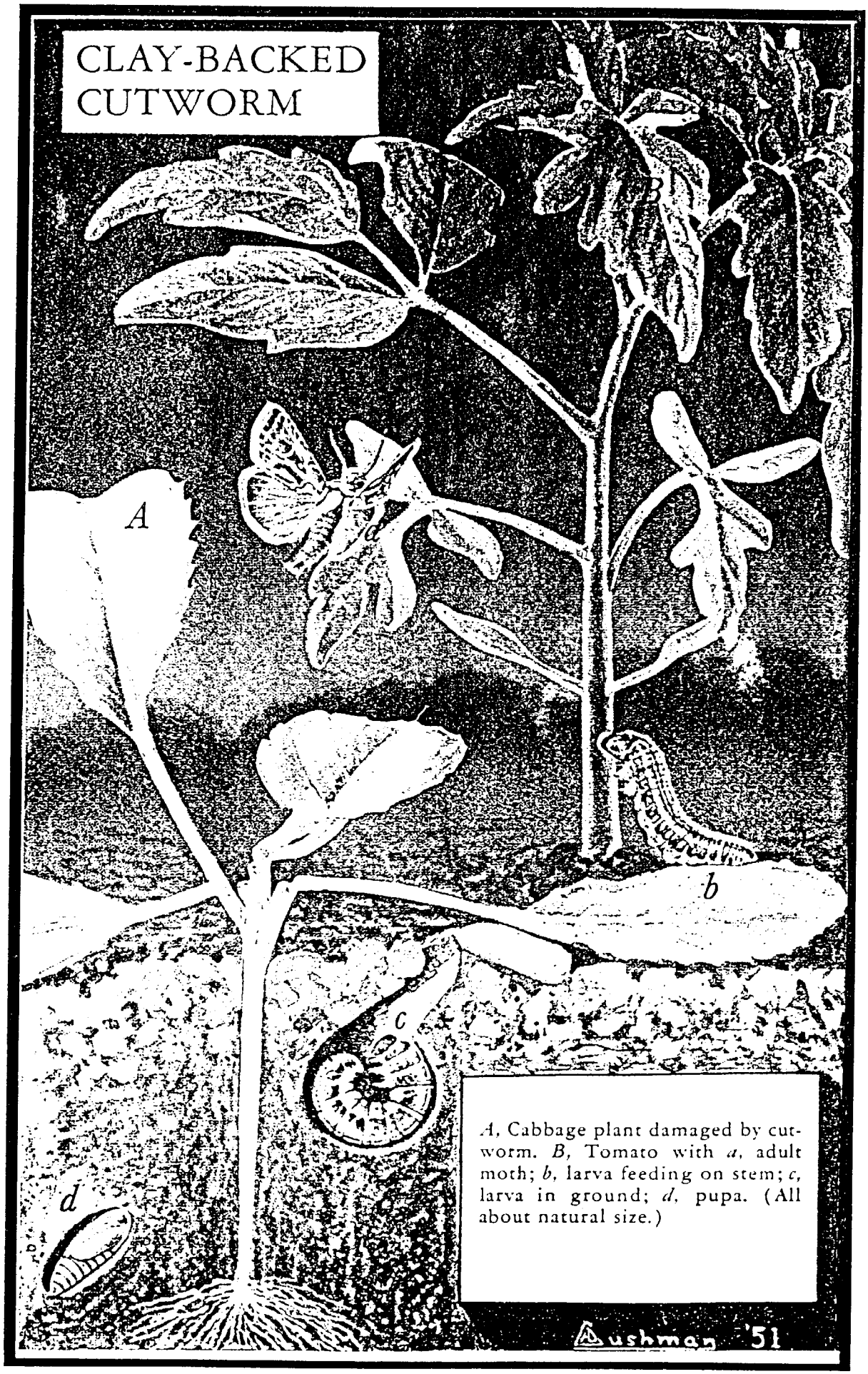
Yard Bird Seeds: Open-pollinated, heirloom, unusual and hard-to-find seed varieties. Catalog free.

Stanley Zubrowski: Box 26, Prairie River, Saskatchewan S0E 1J0, Canada. Short-season adapted tomato varieties. Price list for SASE within Canada, SASE plus $1 for U.S. customers.

BEET LEAFHOPPER

A, Life stages: *a*, adult; *b*, nearly mature nymph; *c*, young nymph (all about eight times natural size). *B*, *C*, and *D* show the effect of curly top disease on tomato, sugar beet, and bean, respectively.

Background shows chinch bugs leaving maturing wheat to feed on young corn. *A*, Life stages of the insect (greatly enlarged); *a*, eggs in wheat sheath; *b*, adult bug; *c*, red nymph; and *d*, black nymph.

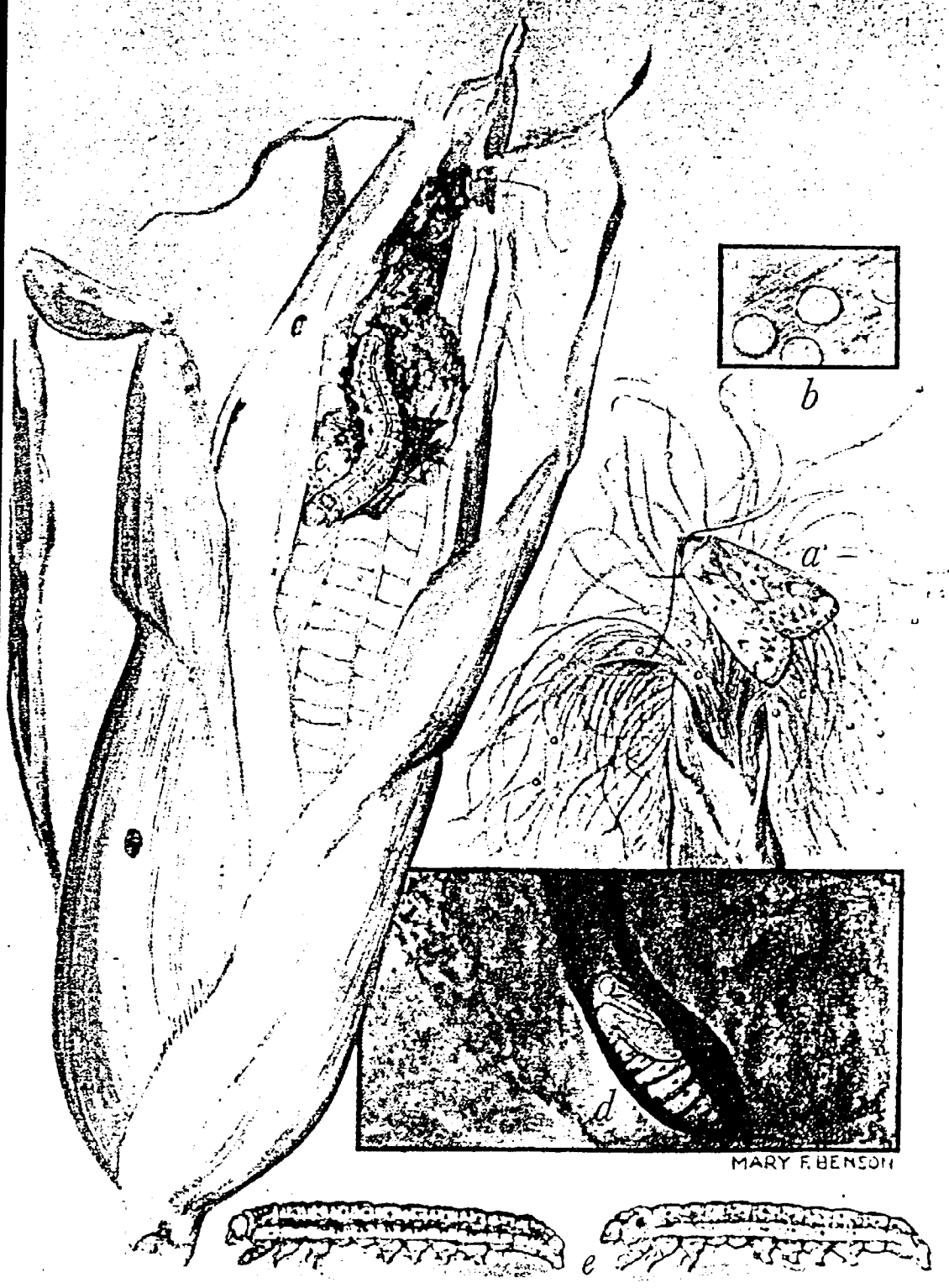


A, Cabbage plant damaged by cutworm. *B*, Tomato with *a*, adult moth; *b*, larva feeding on stem; *c*, larva in ground; *d*, pupa. (All about natural size.)

COLORADO POTATO BEETLE

a. Adult beetle; *b*. eggs; *c*. larvae (or slugs); *d*. pupa (or resting stage). (*a*, *c*, and *d*. about natural size; *b*. about twice natural size.)

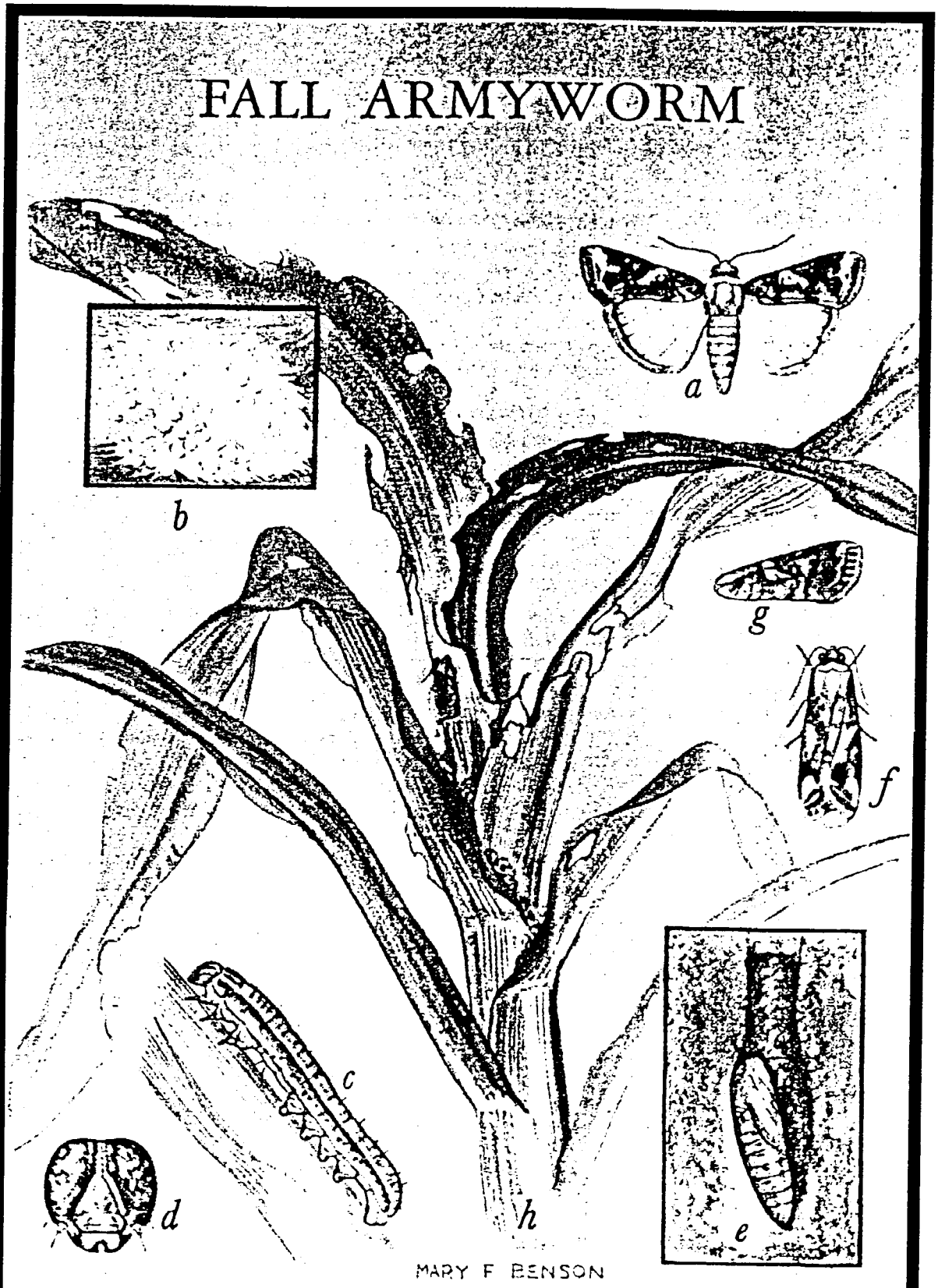
CORN EARWORM



a. Moth (or adult) and eggs on silks; *b*. eggs; *c*. earworm feeding in ear of corn; *d*. pupa in a cell; *e*. color phases of the earworm. (All except *b*. about natural size; *b*. five and one-half times natural size.)

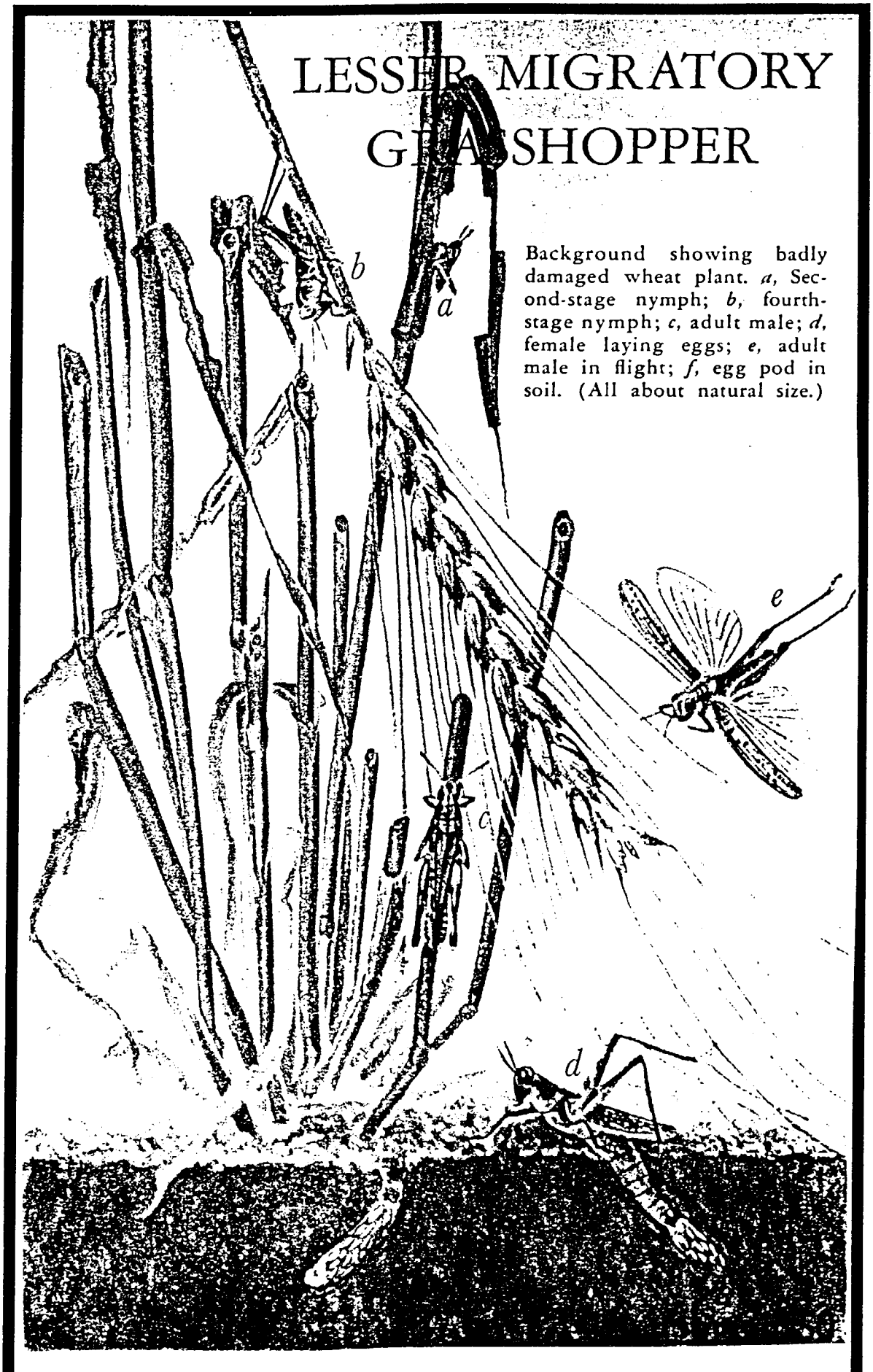
EUROPEAN CORN BORER

a, Egg mass on under side of leaf; *b*, larvae in stalk and ear of corn; *c*, pupa in stalk; *d*, female moth; *e*, male moth; *f*, borings from burrow of larva. (Egg mass, about three times natural size, other stages, about one and one-fourth times natural size.)

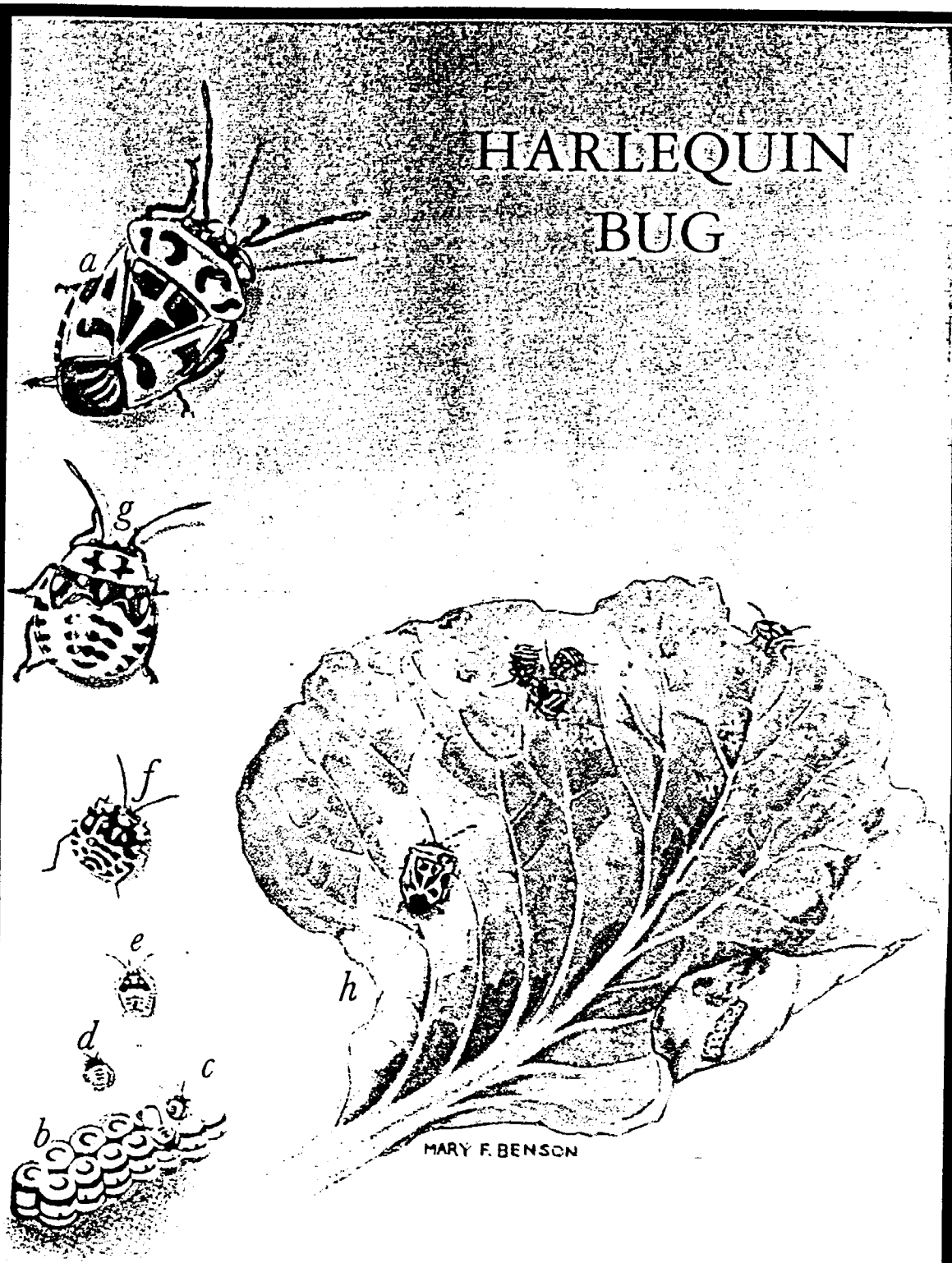


a, Male moth (or adult); *b*, eggs; *c*, larva; *d*, face of larva; *e*, pupa in a cell; *f*, moth in resting posture; *g*, wing of female moth; *h*, feeding injury to corn plant. (*a*, *c*, *e*, *f*, *g*, *h*, about one and one-third times natural size; *b*, twice natural size; *d*, eight times natural size.)

LESSER MIGRATORY GRASSHOPPER



Background showing badly damaged wheat plant. *a*, Second-stage nymph; *b*, fourth-stage nymph; *c*, adult male; *d*, female laying eggs; *e*, adult male in flight; *f*, egg pod in soil. (All about natural size.)



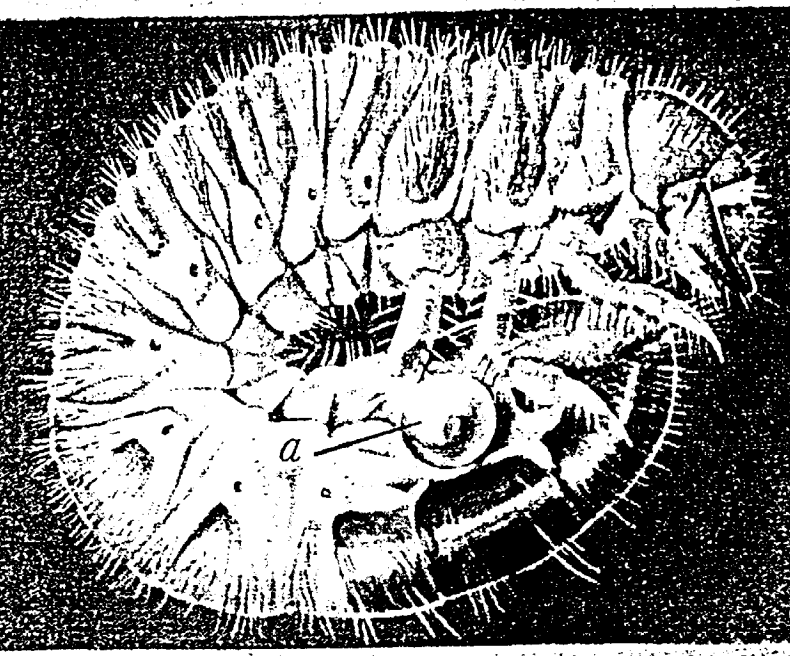
a. Adult; *b*, eggs; *c* to *g*, young, or nymphs; *h*, damaged cabbage leaf with nymphs, adult bug, and eggs. (*a* and *c* to *g*, about three times natural size; *b*, about four times natural size; *h*, about natural size.)

IMPORTED CABBAGEWORM

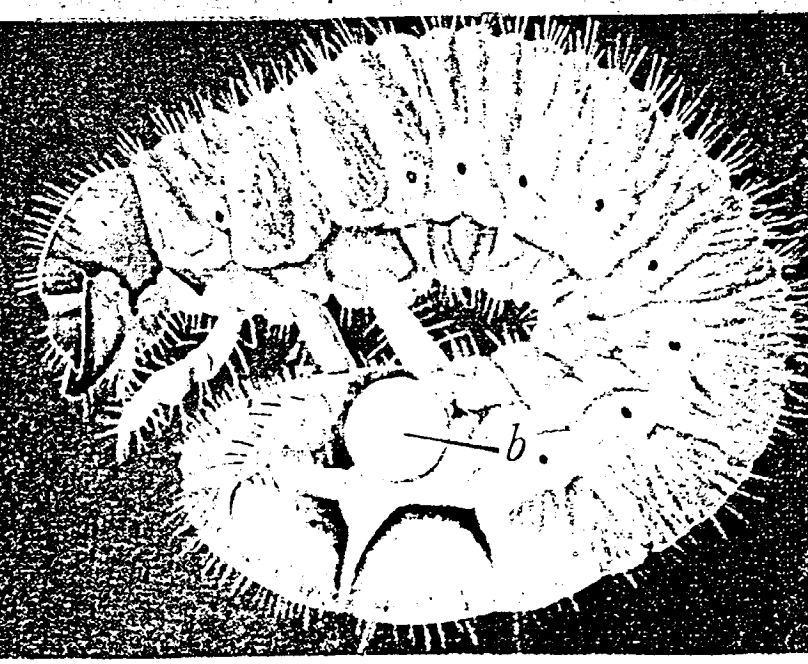
a, Butterflies (or adults) with wings in natural positions; *b*, larvae (caterpillars, or "worms"); *c*, pupae (chrysalids, the resting stage); *d*, cabbage plant showing typical feeding injuries. (Upper illustration: *a*, *b*, and *c*, about one-half natural size; *d*, slightly less than two-thirds natural size. Lower illustration: *a*, *b*, and *c*, about natural size.)

A, Mature grub in spring feeding on roots in underground burrow. *B*, Pupa in underground cell. *C*, Adult beetle emerged from earth. *D*, Beetles feeding on smartweed. *E*, Beetles feeding on grape leaves. *F*, Beetles feeding on apple leaves. *G*, Female beetle depositing eggs in soil at bottom of shallow burrow. *H*, Egg. *I*, Egg hatching and young grubs. *J*, Partly grown grub in fall.

MILKY DISEASE
In Japanese Beetle Grubs
(Drawings greatly enlarged)



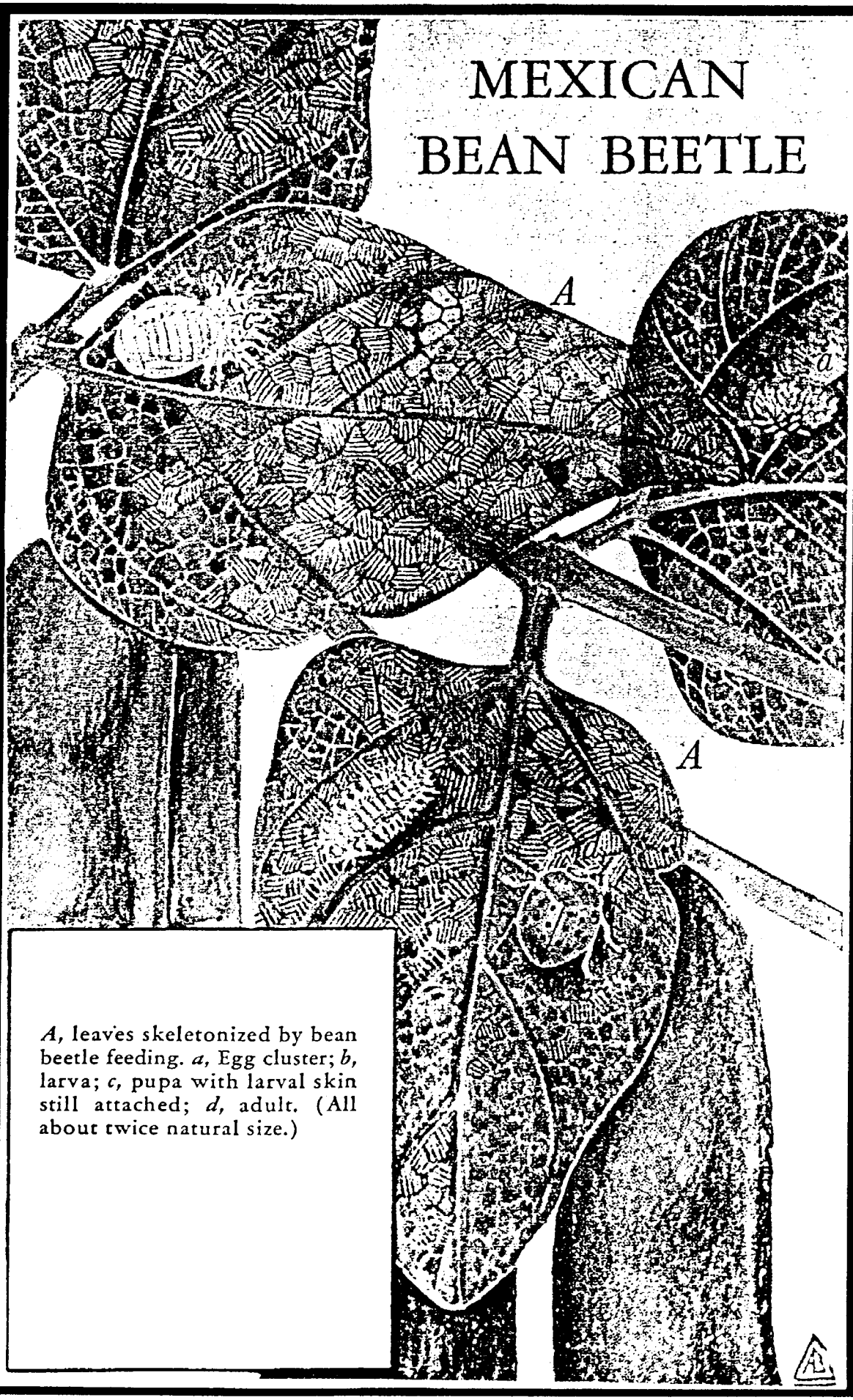
Healthy grub; *a*, droplet of normal translucent blood.



Diseased grub showing lack of color and *b*, droplet of opaque "milky" blood.

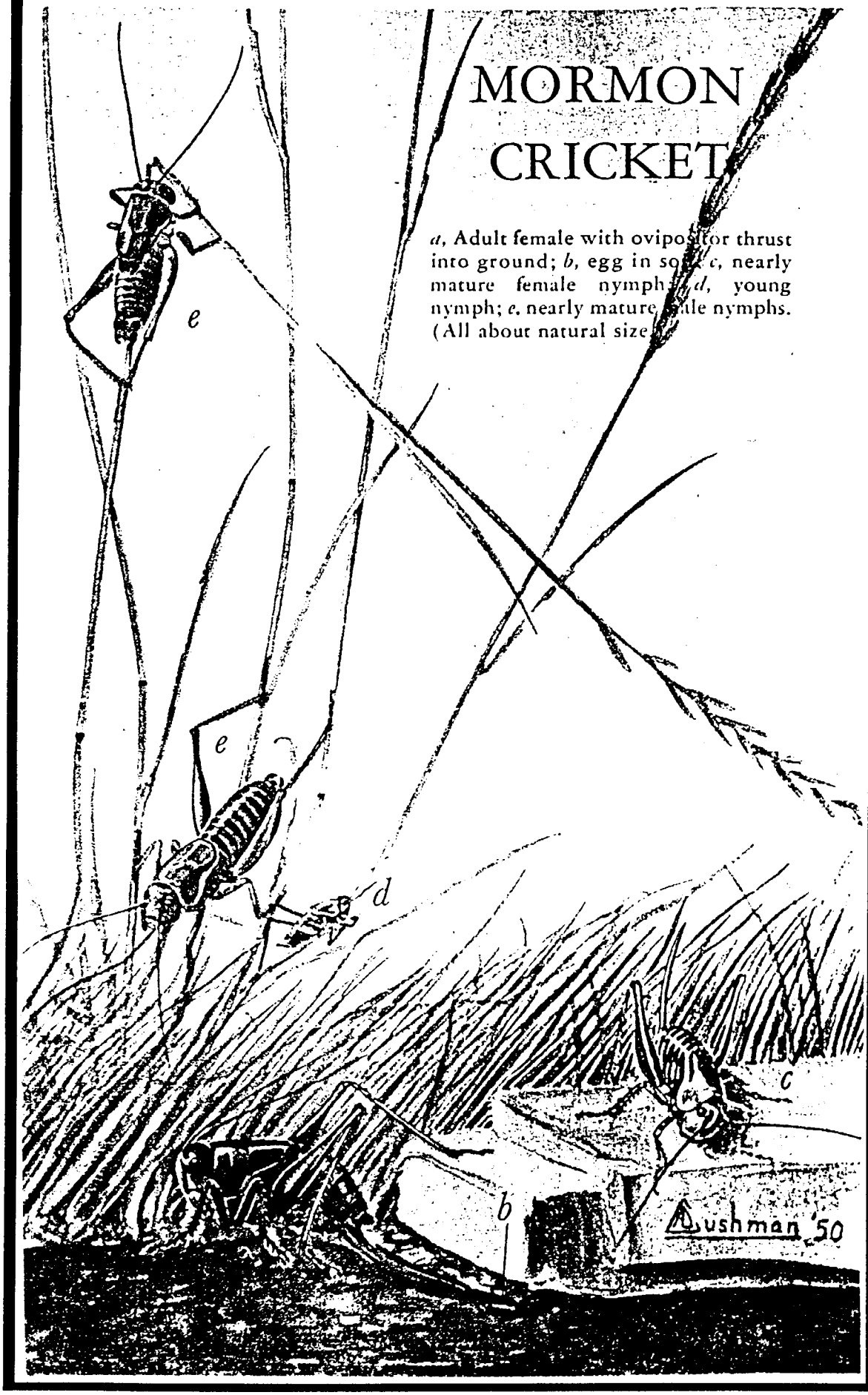
Gushman '50

MEXICAN BEAN BEETLE

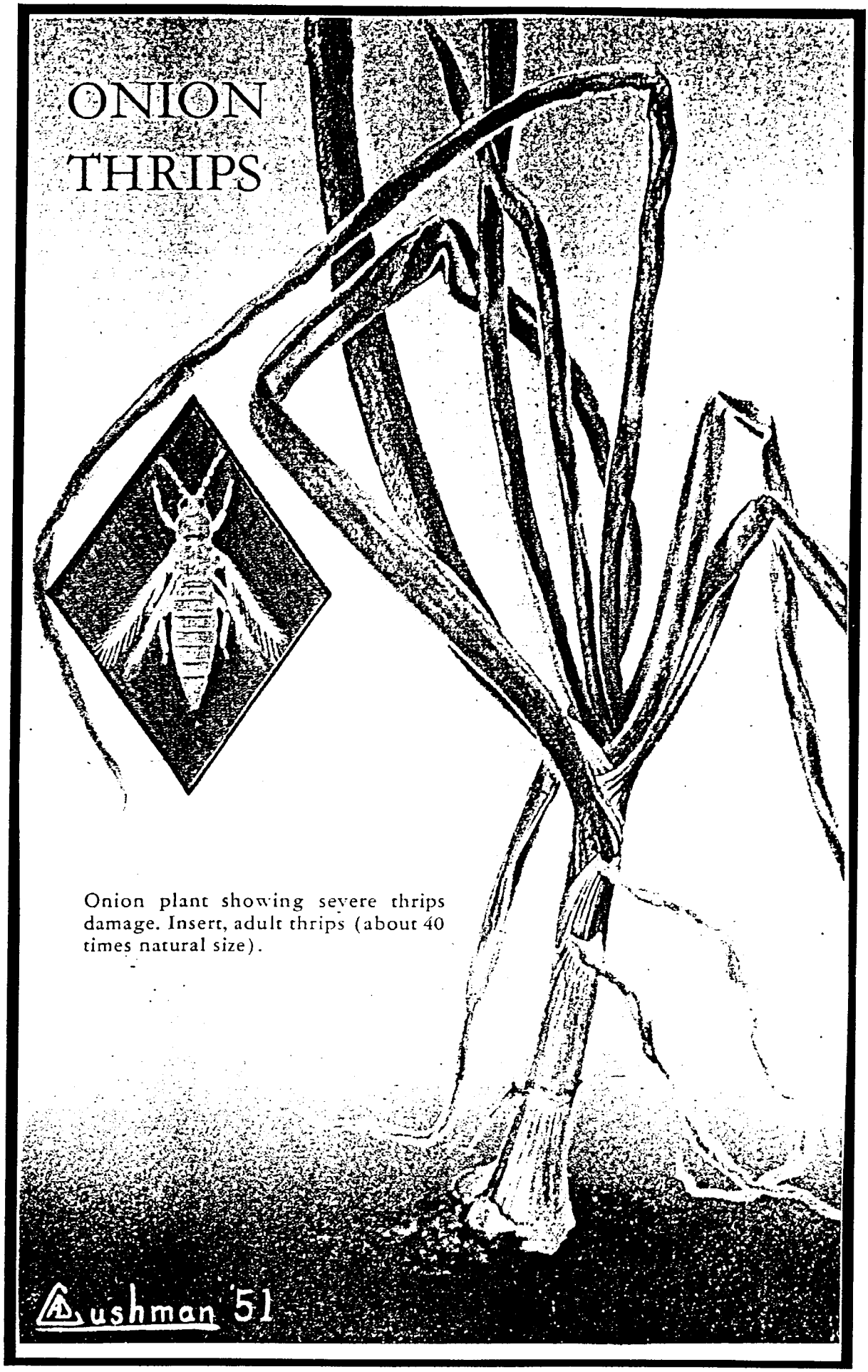


A, leaves skeletonized by bean beetle feeding. *a*, Egg cluster; *b*, larva; *c*, pupa with larval skin still attached; *d*, adult. (All about twice natural size.)

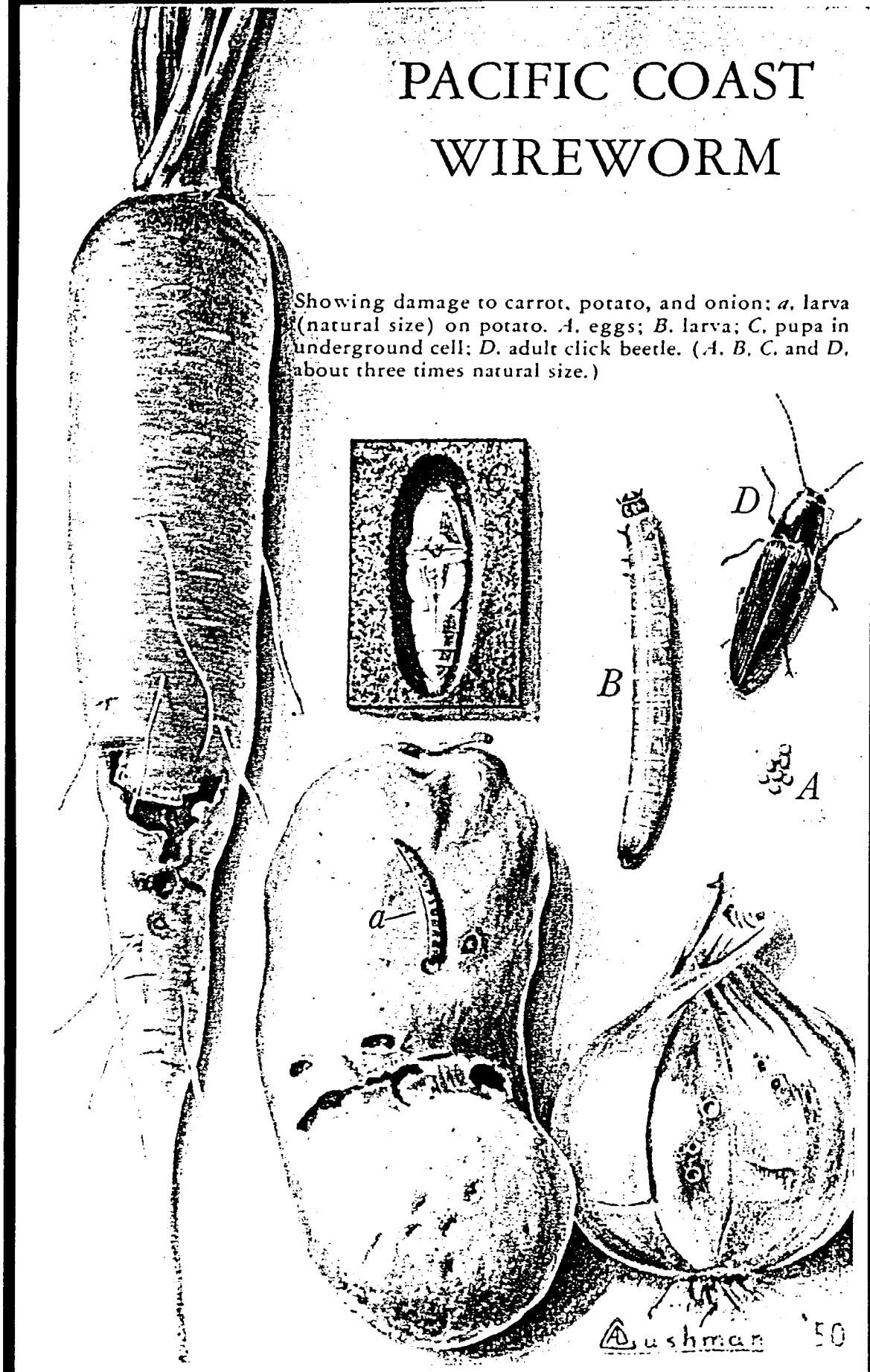
MORMON CRICKET



a, Adult female with ovipositor thrust into ground; *b*, egg in soil; *c*, nearly mature female nymph; *d*, young nymph; *e*, nearly mature male nymphs. (All about natural size.)

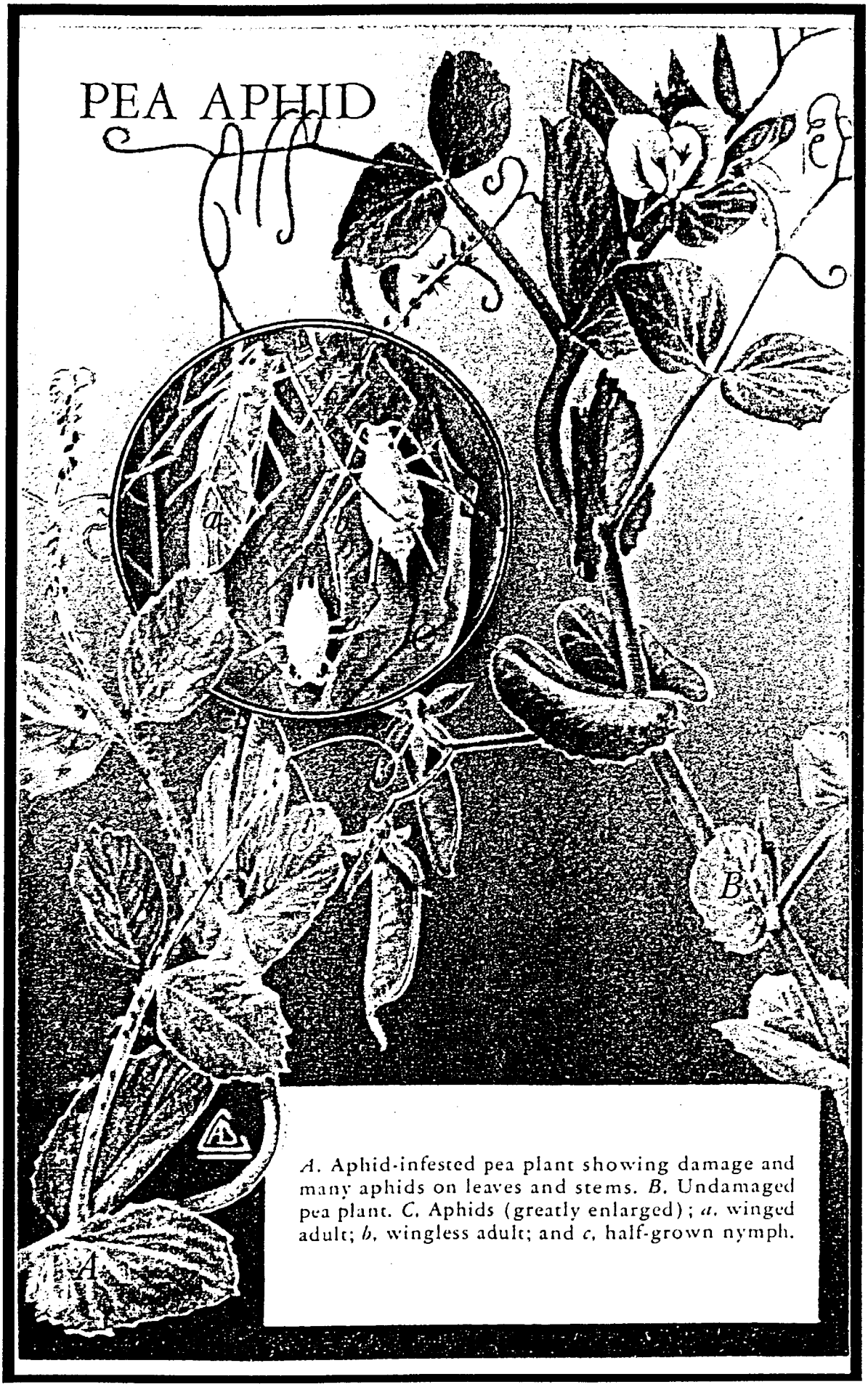

ONION
THRIPS
Onion plant showing severe thrips damage. Insert, adult thrips (about 40 times natural size).
Aushman 51

PACIFIC COAST WIREWORM



Showing damage to carrot, potato, and onion; *a*, larva (natural size) on potato. *A*, eggs; *B*, larva; *C*, pupa in underground cell; *D*, adult click beetle. (*A*, *B*, *C*, and *D*, about three times natural size.)

PEA APHID

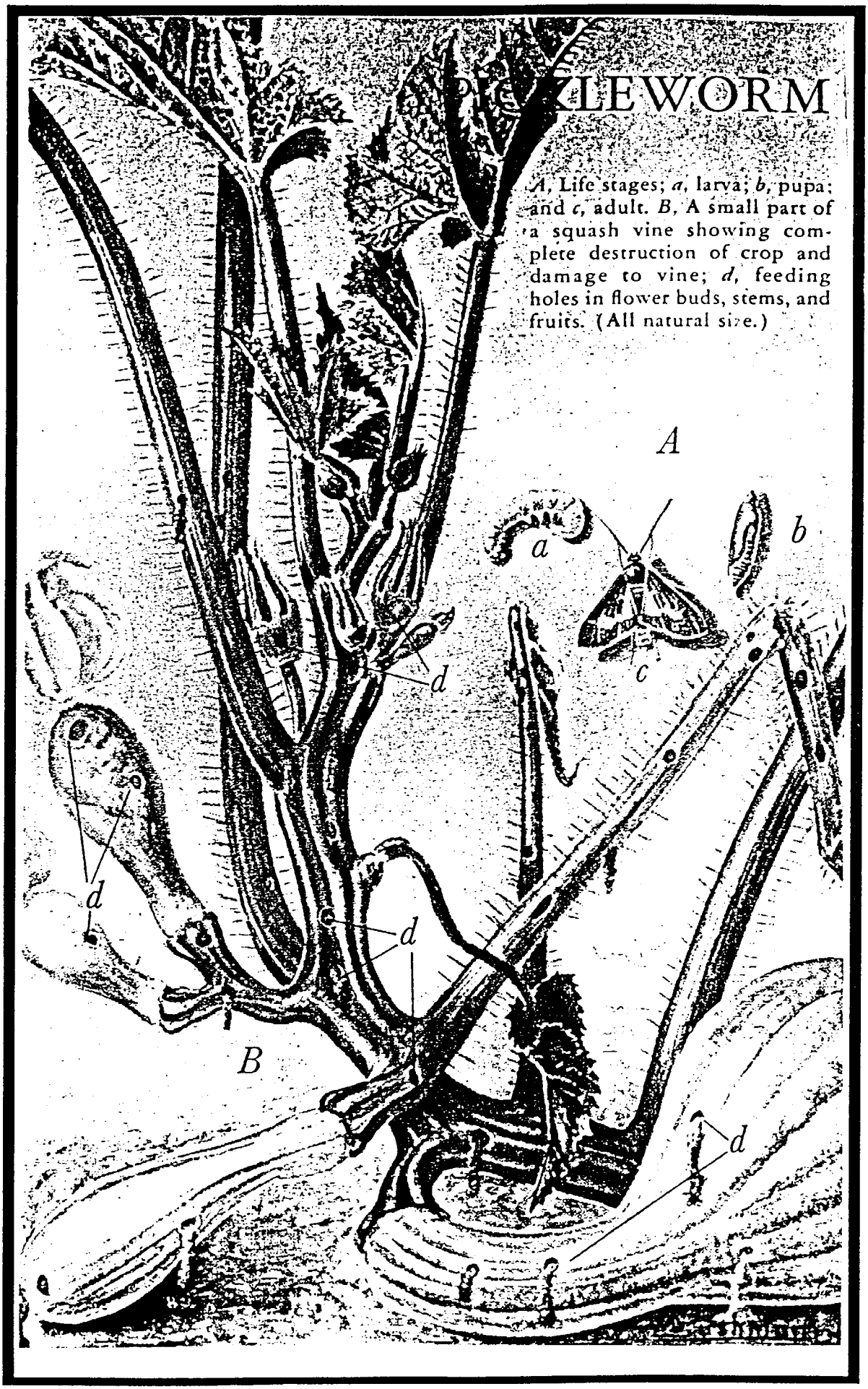


A. Aphid-infested pea plant showing damage and many aphids on leaves and stems. *B*. Undamaged pea plant. *C*. Aphids (greatly enlarged); *a*, winged adult; *b*, wingless adult; and *c*, half-grown nymph.

A, Life stages (greatly enlarged): *a*, adult; *b*, pupa, *c*, larva; *d*, egg. *B*, Stem of pea vine with life-size adult in bloom, *e*. *C*, Small pod with several eggs attached. *D*, Larva in seed (considerably enlarged).

LEWORM

A, Life stages; *a*, larva; *b*, pupa; and *c*, adult. *B*, A small part of a squash vine showing complete destruction of crop and damage to vine; *d*, feeding holes in flower buds, stems, and fruits. (All natural size.)



POTATO LEAFHOPPER

a. Adult leafhopper; *b*. nymphs; *c*. potato leaflets, showing upcurled brown tips and margins, known as hopperburn, caused by the feeding of leafhoppers. (*a* and *b*, about 14 times natural size; *c*, about three-fourths natural size.)

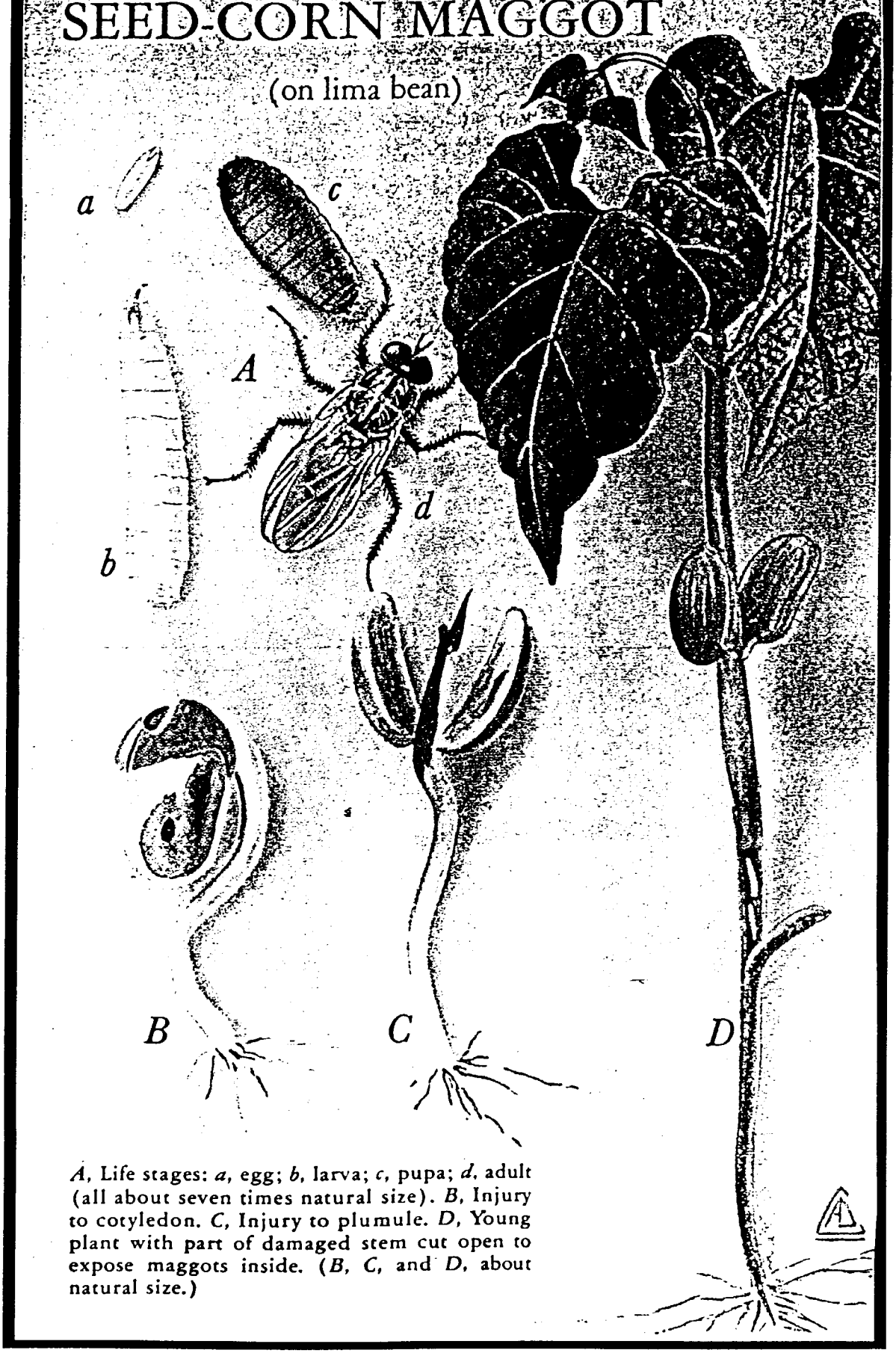
POTATO LEAFHOPPER ON ALFALFA

A, Damaged plant showing discolored leaves, short internodes, and lack of bloom. *B*, The insect (greatly enlarged); *a*, nymph; *b*, adult.

Bushman '51

SEED-CORN MAGGOT

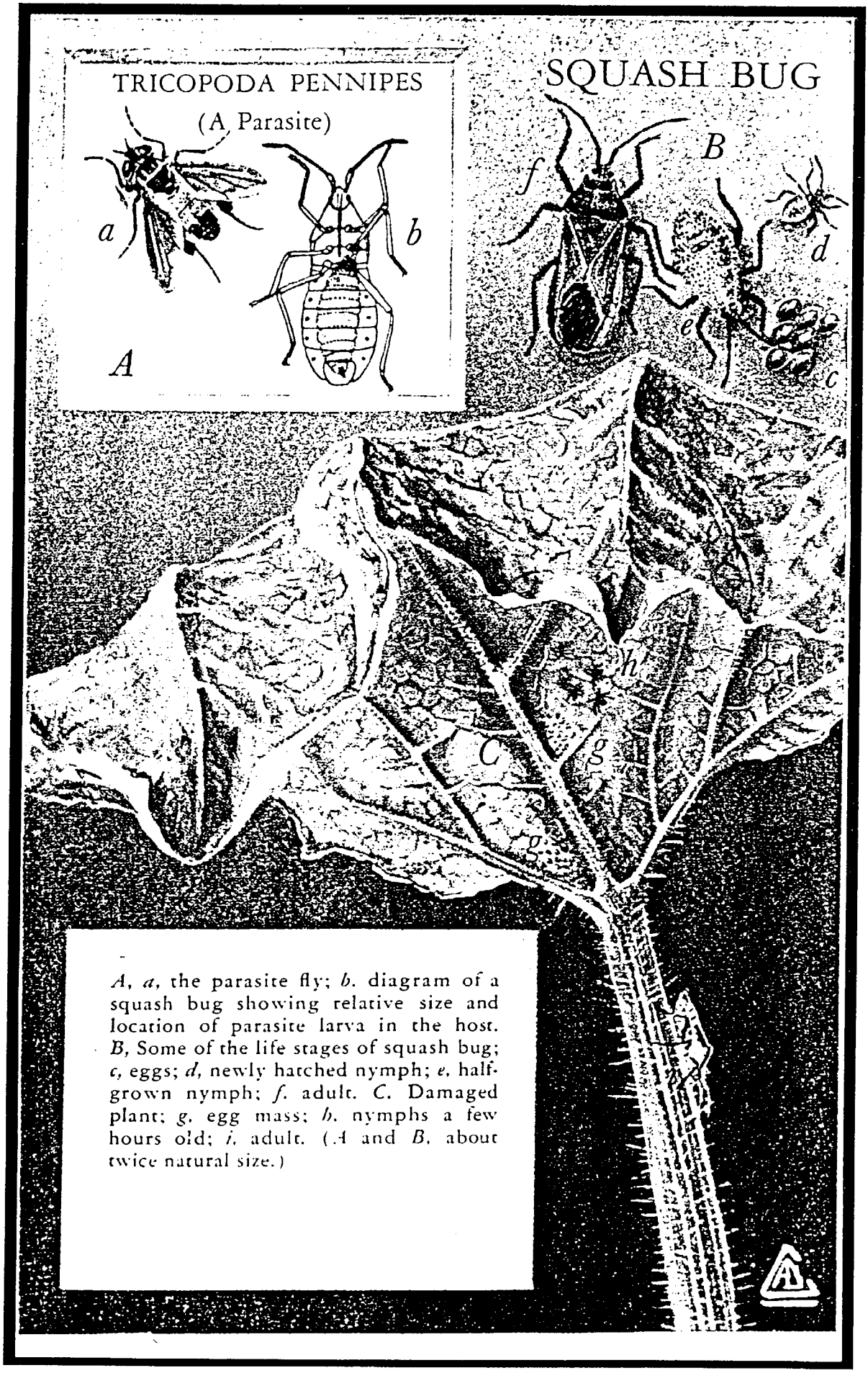
(on lima bean)



A, Life stages: *a*, egg; *b*, larva; *c*, pupa; *d*, adult (all about seven times natural size). *B*, Injury to cotyledon. *C*, Injury to plumule. *D*, Young plant with part of damaged stem cut open to expose maggots inside. (*B*, *C*, and *D*, about natural size.)

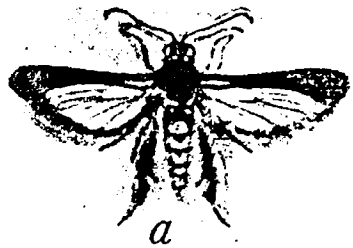
STRIPED CUCUMBER BEETLE

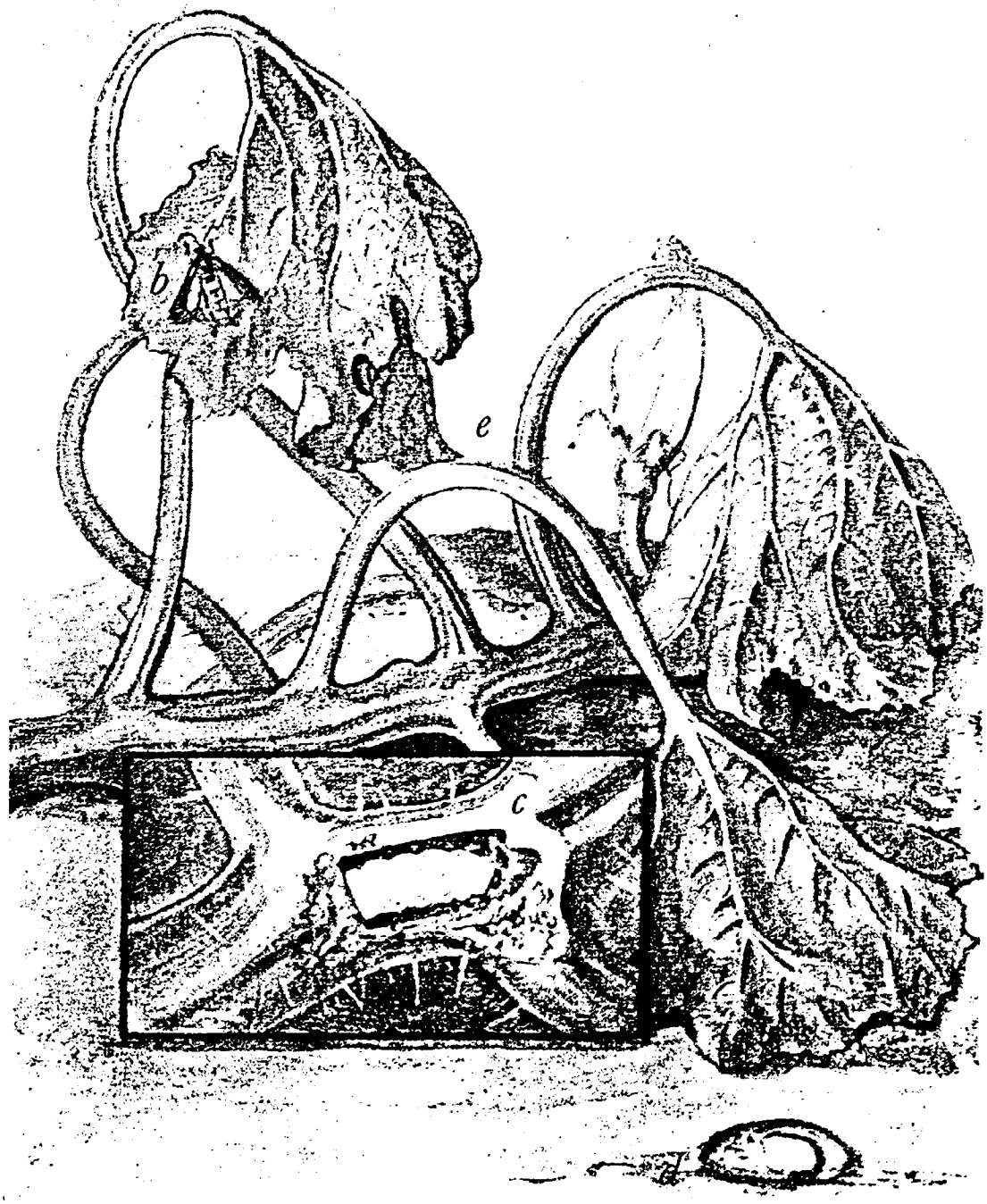
a, Adult beetle; *b*, underground stem of cucumber seedling cut open to show larva (grub, or "worm") feeding within; *c*, small cucumber plants showing characteristic feeding by adult beetles on leaves and stems. (*a*, about seven times natural size; *b*, about twice natural size; *c*, about three-fourths natural size.)



A, *a*, the parasite fly; *b*, diagram of a squash bug showing relative size and location of parasite larva in the host. *B*, Some of the life stages of squash bug; *c*, eggs; *d*, newly hatched nymph; *e*, half-grown nymph; *f*, adult. *C*, Damaged plant; *g*, egg mass; *h*, nymphs a few hours old; *i*, adult. (*A* and *B*, about twice natural size.)

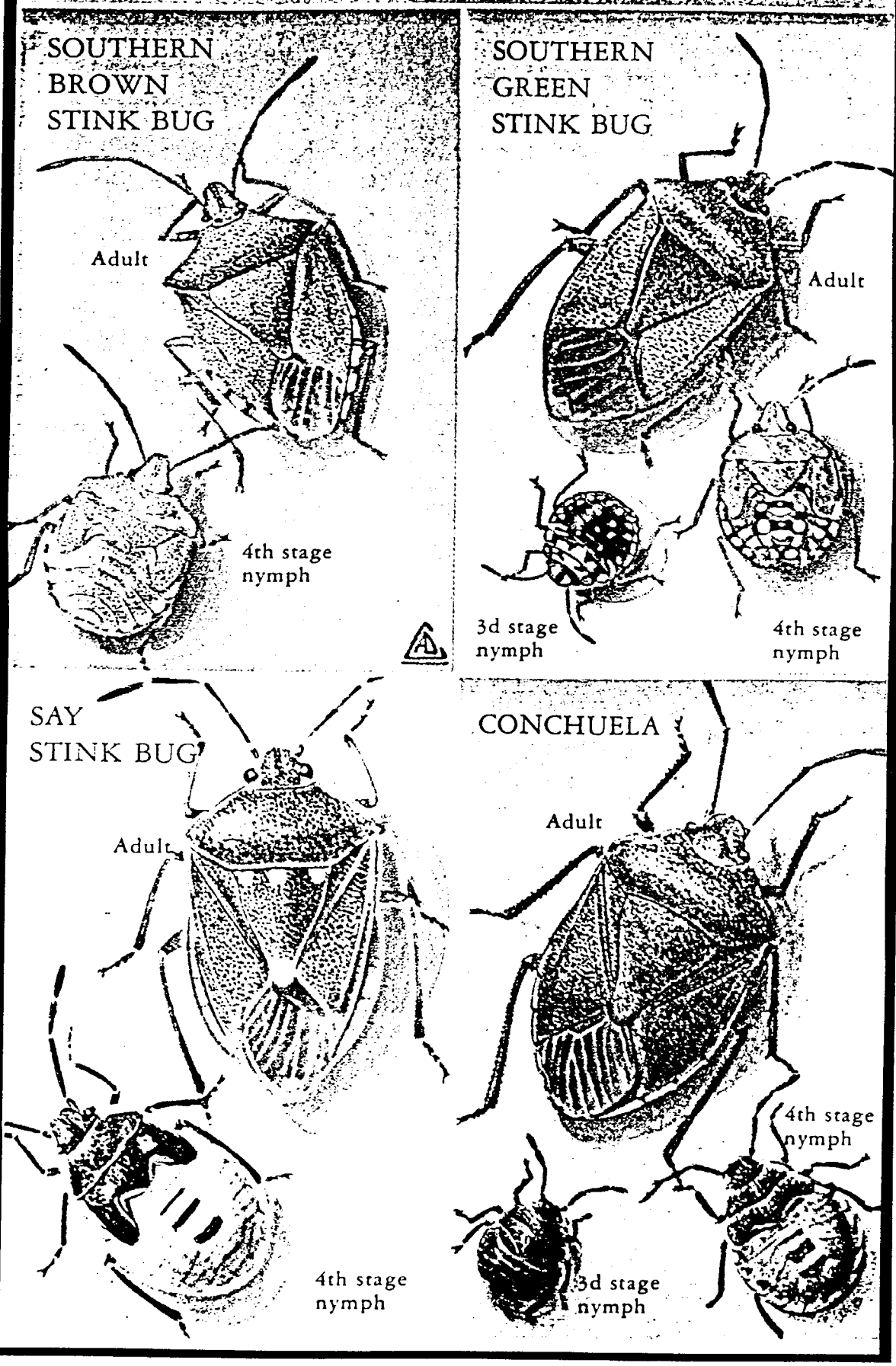
SQUASH VINE BORER



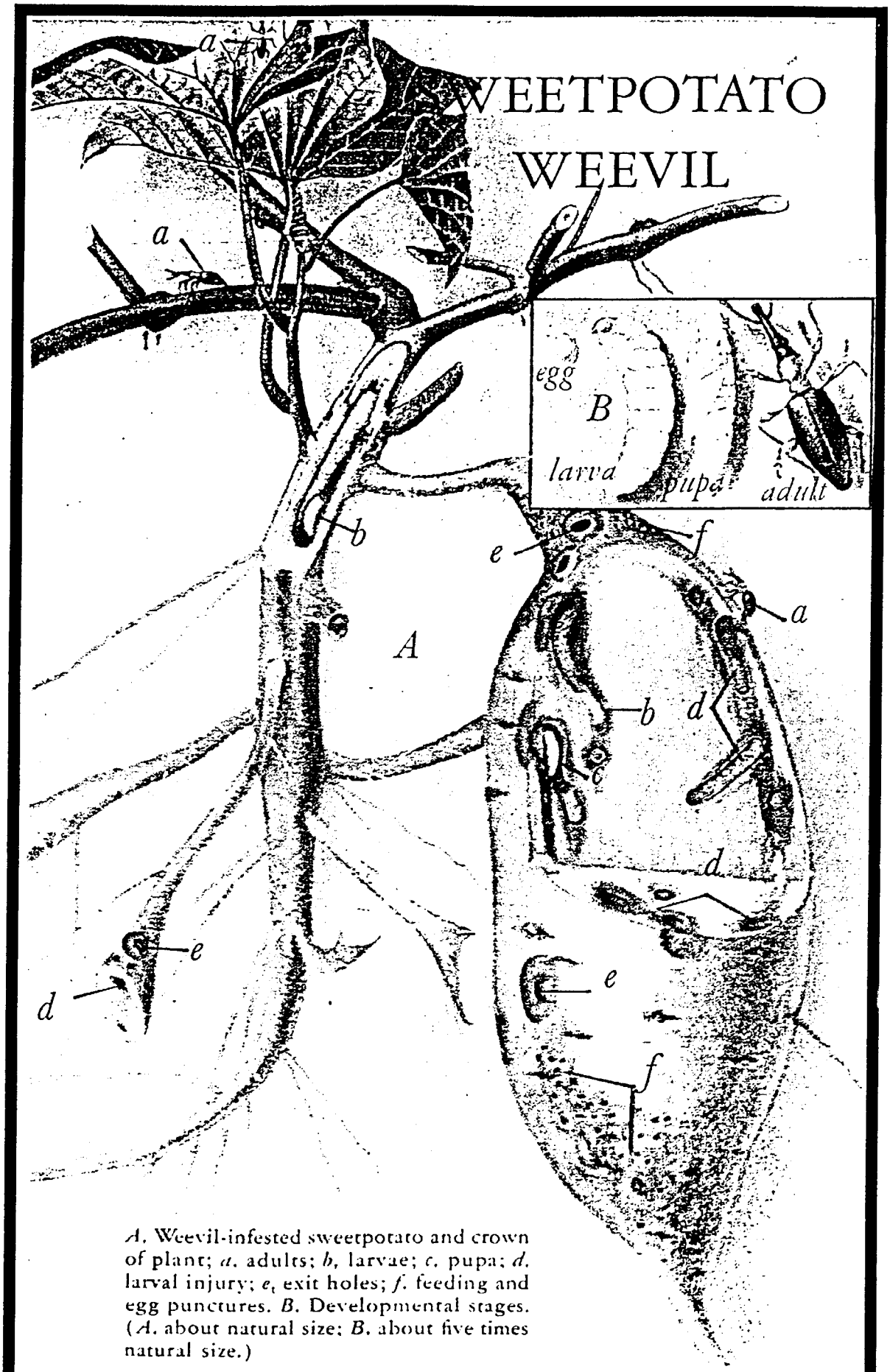


a. Moth (or adult) with wings spread; *b*. moth with wings partly folded; *c*. part of squash stem (enlarged) cut open to show borer (or larva) feeding within; *d*. pupal cell in soil cut open to show pupa (or resting state) inside; *e*. part of squash plant showing typical appearance of wilting caused by feeding of squash vine borer

STINK BUGS

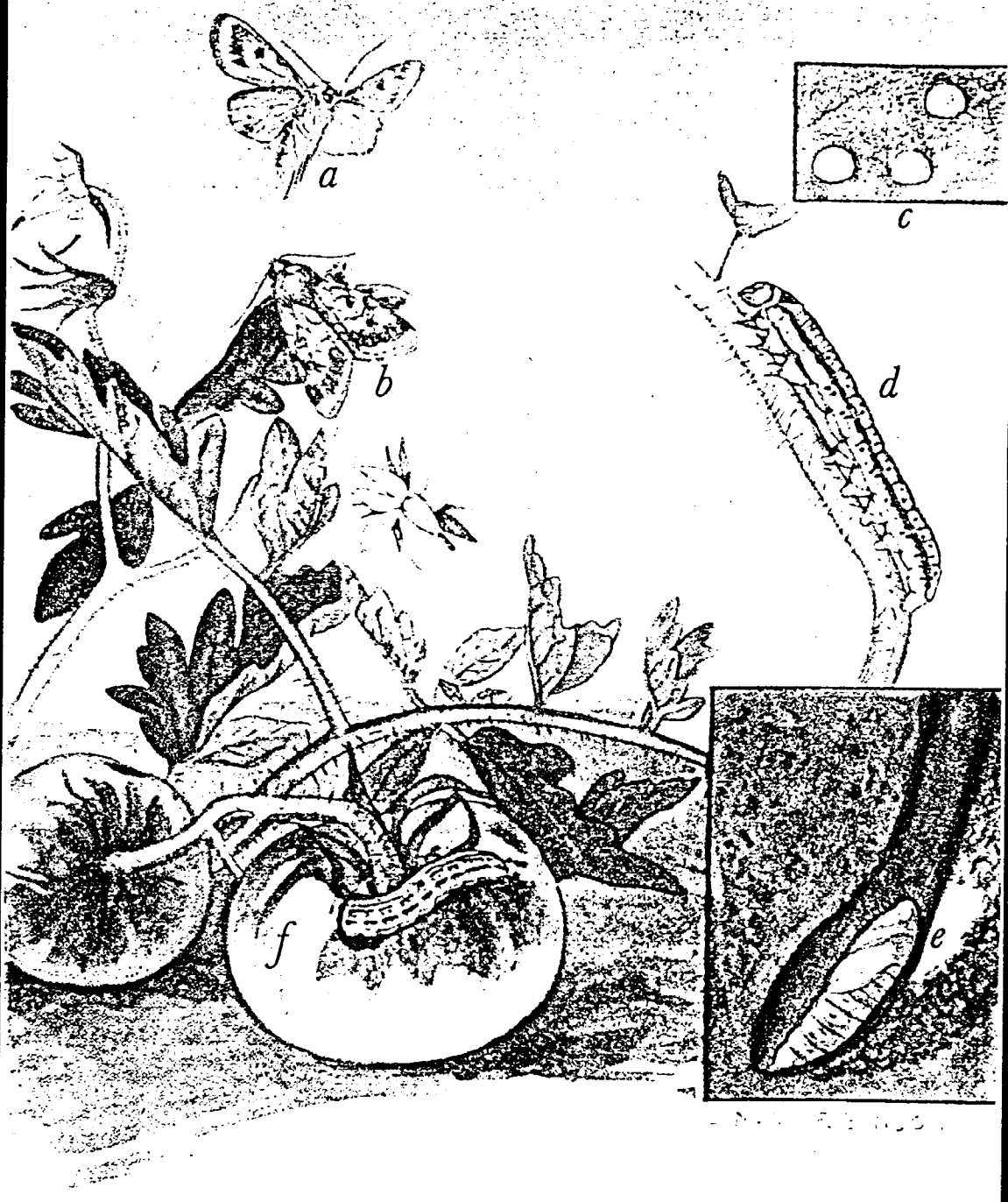

SOUTHERN BROWN STINK BUG
Adult
4th stage nymph
SOUTHERN GREEN STINK BUG
Adult
3d stage nymph
4th stage nymph
SAY STINK BUG
Adult
4th stage nymph
CONCHUELA
Adult
4th stage nymph
3d stage nymph

SWEETPOTATO WEEVIL



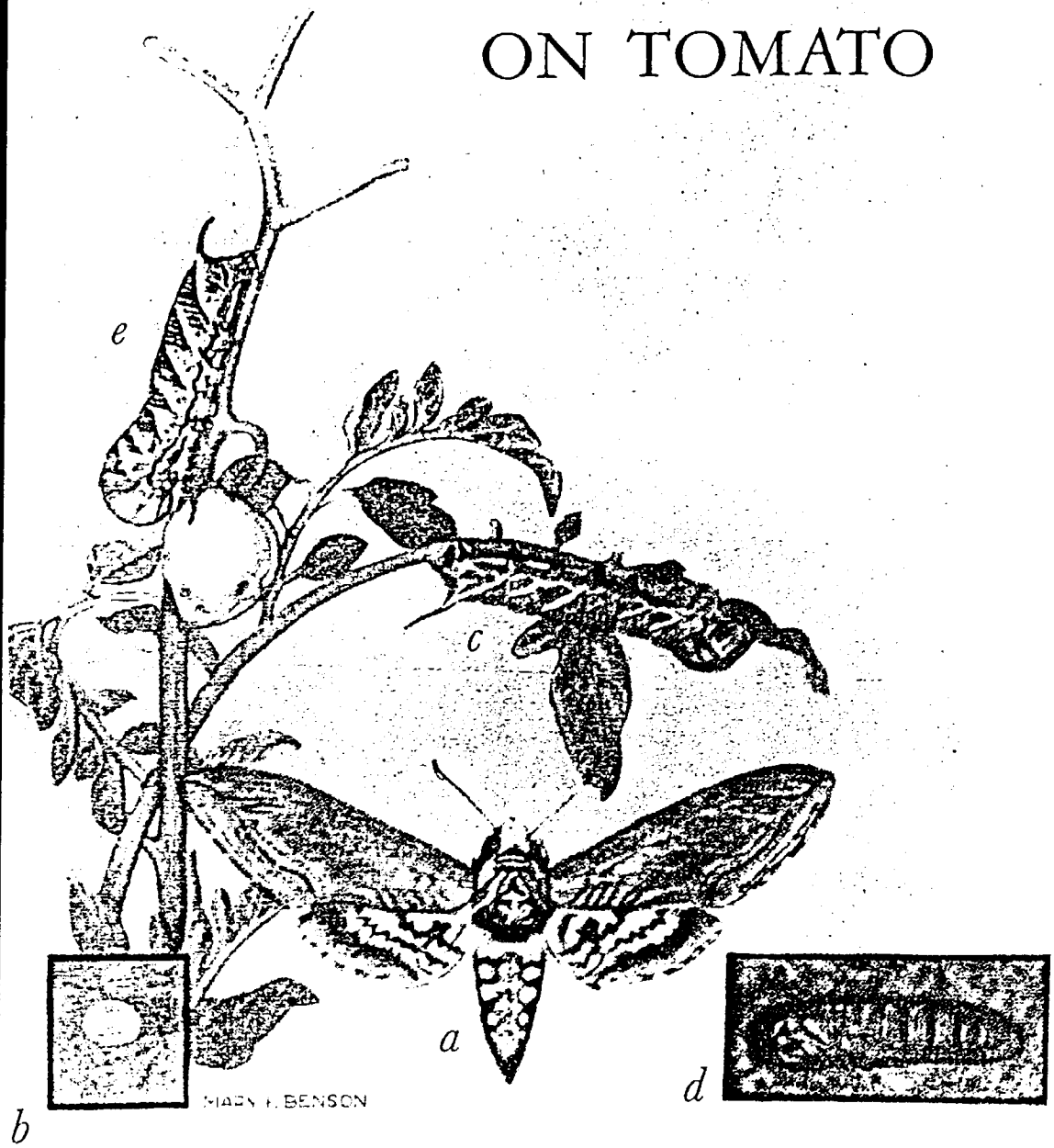
A. Weevil-infested sweetpotato and crown of plant; *a*, adults; *b*, larvae; *c*, pupa; *d*, larval injury; *e*, exit holes; *f*, feeding and egg punctures. *B*. Developmental stages. (*A*, about natural size; *B*, about five times natural size.)

TOMATO FRUITWORM

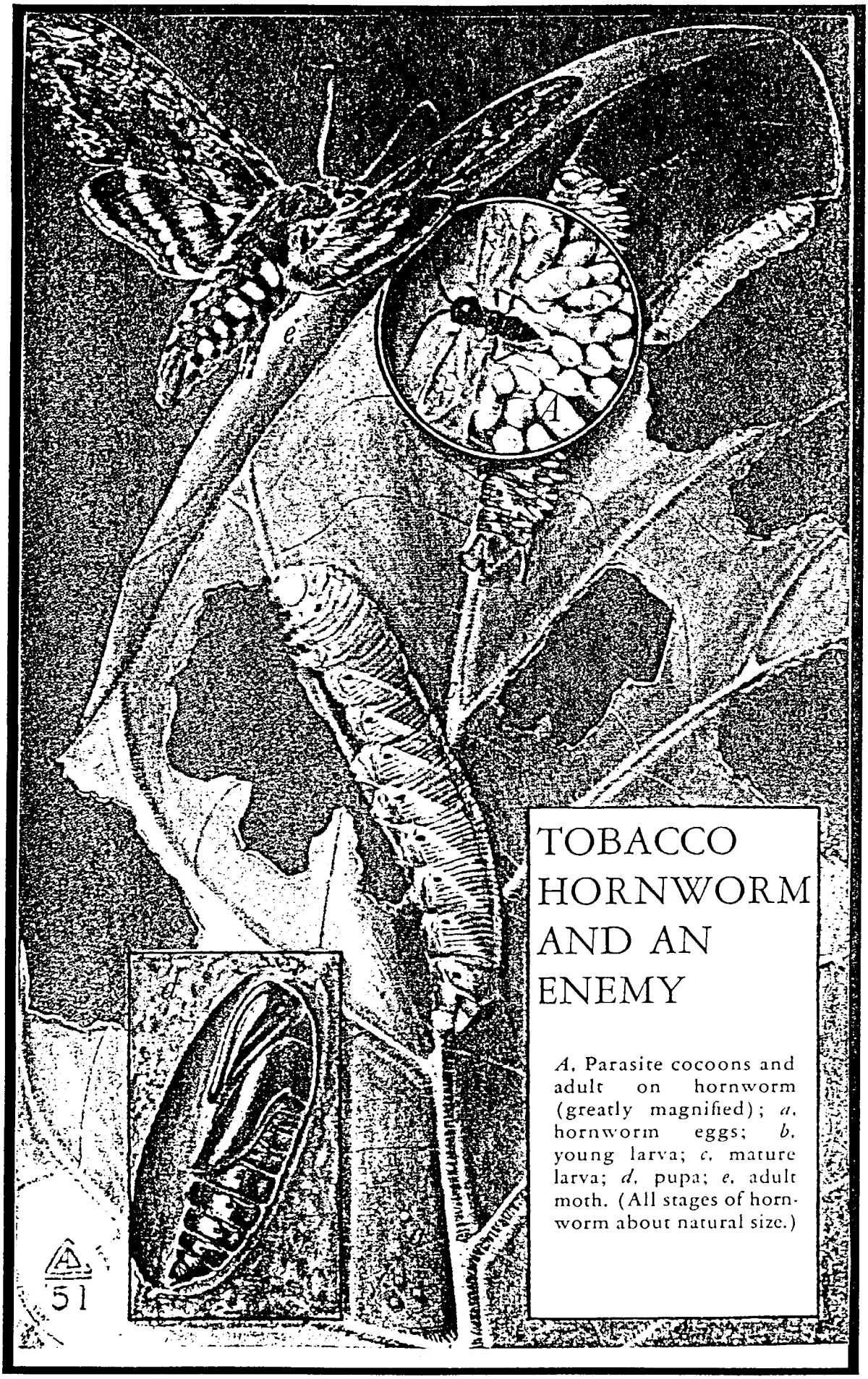


a, Female moth (or adult) with wings spread; *b*, male moth with wings in natural position; *c*, eggs; *d*, larva; *e*, pupa (or transformation stage) in its cell in the soil; *f*, larva feeding on tomato fruit, showing typical injury. (*a*, *b*, and *f*, about two-thirds natural size; *c*, about seven times natural size; *e*, about one and one-third natural size.)

HORNWORMS ON TOMATO



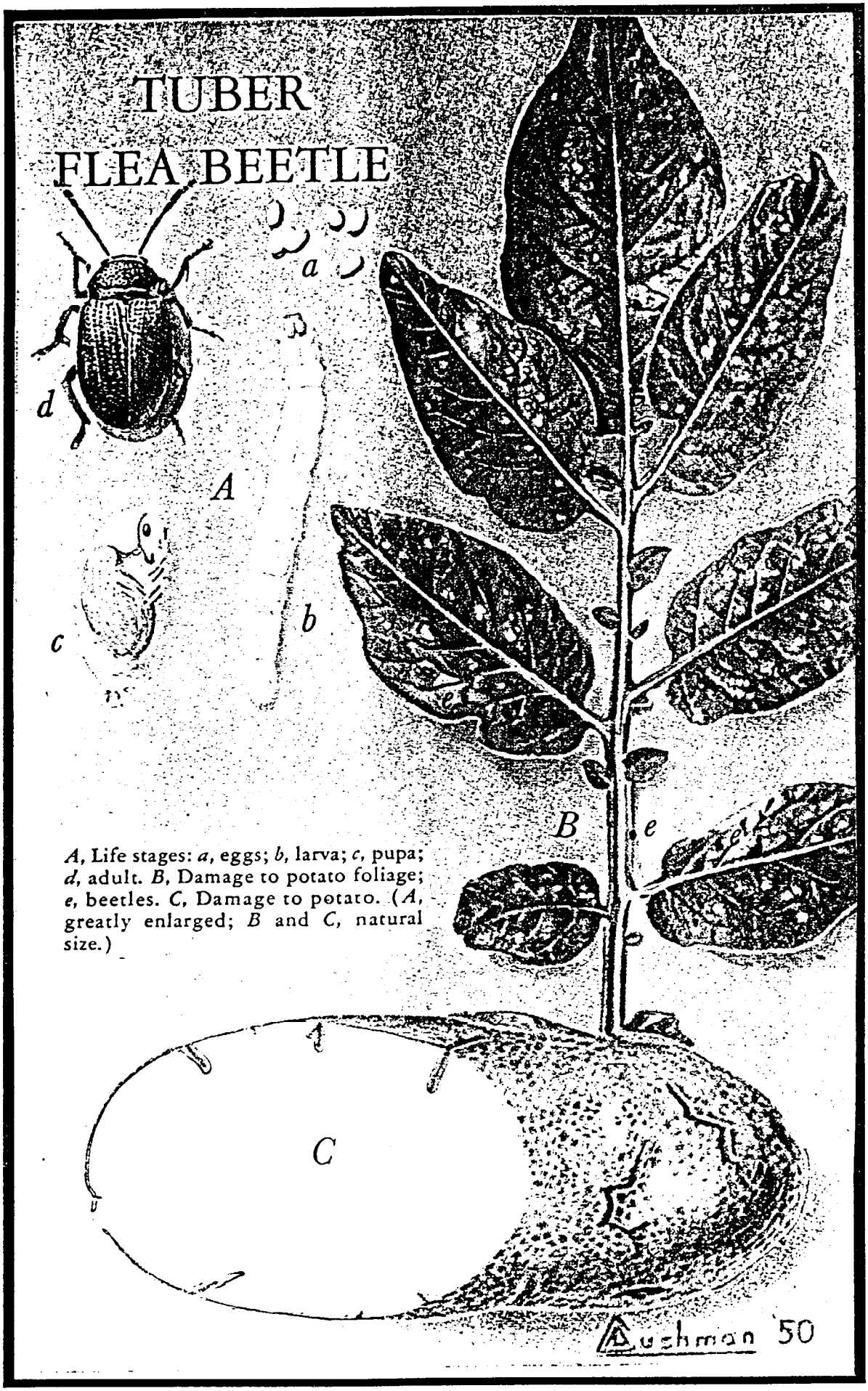
a. Tomato hornworm moth (or adult) with wings spread; *b*. egg; *c*. larva, dark form; *d*. pupa (or resting stage); *e*. tobacco hornworm larva, light form. (*a*. about three-fourths natural size; *b*. about four times natural size; *c*. *d*. and *e*. about one-half natural size.)



TOBACCO HORNWORM AND AN ENEMY

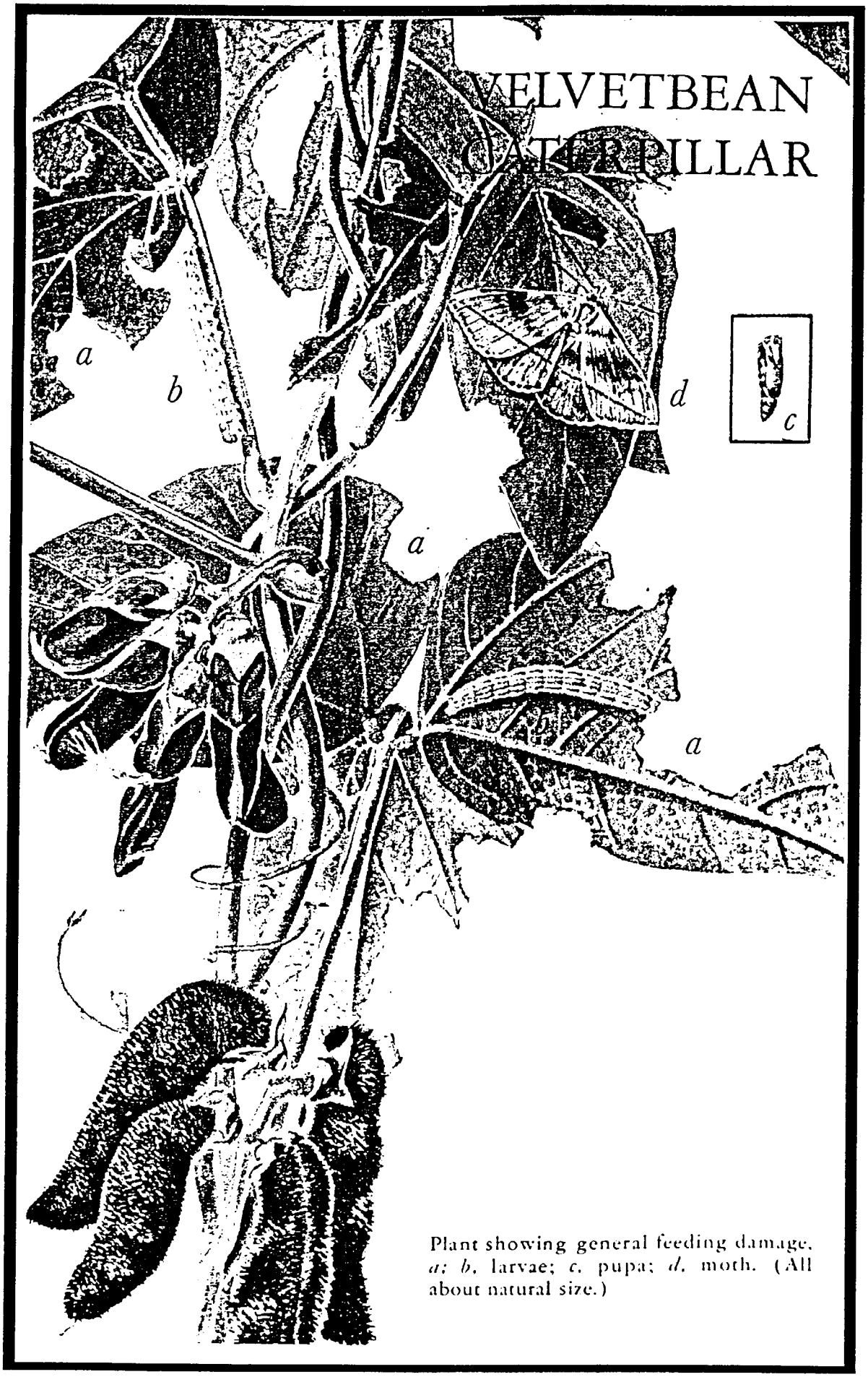
A, Parasite cocoons and adult on hornworm (greatly magnified); *a*, hornworm eggs; *b*, young larva; *c*, mature larva; *d*, pupa; *e*, adult moth. (All stages of hornworm about natural size.)

TUBER FLEA BEETLE

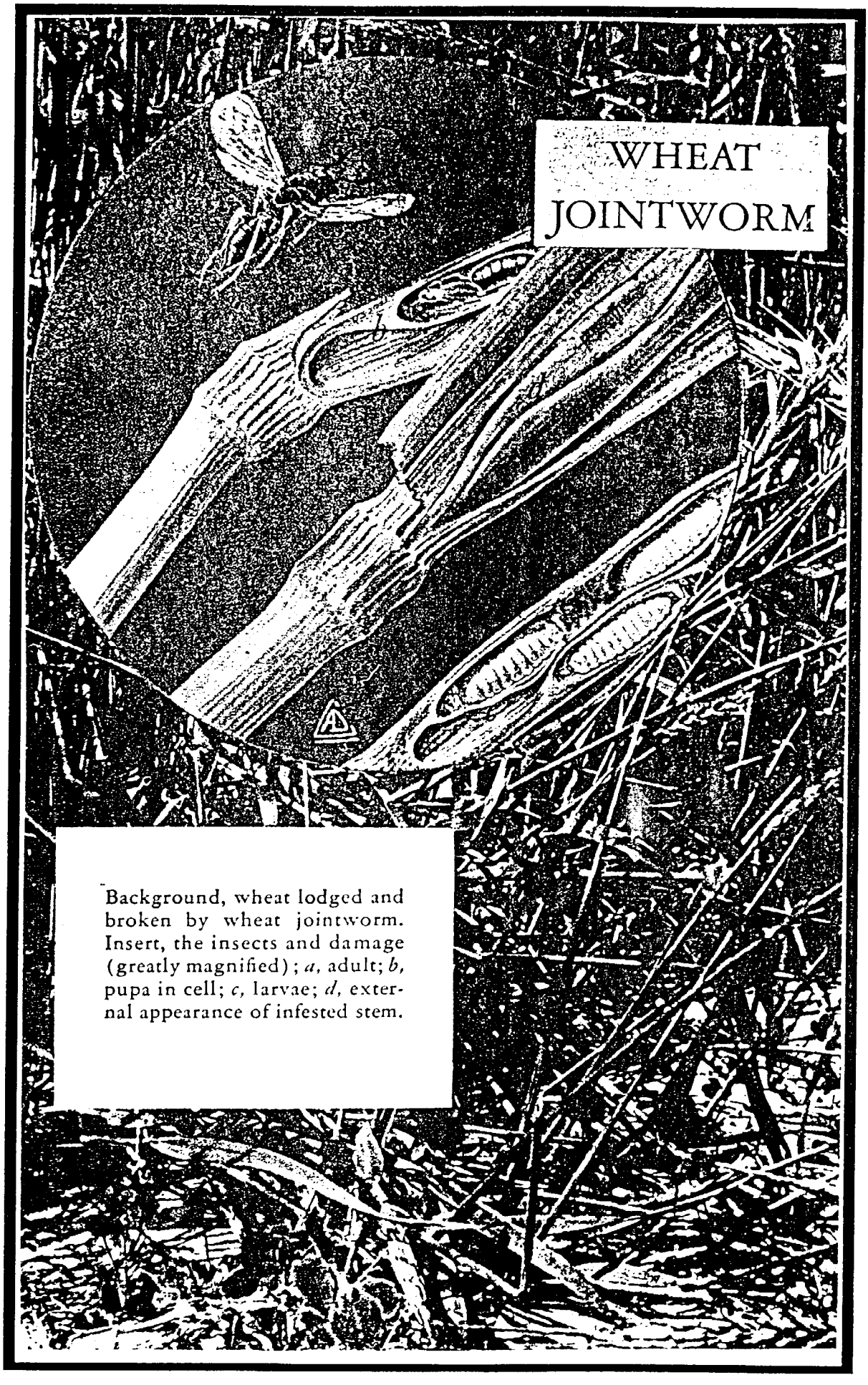


A, Life stages: *a*, eggs; *b*, larva; *c*, pupa; *d*, adult. *B*, Damage to potato foliage; *e*, beetles. *C*, Damage to potato. (*A*, greatly enlarged; *B* and *C*, natural size.)

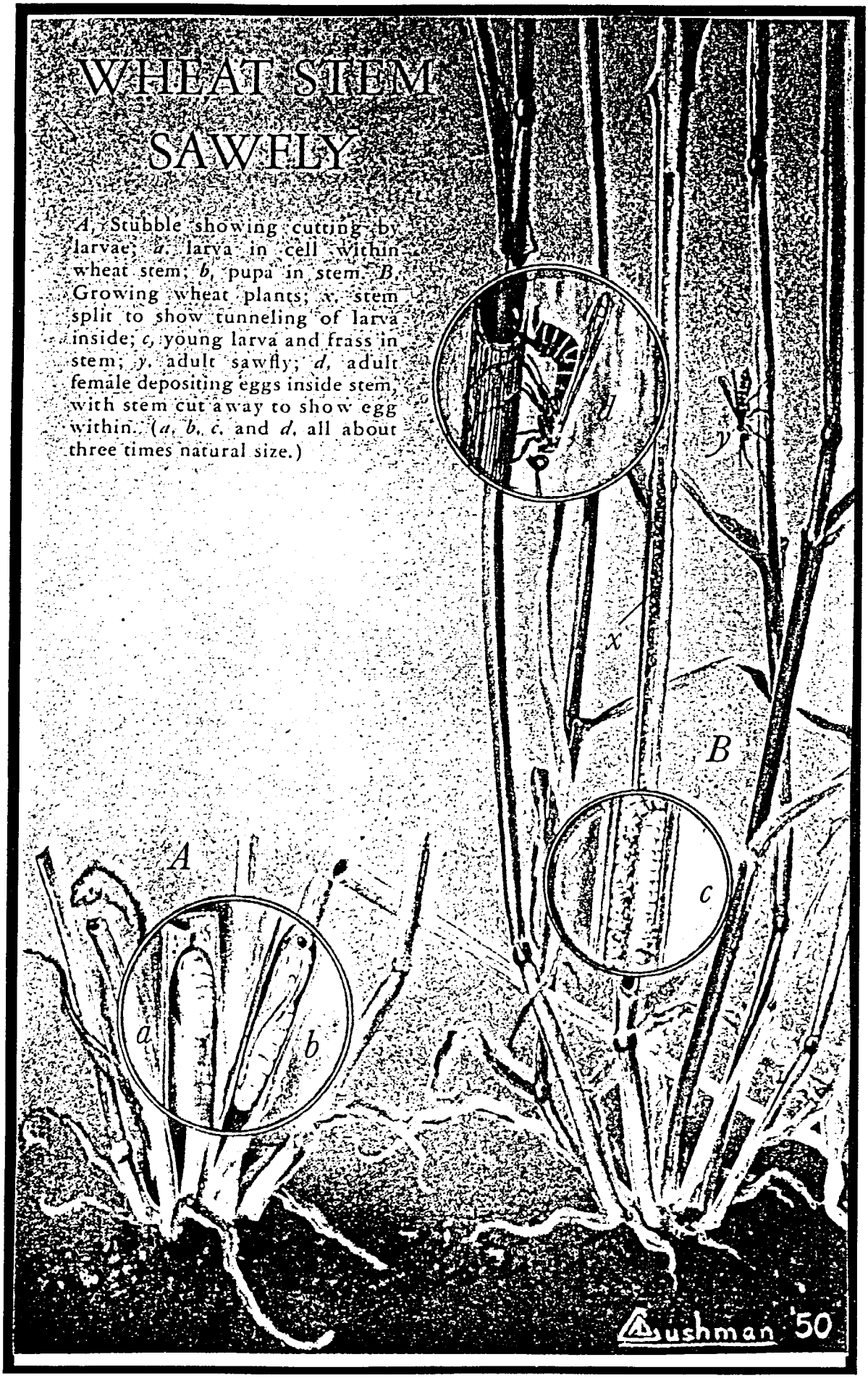
VELVETBEAN CATERPILLAR



Plant showing general feeding damage, *a*; *b*, larvae; *c*, pupa; *d*, moth. (All about natural size.)



Background, wheat lodged and broken by wheat jointworm. Insert, the insects and damage (greatly magnified); *a*, adult; *b*, pupa in cell; *c*, larvae; *d*, external appearance of infested stem.


WHEAT STEM SAWFLY
A, Stubble showing cutting by larvae; a, larva in cell within wheat stem; b, pupa in stem. B, Growing wheat plants; x, stem split to show tunneling of larva inside; c, young larva and frass in stem; y, adult sawfly; d, adult female depositing eggs inside stem, with stem cut away to show egg within. (a, b, c, and d, all about three times natural size.)
A
a
b
B
c
d
x
y
Bushman '50


WHITE GRUBS
A, Adult beetles feeding on white oak leaf. B, Grub feeding on roots of young corn plant. C, Life stages including a, eggs in earth cells; b, fully developed grub; and c, pupa in earth cell. (All about natural size.)
A
b
a
C
B

Vegetables, Grains & Garden Fruits

****All varieties listed are open-pollinated**

Amaranth

Grain Varieties:	All Red, Bolivia 153, Burgundy, Golden Giant, Grain Amaranth, Green Top, Intense Purple, Manna, Multicolor, Pygmy Torch and many more.
Leaf Varieties:	Early Splendor, Flaming Fountain, Himalyan Celosia, Hopi Red Dye, Joseph's Coat, Love-Lies-Bleeding, Molten Fire, Rose Beauty, Red Stripe Leaf, Sunrise, Tampala, and many more.
Time to Plant:	From seed, a week or two before last spring frost
Distance between rows:	4 feet
Distance between plants:	18 inches for leaf varieties, 8-10 inches for seed varieties
Planting Depth:	1/4 -1/2 inch
Harvest:	Time varies with variety. Leaf varieties can be harvested earlier as a rule, some as early as 40 days after planting. Grain varieties may take 100-120 days for mature grain heads. Choose grain varieties that suit length of growing season in your area or start indoors in pots to get a jump on the season.
Yield:	Varies. Leaf varieties vary from 2 - 8 feet tall. The larger plants can yield a pound or more of greens each. Grain varieties can yield up to a pound of grain per plant.

Amaranth is an ancient, staple crop grown today for its delicious leaves and seed in Asian countries and in South America. A relative of ornamental amaranth, it is also growing in popularity as a food crop in Europe and North America. One reason is its superior nutrition. Its leaves, which are similar to spinach in flavor, contain more iron, calcium and other important nutrients than spinach or any other common greens. Its seeds are an astounding 16 percent protein and are high in the amino acid, lysine, an essential protein building block that is in poor supply in wheat, corn, oats, rice and barley. If eaten together with beans, amaranth's proteins are comparable or superior to meat, egg and dairy proteins -- without the artery-clogging fats.

Amaranth is especially suitable as a home grown food crop because of its high yield in a relatively small amount of space--up to a pound of seed grain per plant--and all the greens for stir-fry, soup and salad greens that you can use. On top of that, many varieties are downright beautiful to grow! Plants ranging from two feet to over ten feet tall are topped with spectacular seed heads bursting with colors ranging from white and gold to deep burgundy and even black. Leaves range from deep, solid green to green streaked with red, to solid burgundy.

Some tips for growing: follow package directions for the variety you are growing. When thinning plants for proper spacing, eat the thinnings in stir-fry dishes -- your first harvest. Though leaves and head of all varieties are edible, if you plan to harvest heavy-headed, larger seed varieties for grain, thin plants to eight to ten inches apart so they can lean on one another for support. Plants that are top-heavy with seed are easy targets for toppling by a heavy windstorm. Or, if you have only grown a few, stake them for support.

To harvest, seeds from dry, ripe amaranth heads are shaken or rubbed from heads inside a cloth sack such as a pillowcase. A fine sieve or strainer allows clean seed to fall through into a bowl or other container. Seed can then be included--ground or whole-- in bread, muffin or cake recipes, toasted and used as cereal, cooked like rice or saved for next year's planting. Some amaranth varieties are especially suitable for popping, just like popcorn, in a heavy pan.

Given all its merits, amaranth should be considered a nutritious, productive, easy-to-grow, self-sufficiency staple.

Artichokes, Jerusalem

Varieties:	Long Red, Magenta, Mammoth French White, Jack's Copperclad, Fuseau, Golden Nugget, Smooth Garnet, Firehouse, Freedom
Time to Plant:	Plant tubers any time from very early spring through fall
Quantity:	For a family of four, one or two tubers should be plenty...they're as fruitful as rabbits! You can expand next year if you have the space. You'll definitely have the tubers!
Distance between plants:	2 feet
Distance between rows:	4 feet....these spread!
Planting Depth:	6 inches
Harvest:	Dig fresh tubers in the fall, in winter until the ground freezes and in early spring before they sprout. Dig all remaining tubers in the spring unless you want them all to sprout, vastly expanding your patch.

Jerusalem artichokes are one of those vegetables that people both love and hate. Love because they are so productive, so pretty to grow, so dependable as a food source and so good served so many ways. So what could possibly be bad about them? It's just that they grow so well that if you don't dig up all of this year's crop of tubers you will have beautiful, productive, delicious plants growing *everywhere* next year.

A native North American relative of sunflowers, they are nick-named sunchokes, sunroots, and native sunflowers. They grow tall like sunflowers and most varieties produce pretty sunflowers at the top of each flower stalk. Birds love the small seeds that the flowers produce each fall. The "people food" is the crisp, potato-like tuber found just under the surface of the soil

all around each plant. Some tubers can be found 2-3 feet from the mother plant.

Sunchokes are prepared by washing and slicing raw into salads where they have the taste and texture of water chestnuts; they can be used instead of chips as dippers on vegetable trays; they can be fried like potatoes, oven baked as chips or even dehydrated. Because they store their plant sugar as inulin instead of sucrose or dextrose, they can be enjoyed by diabetics. They are rich in magnesium, calcium and even contain iron.

Their growing popularity with chefs has led to the selection of very large, smooth tuber varieties often called "yam artichokes". Easier to clean than the older, knobby types, they are winning new friends. And if you have a few farm critters around, you'll find that cattle, pigs and even chickens will soon figure out how to harvest them for themselves. Cheap, good food for them and you. What more could you ask for?

Asparagus

Varieties:	Mary Washington, Martha Washington, Argenteuil Early, California 309, California 500, Roberts Improved, UC 72, 157 or 800, Viking KB3, Waltham.
Time to Grow:	Start seed indoors in late February and plant out in early spring. Or buy one year old roots in early spring and plant as soon as you receive them.
Quantity:	100 ft. of row for seeds or 50-75 roots for family of four
Distance between plants:	18 inches between roots; thin to 18 inches between plants when grown from seed
Distance between rows:	4-5 feet

Planting Depth:	For seedlings grown to 1 foot tall, plant 3 inches deep. For purchased roots, dig trench 8 inches deep. Spread roots out, crowns on top, 1 and 1/2 to 2 feet apart and cover with 2 inches of soil. Backfill with 2 inches of soil every 2 weeks until whole trench is refilled and slightly mounded.
Special Tip:	After first year, sprinkle beds with *pickling* salt -- not table salt, not rock salt-- at rate of 2 and 1/2 lbs. salt for a 100 foot row, in very early spring before spears are up or if you miss it, around July 4th. Helps fight fungal crown and root rots.
Harvest:	Second year, lightly, for 4 weeks. Third year on, harvest 8 weeks and then let spears grow into feathery fronds to recharge the roots.

Planting asparagus is something like childbirth -- the process itself can be a lot of work, but the result is well worth the effort and will likely be around to give you joy for many years to come. In fact there are asparagus beds well over 20 years old that are still highly productive. If you like this vegetable, you should also know that it is an excellent source of B vitamins, iron, vitamin C, potassium and calcium. And they do all this at only five calories/ medium spear. What's more, just when you're beginning to believe that what you thought was cabin fever is really an inherited psychosis, up pop these bright green spears, right through the early spring snows, and you know that life, indeed, is going to go on.

You can get a one year jump on your eventual harvest by purchasing one year, disease-free roots from a reputable seed house or you can buy a package of seed for about the price of one root and raise them yourself. One advantage of going the seed route is that you can weed out most of the female plants, which are far less productive than the males, when the seedlings are only one season old. Roots purchased from a nursery are a mix of males and females and you have no way of knowing the

difference until you have done all of the hard work of planting and growing them.

An exception to this note is the asparagus variety called Jersey Knight Hybrid and a growing number of similar hybrids said to be in development. They are bred to produce all males, thus having the advantage of planting roots which will never put plant energy into seed production -- only into nice, plump male spears. But, do keep in mind that these beds will never produce a viable seed, so if you were to lose a bed to disease or another natural or man-made calamity, you would not personally have seed to replant it. If you agree that you may one day face the *need* to be self-sufficient, this could be a major factor in your decision. If garden space is at a premium, shoot for all male plants by weeding out the smaller flowered female plants. Male flowers are larger and longer than female flowers. Then save one female plant for seed production. Or break the "no hybrid rule" and plant Jersey Knight.

As years of heaving and thawing of the soil go on, the roots will eventually work their way closer to the surface where they will produce skinny, weaker spears. To prevent this from happening, just mound soil up on the row at the end of each year. It will also help with drainage in heavy rains, reducing the risk of root and crown rots. And always apply a nice blanket ot leaf mulch, wheat straw,compost or well rotted manure after the first hard freeze in late fall for winter protection and spring nutrients. Remove dead asparagus fronds at this time. If they have become diseased during the season, removal now may prevent infection of the whole bed next spring.

Beans, Dry

Bush Varieties:	Red Kidney, Black Turtle, Appaloosa, Anasazi, Boston Beauty, Iroquois Cranberry, Flageolet, Dragon's Tongue, hundreds more!
Pole Varieties:	Black Mexican Turtle, Blue Beauty, Sparrow Egg Cranberry, Mouse Kidney, Golden Lima, Black Pinto, Wild Goose Pea, White Dutch

	Runner, Scarlet Runner, Vin Burgundy, many more.
Time to Plant:	In Spring, after frosts are over and the soil has warmed up. Beans won't survive frost and seeds will succumb to fungus in cold soil, so don't be fooled into planting them on a sunny March day. Some varieties take as long as 100 or more days to ripen a dry bean crop, so plant as soon as you can in shorter season areas and look for varieties that are ready in 90 days or less.
Quantity:	As the high protein foundation of a self-sufficiency food program, you will need 4 - 6 lbs. of dried beans/week for a family of 4. This assumes there is no meat or dairy available or chosen.
Distance between plants:	Depending on variety, 2 - 4 inches for bush beans, 6 - 8 inches for pole beans
Distance between rows:	2 and 1/2 feet for bush varieties, 3 feet for pole varieties. Also see discussion, below, for more about pole beans.
Planting Depth:	1/2 inch for smaller seeded beans, 1 inch for larger bean seeds
Special Tip:	Beans, like all legumes, have a very special relationship with a group of bacteria called Rhizobium species present in soil. These bacteria actually invade and grow inside bean roots in little, visible bumps called nodules. In exchange for their room and board, the Rhizobia take nitrogen gas from air trapped in the soil and convert it into ammonia, a form of nitrogen the plant can use for food. Free fertilizer! Though most

soils have many different and sufficient rhizobia present to grow a good crop of beans, others are deficient. To be safe, dusting dampened seed with these bacteria will only improve the size and quality of your crop. And it's cheap besides! A bag of bean (and pea, by the way) inoculant costs a little over a dollar from a seed catalog and will inoculate some 5 - 7 lbs. of seed!

Harvest: Anywhere from 65 days for some quick little bush Anasazis to 110 days for some Nova Scotia Reds; there is a dry bean for just about every climate. Leave pods on bushes or vines until dry and leathery unless there is a long, wet spell at harvest time. If that's the case, pick pods, spread on old trays or newspaper in the garage, basement or other cover to dry. Shell when brittle dry. Put in airtight containers in freezer overnight to kill any invisible critters that might ruin your long-term storage plans. Then remove from freezer and store in jars, well-sealed plastic pails, etc. in any cool, dry location. A basement is just fine.

Yield: The yield of dry beans/foot of row planted depends on the bean type, weather, insects, etc. A rough guide would be 10 ft. of bush bean plants, 5 ft. of pole bean plants, well grown, will yield about a pound of beans. 50 ft. of bush limas would yield half a bushel.

Planting and storing beans is essential to any serious food self-sufficiency program. They contain anywhere from 20.4 percent protein for lima beans to 22.5 percent in red, black, pinto or white beans, to a whopping 34.1 percent in soybeans. What's more, this is very high quality protein. If eaten with wheat, corn, rice or other grain products, bean protein becomes as usable by our bodies as milk, meat and eggs--without any of the

cholesterol and saturated fat!

If you don't have any or enough garden space to grow as many of these life-sustaining goodies as your family will need, be sure to buy enough to store. If done properly -- in a cool, dark, dry area, sealed from insects, beans will keep as a food supply almost indefinitely. Stored under the same conditions, they will also be good for planting another crop for about 3 years.

When deciding which varieties to plant, consider both your personal tastes as well as the length of your frost-free growing season; they are tender plants. In general, pole beans will give you a higher yield per foot of row than will bush beans--they grow up instead of out -- but you must provide poles, trellises or other support for their long vines. They do best on the poles, but providing enough poles for a family's bean needs may be difficult for those without the materials or skills. Keep in mind that a teepee of poles holds up better to the wind than individual poles sunken in the ground. Bush beans generally require no support and can be planted close together in rows or beds to maximize yields.

Beans, Snap or Green

Bush Varieties:	Contender, Commodore, French Flageolet, Frenchie, Jumbo Green, Oregon Trail, Kentucky Wonder, Provider, hundreds more
Pole Varieties:	Kentucky Wonder, Blue Lake, Italian Stringless, Lazy Wife, Purple Peacock, Rattlesnake, Foot Long Italian, Goliath, hundreds more
Time to Plant:	Like dry beans, when soil is fully warmed up in spring. Some bush beans are ready to pick 45 days after planting so you could get in two or even three crops in one season. Pole types generally take longer, so check directions that came with your seed.
Culture:	The same as dry bean plants, above

Harvest: For tender green beans, harvest young, before the seeds swell up as bumps in the pod. For "shellies" (see below), after beans have swollen in the pods. Pods too tough to use at this stage. For dry beans, harvest the same as dry bean directions, above.

Yield: One bushel for every 50 ft. of row of bush bean plants or for every 35 ft. of pole bean plants

Snap beans are bean plants that are generally grown for their tender, immature green pods rather than for their dried seed. Both green and yellow snap varieties contain vitamins C and A, potassium, calcium and some protein. Over the years, gardeners and seed companies alike have selected bush and pole bean varieties that offer the most tender, most flavorful green beans and many have had the old "string" bred out.

But keep in mind that the pods of varieties bred for their tenderness can be left on the plants until their seeds mature and dry. They can then be harvested and eaten just as you would any other dry bean. In fact, some of these varieties, like Commodore, produce large dry beans that are excellent in dry bean dishes. You might become overwhelmed with an excellent harvest of tender young beans and then leave any further pods on the plants for fall harvest. Another use seen largely in Europe, is to shell the bean seeds when they have swollen to full size within the green pod but have not been allowed to dry out. These, used in soups, pasta or just plain buttered, are often referred to as "shellies". What an incredibly versatile food source!

Beets

Varieties: Detroit Dark Red, Lutz Greenleaf Winter-keeper, Chioggia Pink, Albino, Amish, Ruby

	Queen, Crosby's Egyptian, many more
Time to Plant:	Very early spring, two or three weeks before last frost is fine. Plant another crop mid- to late summer for fall harvest.
Distance between rows:	18 inches for small varieties, 24 inches for large ones
Distance between plants:	3 inches for small varieties, 6 inches for large ones
Planting Depth:	1/2 inch
Special Tips:	Beets like soil on the alkaline side, so may need some lime in the soil before planting. Beet seeds are not really individual seeds but bumpy seed pod containing several seeds. In every spot you plant a "seed" you should get 3 - 5 baby plants. When they get about an inch or so high, pull out all but the one strongest plant in each cluster. Eat these in salads; they're rich in vitamins and delicious.
Harvest:	Roots and leaves when young. Small roots are especially tender and sweet and can be canned whole. Exception: Lutz Winter-keeper varieties are tender and sweet even when very large. Leaves are likewise tender.
Yield:	60 lbs. of small beet varieties to 90 lbs. of large beet varieties /100 ft. of row

Did you know that beets come in red, pink, yellow, orange and white varieties? Almost without fail, American grocery

stores carry only one type -- red -- and these are usually related to the old standby, Detroit Red. Yet beets of so many different flavors and types are some of the easiest, most productive, most delicious and practical vegetables you can grow.

The sweet roots can be boiled, baked, chilled, sliced, diced, grated, pickled, buttered, spiced and puree'd. The tops can be eaten young, as part of a gourmet-quality salad, stir-fried in delicious Asian recipes and added to health-restoring winter soups. You can eat a whole cup of boiled beets, and it will add only 55 calories to your daily count. Yet the roots are rich in potassium and are a natural, fibrous laxative. The beet greens are a great source of vitamin A, potassium and iron.

Those so-called baby beets that you find in cans at the grocery store are just that -- beets picked very young when they are very tender. You might want to plant them at twice the density recommended and then thin them by picking every other one, as a baby beet, when it is about 1 to 1 and 1/2 inch in diameter. You'll get two complete harvests from the same planting.

Broccoli

Varieties:	Green Goliath, De Cicco, Purple Sprouting, Green Sprouting, Italian Sprouting, Raab, Romanesco, Pacifica, King Purple, more
Time to Grow:	A cool weather crop, start indoors from seed in very early spring and plant outdoors mid- to late spring. Matures quickly, so a second crop can be sown for fall harvest. Plant indoors in mid- summer; transplant outside late summer to very early fall.
Distance between plants:	18 inches
Distance between rows:	2 and 1/2 feet

Planting Depth:	1/4 inch
Special Tips:	Be sure to read section on natural pesticides to control insects that attack broccoli. They can be avoided by using floating row covers available in catalogs and good nurseries.
Harvest:	Pick main head before the tiny buds open into yellow flowers. The flowers are edible, but the stalks will be too tough. Leave beheaded plants in ground a while, and they will produce lots of smaller side shoots. When these get too small to pick and growth of shoots slows down, pull the plants.
Yield:	40 large heads/ 100 ft. of row plus abundant smaller, side shoots if plants are well cared for.

You *must* grow broccoli....no choice, you must. Learn to grow it, cook it, eat it, love it. It has scientifically proven anti-cancer properties. It is an excellent source of vitamins A, B_3 or niacin and C. For a vegetable, broccoli is a good supplier of protein and if that's not enough, it is rich in potassium, iron, and calcium. If you have room to grow only one vegetable, grow broccoli, especially if resources and food supplies are short and every nutrient counts.

Broccoli along with its relatives, cabbage, cauliflower, kale, kohlrabi and Brussels sprouts, is loved by cabbage worms and root mag-gots just about as much as it is by humans. But natural Bt sprays give the cabbage worms a stomach "flu" they never get over, and floating row covers will protect the plants from the fly that lays the eggs that hatch into root maggots. Never planting this family of veggies in the same place, two years in a row, will also help to protect it against root maggots. See the appendix for more details.

If you never cared much for boiled broccoli, try it stir-fried, puree`d with basil or in creamed soups, tossed with pasta, olive oil and garlic, or even raw in salads.

Cabbage

Varieties:	Regular green: Golden Acre, Danish Ballhead, Copenhagen Market, many more Red types: Red Dutch, Red Acre, Mammoth Red Rock, Meteor, Preko Savoy types: Tuscan Black, Chieftain, Red Verona Chinese types: Bali, Che Foo, Lei Choy, Michili, Pak Choi, Purple Leaved, Tatsoi, Tyfon, Santo, Wombok and more
Time to Plant:	There are early types, late types and mid-season types. Most can be planted indoors several weeks in advance of the outdoor planting date for your area. Check the package for target dates. Plan for some late, storage types for winter use as well as those first spring heads. Many can take heavy frost.
Distance between plants:	Depends on type. Small, ballhead and vertical oriental types can be placed 12 - 15 inches apart. Larger, winter storage types require up to 2 and 1/2 feet between them.
Distance between rows:	2 and 1/2 feet
Planting Depth:	1/2 inch
Special Tips:	See section on broccoli for pests that attack the cabbage family. Also read section on natural, organic pesticides.

Harvest:	For ballhead types, when heads are full and solid. If they are well-formed do not overwater and pick them if a heavy rain is expected. Full-grown heads that are suddenly flooded may crack, reducing storage quality.
Yield:	Between 40 and 70 heads per 100 ft. of row, depending on variety chosen

Cabbage, like broccoli, has been found to contain natural compounds that help to prevent cancer. It can be eaten raw as coleslaw and, in this form, is high in vitamin C and potassium. It is an excellent substitute for green salads in the dead of winter when lettuce is no longer able to grow in the garden.

Because late cabbages can be stored for months in a cold cellar or in a spare refrigerator, it is a wise self-sufficiency move to grow at least late cabbage. If you grow the dark green oriental types, you'll get an extra bonus of high vitamin A, though they won't store as long as the large-headed ballhead types.

Like broccoli, cabbage can take cool weather. In fact, some early spring Chinese cabbages must be grown in cool weather and some late fall types, like January King, actually thrive on chilly temperatures. You can use that to great advantage; when you pull out a summer crop of beans or have harvested those last peas in early July, use the same ground to put in your fall cabbages. Two complete crops from the same space! Now that's smart planning.

Carrots

Varieties:	Chantenay (many types), Nantes (many types), Gold Pak, Oxheart, Danvers, Royal Chantenay, Touchon, Juwarot, many more
Time to Grow:	Early spring, a week or two before last frost

Distance between plants:	1 and 1/2 to 2 inches; the larger carrot types get the larger spacing.
Distance between rows:	1 to 2 feet. Wider spacing of rows is required if you plan to walk between rows; compacted soil from foot traffic prevents good root formation. Better to plant in a wide bed with 1 foot between rows and no walking on the bed. Tend rows from paths outside the bed.
Planting Depth:	1/4 to 1/2 inch deep covered with fine soil
Special Tips:	Carrots are easy to grow if you cover the seed with fine soil and be certain not to let the soil dry out. Dry, crusted soil is the enemy of carrot seed germination. Top the bed with a 1/4 inch layer of fine grass clippings if dry weather is expected for a week to ten days after planting. This will help prevent drying. Be sure to thin plants to at least the recommended space between them to ensure full size roots. Good root size also depends on a deeply prepared soil, at least 12 to 14 inches deep, for most varieties.
Harvest:	Time to maturity varies with variety, anywhere from 50 to 100 days. Consider growing several types -- some for early, summer eating and the larger, later types for fall and winter meals. Royal Chantenay is an especially good variety for size, yield and storage and matures in 70-80 days. Some can be picked earlier for summer eating.
Yield:	For medium weight varieties, figure you will get about one pound of carrots for every foot you plant. A family of four can easily eat

two pounds a week, so plan accordingly.

Carrots should be on everyone's must-grow list. Their high vitamin A content is excellent for overall health, especially for the eyes, and they too have been found to help prevent the development of cancer.

With a potential yield of a pound a foot, they are also very productive for a small garden space. Add to that the fact that they can be stored without canning or freezing under cold cellar conditions, and you have an excellent component of a self-sufficiency strategic plan.

Keep in mind that the deeper and lighter the soil, the larger and better shaped the roots. If all you have is heavy clay in your garden area, consider one of the following solutions: Add sand to the bed where you plan to plant your carrots to lighten up the soil; or build a raised bed just for carrots, using purchased topsoil to fill it; or grow Oxheart carrots which, as their name implies, are short and fat, about the size and shape of an ox's heart. They don't require the light soil that the longer, more delicate carrots do and, because they make up in width what they sacrifice in length, they'll still give you a very good yield.

Cauliflower

Varieties:	Snowball (several varieties), Self-Blanche, Early Self-Blanche, Matra, Purple Giant, All Year Round, Dominant
Time to Grow:	Start indoors in late February and transplant outdoors in early to mid-spring. Late varieties can be started in late May for fall harvest.
Distance between plants:	18 inches
Distance between rows:	2 and 1/2 ft. for smaller varieties, 3 ft. for larger ones
Planting Depth:	1/4 inch

Special Tips:	No doubt about it, cauliflower is a bit tricky to grow because it is especially sensitive to weather changes. Excessive heat, drought or too much cold can cause bolting, miserable little "ricey" heads, no heads at all, or stem rot. Cover young white heads when they are about the size of a teacup by tying their leaves over them with a piece of string. This will prevent them from turning green, brown or brownish-purple. So-called self-blanching varieties tend to self-wrap their heads but imperfectly. You will still need to ensure that the sun will not hit the white curds inside. If weather in your area tends to be very unstable in spring and early summer, consider growing broccoli instead.
Harvest:	Depending on variety and conditions, they should be ready 65 - 95 days after transplanting. For all varieties, pick when head is full of tightly packed curds. This is usually about 5 - 10 days after tying up the teacup size heads.
Yield:	If all goes well, expect to harvest 40 -45 heads from 100 ft. of row. This could be between 60 and 100 lbs., depending on variety.

Yes, cauliflower, too, has cancer-thwarting properties, but it is a bit more challenging to grow than its similarly blessed cousins, broccoli and cabbage. Also high in vitamin C when raw, it contains fair amounts of potassium, protein and iron.

If you love cauliflower but live in an area with the weather instabilities that bring this veggie to its knees, plant seed in flats every week for a few weeks starting in late February. Transplant outside a week apart as well. With several staggered plantings, you greatly improve your probability of bringing in a decent harvest. Who knows, maybe you'll have unusually cooperative spring weather and *all* of your plants will produce nice heads! Then you'll be in the enviable position of having to

freeze, pickle, can or give away all of that abundance.

Celery

Varieties:	Pascal, Solid Pink, American Green, Tall Utah, Lathom Self-Blanching, Tendercrisp, more
Time to Grow:	For summer eating, start indoors in late February to early March. Transplant outdoors when 3 in. tall and no earlier than June 1 or after last threat of frost in your area. Days to maturity vary from 70 - 100 days, depending on variety. For fall eating, plant in flats in April or direct seed outdoors in June. But be careful that seedbed never dries out. Seed is shallow and a hot sun on a dry day can kill germinating seeds.
Distance between plants:	9 inches
Distance between rows:	36 inches
Planting Depth:	1/16 to 1/8 inch
Special Tips:	These tiny seeds need to be sown with so little soil over them that they are very prone to dehydration if that soil dries out. There is a distinct advantage to planting them in flats indoors where they can be watched carefully for drying. That's not to say that flats should be kept soggy; moist is the key word, here. As heavy feeders and drinkers, celery needs fertilizer every 2 - 3 weeks and water as needed to keep growing rapidly.
Harvest:	When plants appear full-grown, sample. Interior stalks should be crisp, juicy and

blanched creamy white at their bases. Plants that have not been fed or watered well may be skinny, tough, dry and fibrous.

Yield: Approximately 135 celery plants per 100 ft. of row. At nearly 2 lbs. each for the largest varieties, that's probably more celery than any family would care to eat in a year, so plan accordingly. If you use one plant per week and are limiting that eating to fresh use, in season, you will probably want to plant no more than 20 - 25 ft. of celery.

Celery is one of those vegetables that you usually pair up with something else to eat -- celery stuffed with cream cheese or tuna, in turkey dressing, in potato salad, in soup or stew. Except for the most determined dieters, few people sit down to huge servings of celery. But it is one of those vegetables we'd rather not do without if we don't have to because we have grown accustomed to the flavor it adds to our favorite dishes.

High in potassium and very low in calories (20 calories/cup), it is also a smart addition to a well-rounded food self-sufficiency program. Though not the nutritional powerhouse that broccoli or its cousins are, it is worth growing if you have the space.

Collards

Varieties: Vates, Georgia, Georgia Blue, Georgia Southern, Vates Champion, Morris Improved Heading

Time to Grow: Best as a late summer planting for fall and early winter harvest. In mild areas, harvest all winter. Frost improves flavor and quality.

Distance between plants: 18 - 24 inches

Distance between rows:	24 - 36 inches
Planting Depth:	1/4 inch
Special Tips:	Check the appendix for insects that eat collards along with their broccoli. You can eliminate them safely.
Harvest:	If you have only tasted collards bought at the supermarket, you haven't yet tasted collards. Grow for fall harvest. Pick after a week or more of cool fall nights, even after a bit of frost.
Yield:	50 - 65 plants/ 100 ft. of row

Collards, also called collard greens, are another relative of the cabbage family and share the cancer preventative and nutrient rich heritage of its kin. Like broccoli, collards are an excellent vegetable source of calcium. This is especially good to know if you suddenly found yourself with little or no access to milk, cheese or dairy products in general. In fact, a cup of collards contains nearly the same amount of calcium as a cup of milk. And, like dairy products and meats, collards are very high in vitamin A, but don't have the fat common in animal sources of this nutrient. Add their high vitamin C, iron, niacin, potassium and protein content, and they become a virtual powerhouse of health maintenance and disease prevention.

If the thought of sitting down to a portion of boiled, buttered, sautee`d or stir-fried greens doesn't get your digestive juices flowing, think of them as wrappers for your favorite hors d'oeuvre fillings. Steam the leaves first to soften. Or use as a substitute for cabbage leaves in stuffed cabbage dishes. Or layer of few leaves into a lasagna dish. If you eat meat, boil up some ham or sausage with collards. This is a traditional way of serving these greens in the American South.

Corn, Sweet

Varieties:	Golden Bantam, Double Standard,Ashworth, Hopi Early, Iroquois Black, Shoepeg, Aunt Mary's, Puget Gold, Golden Jubilee, Country Gentleman
Time to Plant:	Early spring to early summer. Divided into early, main season and late varieties. It is possible to plant all three types or stagger plantings to have fresh corn early summer to fall. Plant no earlier than a week before last predicted spring frost. Soil temperature should be above 50 degrees.
Distance between plants:	8 inches smaller types to 12 inches for larger plants
Distance between rows:	2 and 1/2 feet
Planting depth:	1/2 inch
Special tips:	Plant corn in blocks of at least 4 rows or in clumps of 4 plants each, called hills. Corn is wind pollinated; a single or double row will be insufficiently exposed to pollen and will result in ears with few or missing rows of kernels.
Harvest:	When silks at tips of ears are shriveled and brown, peel back a thin strip of wrapper leaves or husks to expose a few inches of kernels. Tips of ears should be filled with small kernels. Pierce a fat kernel an inch or more down the cob with a fingernail. Corn that is ripe will ooze or squirt white juice that looks like milk. This is the "milk stage"

and is ready to pick. If it is not ready, pull the husk back over the kernels and let it ripen a few more days. Depending on the variety, ears may not all ripen at once. The top ear is always ready first on varieties that yield more than one good ear per plant. It's a good idea to check each ear before detaching it from the plant. Racoons know *exactly* when corn is ripe. If you find what appears to be cat-like scratches in the soil around your corn plants and the husks of harvested ears on the ground, racoons are sharing the bounty of your labors late at night. See notes on critter control in the appendix.

Yield: 4 rows at 25 feet each will yield between 85 and 100 ears. See more about yield, below.

The corn that most of us are used to eating on the cob or as kernels, is often called sweet corn to distinguish it from corn grown for flour, cornmeal or animal feed. In its ripe or "milk stage", sweet corn is sweeter than the so-called field, flint, flour or dent corns used for these other purposes. Yet, open-pollinated, old-fashioned sweet corn rapidly converts its sweet sugars to starch soon after picking. In fact, the old farmer's warning that you need to run, not walk, to the kitchen after you've picked corn for dinner, acknowledges the superiority of just-picked sweet corn over its hours-old, starchier kin.

Today, most gardeners and even commercial growers plant hybrid corns which are not only higher in sugar content, but they also hold their sugar, without converting it to starch, well past harvest. Some of the older hybrids have normal, old-fashioned sugar qualities and are referred to as "su" types. The "su" is written to the right of the variety's full name; these have the traditional corn taste. Hybrids which have been bred to enhance sweetness are dubbed "se" or "se+", sugar enhanced types. Another class of hybrids has greatly enhanced sweetness and, when dried by the supplier for seed, has shrunken seeds.

These very sweet corns are labelled "sh" for the genes that cause the dry kernels to shrink or wrinkle.

With so much superior sweetness and holding quality out there, why would anyone want to grow the more traditional corns? For one -- and in our case the most important -- reason, is that you can save your corn seed from year to year and be self-sufficient. Hybrid corn will not breed true, that is, what you thought you planted is not what you are going to get. The parent lines of corn used by commercial breeders to get that hybrid will reappear in the offspring and they may be inferior plants. Another reason many older gardeners cite, is that the new corns are so sweet that the sugar masks the traditional, "corny" taste. And the new, sugary hybrids don't germinate well in cooler soils. You may have to do a couple of plantings and lose good growing time if your's succumb to a chilly spring.

Making a choice isn't that difficult. If you'd like to try a hybrid supersweet just to taste it, plant traditional corn one year, save the seed for your self-sufficiency goals, and then grow a hybrid the next. But, if it looks as though you may need your corn for economic and personal survival year-to-year, grow a good open-pollinated variety. All of the varieties listed at the top of this corn section are open-pollinated, that is, not hybrids. All are very good traditional sweet corns whose seed can be saved for future crops. Be sure to read the seed-saving section of the appendix for important information about saving corn seed.

Once you have decided what kind of sweet corn you want to grow, you'll have to find the room to grow it, and corn needs room to grow. A family of four would want to grow a block of four rows, 25 ft. long and about 12 ft. wide, to have enough for fresh eating in summer and some extra for the freezer or canner. If you like corn a lot, doubling the size of that planting will ensure you'll have corn all winter long and into next spring. If garden space is at a premium, you can still bring in a good crop if you grow a variety that ripens early, say in 60 - 65 days, and then quickly use the same ground to grow fall crops like broccoli, peas, cabbage, or a quick crop of bush green beans if your season is long enough. Most are.

If you are going to reuse the corn plot immediately, be

sure to fertilize it with some good compost, well-rotted manure or other, well balanced, high nitrogen natural fertilizer. Corn is a heavy feeder and can deplete a soil of nutrients, especially nitrogen. Planting peas or beans where the corn has been is a wise and time-tested rotation because these legumes don't require much nitrogen from the soil; they obtain it from the air with the help of bacteria that live in their roots. (See more under beans and peas.)

Another option is to plant quick maturing peas or beans first and follow up with corn that matures well before the first expected fall frost in your area. Keep in mind, however, that as the days grow shorter in late summer and early fall, corn and most other crops will take a bit longer to mature than their packages estimate. Allow a bit more time and plant accordingly.

If you still don't think you have room for a corn crop, consider growing one clump or "hill" of four plants just to watch them grow and to discover what corn *really* tastes like. It's nearly a spiritual experience -- *honest!* In fact, sit yourself down in the middle of your mature corn patch one warm summer night, husk a ripe ear and eat it -- right there. Listen to the rustling of corn leaves that surround you and the scratchy sounds of panicked grasshoppers as they jump from plant to plant, clearing a space for you, as you wipe those sweet, juicy kernels from your cheeks. Now if you don't feel part of the spirit, the guiding intelligence, the God that runs through all living things, then you simply aren't *feeling* , and you had better plant some more corn -- and lots of other things.

Of course, corn is good for the body as well as the spirit. Without the butter, it is a low fat, carbohydrate dense vegetable that is a good source of vitamin A (yellow corn, not white), protein, potassium, niacin and trace minerals. If you grow your own sweet corn and eat it fresh, you won't need butter, a real positive if you are watching your weight or cholesterol. What's more, at only 70 - 85 calories for a medium size ear, it's a great, healthy way to satisfy a sweet tooth without piling on the pounds.

Corn - Flint, Flour, Dent or Popping

Use dent and flint corns for cornmeal, corn flour and animal feed. Some, especially suited for corn flour are called flour corn varieties. Popping corns are, of course, for making popcorn.

Dent Varieties:	Nothstine Dent, Hickory King, Bloody Butcher, Pencil Cob, Mexican June
Flint Varieties:	Garland Flint, Hopi Blue,Indian Ornamental, Great Plains Rainbow, Seneca Red Stalker
Flour Varieties:	Mandan Bride, Cherokee White Flour, Hopi Greasy Hair, Mandan Flour, Mandan Black, Navajo Blue, Pawnee Blue, Osage Red Flour
Popping Varieties:	Miniature Pink, Blue and Indian; Strawberry, Japanese Hulless, Pennsyvania Dutch Butter Flavored, Lady Finger Yellow, Tom Thumb
Time to Plant:	See Sweet Corn
Quantity:	Figure there are roughly 1500 dry corn seeds per pound of flint, dent or flour corns. There are, again roughly, 300-400 seeds/ear. That means it would take about 3 and 3/4 to 5 ears of corn to get a pound of cornmeal or flour. Some varieties yield 2 good ears or more per plant, others only one. For food self-sufficiency, plan to store two to three pounds of flint or flour corn per week for a family of four. To store a year's supply, then, you will need between 100 - 150 lb. of corn. That would be 500 to 750 dried ears for some varieties and 375 to 560 for others. See if the variety you choose forms one, two or more good ears and plan the planting, accordingly. Obviously, you will need a fairly large amount of space to grow this much corn.

Planting: All planting requirements are the same as for sweet corn, but plan to plant as early as possible to ensure sufficient time to mature and dry ears outdoors, on the plants. Be sure to choose varieties that will ripen with time to spare in your geographic area.

Harvest: Dry corn varieties are generally left on the plant, in the field, to ripen and dry. They can even take a couple of light frosts. If weather happens to be so wet that mold-free drying is not possible, harvest ripe ears and bring them under cover to dry; a garage would be fine. Spread them out to discourage mold if humidity is high. Fully dried kernels can be twisted off ears with gloved hands and stored in airtight, rodent-proof containers in a cool place. See appendix for more storage hints.

Corn varieties grown for cornmeal and corn flour are often listed by seed suppliers as interchangeable. Technically speaking, flint corn is harder and a bit grittier when ground, making it especially suitable for cornmeal. Dent corns tend to have softer, starchier kernels more suitable for softer corn flours. For family use, you can't go wrong with either one. Each will provide you with fresh flour for making breads, muffins, cereals, polenta or tortillas. Just keep in mind that, if it's corn tortillas you are largely interested in, you will want to locate the softer, flour dent corn seed. Cornmeal for cornbread and biscuits is usually cut with wheat flour to provide a more cake-like texture.

Whichever type you choose, it is best to keep the grain whole, as kernels, for long-term storage. The nutritious germ or tiny plant embryo in each kernel is rich in corn oil. If the kernels are ground into meal exposing the germ to air, the oil will turn rancid and the meal will no longer be as nutritious. Depending on storage conditions, ground cornmeal can be past its prime in as little as a couple of weeks. The cooler and drier

the conditions, the longer it will retain its freshness. Tightly covered in the refrigerator, small quantities are easily kept fresh for months, but this is obviously impractical for a year's supply for a family of four. Best to keep corn earmarked for family food security as whole kernels, in airtight and insect proof containers in the coolest area of your home or property. And, yes, you would likely want to purchase a grain mill for processing the kernels into grain.

No doubt you have seen degerminated cornmeal and flour in the supermarket. As the name implies, each kernel has had its germ, the most protein- and vitamin-rich part of this grain, removed. With no germ, cornmeal will remain fresh longer at typical indoor temperatures. To partially compensate for the loss of nutrients, the industry adds back a few of the vitamins removed with the germ. If you have no land on which to grow corn, no access to whole grain and no storage capability for large quantities of wholegrain, stoneground cornmeal or flour, then commercially produced degerminated meal may be your only option.

Like most other basic grains, corn is deficient in a couple of essential amino acids which mean that the protein in corn needs to be paired up with another protein source to yield the complete protein humans need. Simply combining it with beans as in burritos or a bit of dairy protein like milk or cheese completes the protein. You could survive on such protein combinations.

The quantity of protein and other nutrients present in your cornmeal or flour depends on the seed and how it is prepared. Wholegrain cornmeal contains 11.2 grams of protein per cup; starchier corn flour contains 9.1 grams and masa harina, cornmeal ground with lime water for Mexican dishes, 10.5 grams. In addition to protein, corn is a good source of B vitamins, calcium (especially in masa harina), iron and potassium. Wholegrain yellow corn is also a good source of Vitamin A and corn bran, vegetable fiber essential for good intestinal health and functioning.

If you have the garden space or can "rent" it from someone you know, corn will provide you with a delicious alternative or addition to a wheat-based cereal diet. And don't forget to save some seed for next year's planting.

Cucumbers

Slicing Varieties:	Straight Eight, Lemon, Spacemaster, Windermoor Wonder, Chinese Snake, Marketmore 70, 77, 80 and 86; many more
Pickling Varieties:	Boston Pickling, Jersey Pickling, Poona Keera, Northern Pickling, Bush Pickle, Early Russian, Vert De Massy (cornichon), more
Time to Plant:	After last frost, when soil has warmed up in spring. Very cold sensitive. Can start indoors in cups 3 - 4 weeks before planting out.
Distance between plants:	Plant in groups of 2 or 3, called hills; space hills 5 ft. apart. Another option: plant or thin plants to 1 foot apart in single rows 5 ft. apart. Bush varieties have short vines and are often small enough to plant 18 in. apart in each direction. Read package instructions for variety you chose.
Planting Depth:	1/2 inch
Special Tips:	Cukes like lots of water. Planting in hills with a depression in the middle makes it easy to water (and fertilize) 2 or 3 plants at once. See Pests for info on cucumber beetles and other pests. If space is a problem, cukes can be trained to a trellis or wire fence. Or choose a bush variety that takes less space.
Harvest:	When young, thin and green. Swollen yellow and orange cukes are well past their prime and have gone into seed production. Exceptions: lemon cucumber types are yellow, but pick young. For seed, pick old.

Yield: Varies greatly with variety chosen. Two or three plants of the larger slicers can produce more cukes than you can use in a daily salad. Pickling cukes are much smaller; if your family is especially fond of dill pickles, plant a row 25 ft. long or 4 hills worth.

The reason cucumbers are so "cool" is because of their high water content. Chill them down in the fridge and they are almost as cold as iced water. But nutritionally they are less than impressive. Though nutritional analyses rarely check for trace minerals and the as yet unknown phytochemicals that might have future health or medical significance, those that are checked for are only present in modest amounts. If green cukes are eaten with the skin on -- delightful with tender, home grown cukes -- they will provide a healthy dose of vitamin A. Otherwise, they contribute some potassium, iron and, of course, fiber. Not powerhouses of nutrition but a nice fresh change of pace after a long winter.

If you'd like to have a few cukes a week for salads instead of a population explosion of 30 cukes this week and 4 next, stagger your plantings about two weeks apart from June through late July. This should give you plants coming into cukes at intervals from early July through August. In longer season areas you might even get to do later plantings to give you new, young cucumbers in September.

If making dill and garlic dill pickles are your life's goal, don't forget to grow the dill and garlic, too. Dill seed can be planted about the same time as you put in those first cuke plants but won't have seed heads until later in the season. Check your pickling cuke and dill maturation dates and plant accordingly. More on garlic further on in this book.

Eggplant

Varieties: Italian Pink Bicolor, Casper, Imperial Black Beauty, Rosa Bianca, White Egg, Early Long Purple, Florida Market, African, Black Egg, Long Green, more

Time to Plant:	When soil and air temperatures are warm, 1 - 2 weeks after last frost. Start indoors March to April 1st for late May to June planting outdoors, 6-8 weeks before warm, settled weather. Seed needs 85 degree soil temperatures to germinate. Plants sensitive to cold nights.
Distance between Plants:	18 to 24 inches, the latter for larger plant types
Distance between Rows:	3 feet
Planting Depth:	3/8 inch
Special Tips:	The dates to maturity written on your seed packet are usually from "setting out plants", so to get eggplants in a shorter growing season you must start seed indoors as indicated above. Also, flea beetles have an absolute obsession with eggplant leaves. Pyrethrin and rotenone are both effective and are approved for organic growers. Pyrethrin has been most effective for me, but it will kill bees which are essential for pollinating so many fruits and vegetables. Be sure to avoid spraying or dusting the flowers which bees visit, and spray at dusk, after bees have returned to their hives. Also consider floating row covers available in catalogs and good nurseries. Another hint: eggplants love heat. The hotter the summers in your area, the better they'll like it.
Harvest:	At any time, but once full-grown, pick them. If you don't, the plant will attempt to ripen the tiny brown seeds inside, making them hard and the eggplant bitter.

Yield: Greatly depends on varieties grown. Large varieties, in a good year, can yield 10 - 20 pounds of eggplants for each plant. Smaller, Japanese types generally produce many smaller eggplants weighing far less in total yield/plant than their bigger cousins.

Eggplants were relatively late to arrive to America. Though they were probably first used in ancient India and by cooks in fourteenth century Europe, it wasn't until the late 1700s or early 1800s that Thomas Jefferson, an enthusiastic farmer always interested in new plant varieties, brought eggplants from France.

One of the reasons more people don't grow eggplants is that they don't know very many dishes that can be made with them. An Italian favorite very popular in the United States is eggplant parmigiana, but today's more health-conscious eaters shy away from all of the oil and cheese used in its traditional preparation. Eggplant slices absorb oil like circular sponges, turning a low calorie (38 calories/cup), low fat (0.4 grams/cup), nutritious vegetable into a dietary fat bomb. But it doesn't have to be so. Tender, young eggplants can be diced and cooked in virtually fat-free, homemade tomato sauce, sliced and broiled with garlic and just a light brushing of olive oil, baked and scooped into recipes for baba ganouj, tossed with tons of other veggies in ratatouille or incorporated into cornmeal-based polenta dishes.

As a moderately good source of potassium, iron,protein, fiber and folic acid and many trace minerals, eggplant will offer nutritious variety to a self-sufficiency lifestyle. Considering the high potential yields that can be obtained from a few well-cared-for plants in a good, hot summer, they can be a wise addition to a self-reliance program. Keep in mind that they can be cooked and frozen, canned or even dehydrated for out-of-season use. And, though their appearance is fairly novel and interesting, white eggplant varieties, like Casper, are not quite as nutritious as the dark purple ones eaten with their skins on.

Endive or Escarole

Varieties:	Full Heart Batavian Escarole, Belgian, President, Grosse Boucle, Tres Fine, Green Curled Ruffec, Traviata, Nuvol, Wallone, Nina, Salad King, more
Time to Plant:	Plant outdoors in early spring, a full month before last spring frost. Plant fall types in late June to harvest heads in late fall to early winter or year 'round in milder, coastal areas. Most endives can take some cold, some down to even 15 degrees F.
Distance between Plants:	Depends on varieties. For more upright types, plant or thin to 12 in. apart. For larger, more spreading, broad leaf types thin to 18 in. for mature heads.
Distance between Rows:	18 inches
Planting Depth:	1/4 inch
Special Tips:	Endives are best -- less bitter -- during cool or even cold growing periods. Plant seed thickly outdoors and harvest thinnings for outstanding salad greens. They are a regular component of expensive "mesclun" salad mixes in gourmet restaurants and markets.
Harvest:	Times to maturity depend on variety but, like many veggies, they are more tender and delicate in flavor when young. See note on next page for special harvest instructions forBelgian endive.
Yield:	35 - 50 heads/ 50 ft. of row

If you have ever eaten salads in Europe, then you know what endive is. These old world greens add a distinctive, yet pleasant, bite to otherwise bland salads. In France and Italy, for example, the character of salads begins with the individual flavors of the greens themselves, not on an overpowering, oversalted, oversweetened salad dressing. Once you become accustomed to eating homegrown salads with a variety of endives and other "continental" greens in them, you'll wonder how you could have eaten all of those nutrient-poor, white-leaved supermarket miracles in their plastic boxes.

Endives are very easy to grow, but tend to be more bitter or even bolt to seed in the hot summer months. Check the seed package or seed catalog for the best time to harvest and eat the in variety you bought. Since they tend to like cool spring or fall weather, endive can provide you with lots of healthy eating when the summer crops are not ready or are long gone. They can make an important contribution to your family's food security.

Endives can also make an important contribution to your health. Unlike those white iceberg balls at the supermarket, stripped of all of their nutritious, dark green outer leaves by the grocer and composed of mostly water and a mere 180 International Units (IU) of vitamin A per cup, curly endive or escarole contain a whopping 1325 IU and almost 4 times the iron. Add to that a broad base of lesser vitamin and mineral nutrients and you have an excellent, health supporting salad staple.

There are three other, less known uses for broad leaf endives or escaroles. One is to use the lighter, blanched heart of small, spoon-shaped leaves of the endive head as individual dippers for bean, cheese or other dips. Another is to remove all of the leaves of an entire head of escarole, wash them, and then toss them into a large pot in which you have sautee`d several fresh garlic cloves in a bit of oil. Add a bit of water or broth and steam down until tender. With salt and pepper (even hot red pepper) to taste, this will make an excellent sandwich on crisp French or Italian bread. Add a slice of good cheese for a complete meal. Couldn't be simpler or healthier. Last, toss clean, cut leaves into a pot of seasoned chicken broth, boil until tender and add a can of cooked white beans and some dry pasta. Cook. Eat!

Garlic

Varieties:	Spanish Roja, Purple Artichoke, New York White, Oregon Blue, Red Italian, Red Czar, Silverskin, Sicilian Silver, Yugoslavian, Zemo, Elephant and more
Time to Plant:	In fall, before ground freezes, at the same time as tulip bulbs for next spring. They will grow roots before the ground freezes hard and really take off when it thaws.
Distance between Plants:	Space cloves about 5 inches apart
Distance between Rows:	12 inches in beds or between a double row. Don't walk on soil between rows or space rows far enough apart to create a footpath that will not compact soil near garlic plants.
Planting Depth:	1 and 1/2 to 2 inches deep, thin, pointed tip up
Special Tips:	Yes, you can plant the garlic cloves you buy in the supermarket or order them from a seed or nursery catalog. Most varieties grow well in many areas. Choose the largest to medium-large outer cloves to plant. You'll get 6 - 10 good "planters" from each average size bulb. Use the small, inner cloves in the kitchen. If you miss the fall planting and plant in early spring, bulb size will be only fair or poor by harvest time that summer.
Harvest:	When tops turn brown and shrivel up in summer, usually in July in the northern U.S. Don't water during this ripening period. Dig and dry under cover. Store in cool, dry area of home or garage. If humid, can break

into individual cloves with skins on and put into freezer in double zip-locked freezer bags. Remove cloves as needed for cooking and return bag to freezer. Will keep a year or more this way.

Yield: About 60 bulbs for 25 ft. of row

Garlic is one of those must grow foods. Not only is it an outstanding seasoning for the dishes of most cultures, it has recently been proven by medical researchers to have anti-bacterial, anti-cholesterol and even anti-cancer properties. In an age when antibiotics are losing their punch, and we are literally finding ourselves on our own to battle once-conquered bugs, it is good to eat lots of health protecting plants like garlic. And you don't have to eat it raw to retain its health benefits. In fact, new studies indicate that many of its protective compounds are released after slicing and heating. If that wasn't good enough news, keep in mind that it loses its sharp taste and odor once cooked, becoming sweet and aromatic. Unless everyone in your family has gastric problems with garlic -- rare -- it should be part of every self-reliance program.

Garlic is easy to grow, takes up little garden space, stores well in a dry place for 6 - 8 months with no refrigeration and can be replanted for next year's crop. What's more, as a companion plant in your vegetable garden, it will often deter insect pests that attack other plants. Other gardeners also report that gophers stay away from those areas of the vegetable garden where a lot of garlic is planted. Enough? Get going!

Herbs

Varieties: Phenomenal variety now available through nurseries and their mail order catalogs. Many of local importance may be in neighbors' gardens or small, local nurseries.

	A partial listing...anise, borage, lemon balm, basil (many kinds), catnip, chervil, chives, cumin, garlic chives, cilantro or coriander (from the same plant), chamomile, dandelion, fennel, dill, oregano, rosemary, sage, sesame, spearmint, savory, sweet marjoram, tansy, tarragon, thyme, water cress, more.
Time to Plant:	Almost all herbs can be started in the spring. Most can be started from seed, some from rooted cuttings or "starts". See more, below.
Distance between Plants:	Varies with herb. Consult seed catalog or nursery.
Distance between Rows:	Varies with herb. Consult seed catalog or nursery.
Planting Depth:	Varies with herb though, in general, shallow plantings, as most herb seeds are small. See package or plant container for instructions.
Special Tips:	If you live in a warm or moderate winter area, many herbs will survive winter and perform like perennials. In cold winter areas treat like annuals or dig roots in late fall and bring indoors for winter protection. Replant outdoors again in spring.
Harvest:	The leaves of most herbs can be harvested at any time in the growing season. Most are at peak flavor before they flower, so pick enough to dry or freeze before flowering and then let the rest of the plant produce seed for planting next year. For herbs grown for their seed instead of or in addition to their leaves

(celery, fennel, cilantro, dill, etc.), harvest when seed heads have matured, darkened and dried. If you have a very wet fall you can harvest whole plants and hang them upside down in a garage until dry. Harvest seeds by rubbing them out of heads or pods. Harvest dried leaves by pulling off stems and placing into zip-locked plastic bags or tightly covered jars for culinary, medicinal or other uses.

Yield: Depends on herb

Worldwide, there has been an explosive growth in interest in buying and growing herbs. There are many reasons for this trend:

•Disillusionment with the cost and results of traditional medical treatments often lead people to seek more natural alternatives.

•Herbs have been important components of native peoples' healing traditions since early human history, and there is resurgent interest in these cultures and their traditions.

•The advent of the "Post-antibiotic Age", that is, the growing ineffectiveness of most modern antibiotics due to their misuse. For some serious bacterial infections there is only one remaining antibiotic left to fight it, and resistance to that one is already showing up around the globe. Scientists are scrambling to find replacements. Herbs are, once again, being considered.

•An aging U. S. population, especially the huge baby boomer wave, is fueling a national obsession with wellness, natural cosmetics, healthy food/drinks, aromatherapy, age reversal and stress relief. Herbs play important roles in many of these areas.

•The global spread of HIV infections andAIDS with no

cure in sight from traditional medical research.

Interestingly, the herbs that tend to be the most popular as seasonings in many cuisines around the world are also among the most beneficial in disease prevention, anti-bacterial, anti-viral, anti-cancer or even immune system boosting functions. Growing those herbs that will make you more self-sufficient may make you healthier as well.

At the very least, you should consider easy-to-grow parsley, basil, sage, rosemary, fennel and tarragon. All are medically important in health maintenance according to recent research and are so easily and deliciously worked into everyday meals. Fennel, by the way, is the "secret" ingredient of Italian sausages and sage, of breakfast sausages. If you didn't have the meat around during leaner times, or if you choose not to eat meat, you could still enjoy these wonderful flavors.

Another herb you should seriously consider growing is *Echinacea purpurea* or purple coneflower. Not only is it a large, spectacular plant full of gorgeous , daisy-like purple flowers with deep brown centers all summer long, it is a perennial and will live from year to year in all but the most devastatingly cold climates. Dried Echinacea petals, leaves and especially roots are made into teas and even poured into capsules to be taken as aids to the immune system during illness. It makes a pleasant tea and can even be mixed with one of your favorite teas for a combination that you will enjoy. Pharmacological tests in Germany have confirmed Echinacea increases the number of white blood cells that destroy bacteria and viruses in the body. These published studies indicate that it is effective in the treatment of colds and flu.

One small note: if you are allergic to bee stings, don't plant Echinacea right by your front door. The bees love the sweet nectar in its flowers and will come from far and wide to collect it. It is great in a corner of the food garden, however, because it will draw the honeybees essential to pollinating those fruits and vegetables that depend on bees to produce a crop. Another note: bees interested in Echinacea are not interested in attacking you or anyone else -- they simply love this plant and are generally too busy to bother with people. But if you are allergic, you will likely be anxious with that many bees around the house itself.

Many herbs are grown as annuals in climates that include hard ground freezes in winter. Others, like sweet basil, are even sensitive to a light frost and must be replanted annually, hence their classification as annuals. But many others like parsley and sage will withstand lighter freezes and "come back" again in the spring despite the killing of their top growth during the winter. All depends on where you live. Also keep in mind that an annual like basil will produce seed in the same season, but a biennial like parsley will only produce seed in its second year. If you live in a hard winter area, you would have to bring a parsley root or two into your baement or refrigerator to protect it from hard ground freezing in order to harvest seed the following year. This would be a very important detail if you were needing to be self-reliant for your food seeds. Read the seed catalog or packages to classify herbs you are unfamiliar with.

As this book goes to press, a beautiful and exhaustive new book, The Herb Society of America Encyclopedia of Herbs and Their Uses, has just arrived in our local library. What a treasure! It features over 1000 plants, 1500 colored photographs, detailed descriptions of multiple uses for each of them and even directions for medicinal preparations. It includes growth and cultivation instructions, formal and informal herb garden design, historical background, wild herb information and more. It brings the whole field up-to-date and in one volume to boot. Past works have been sadly limited in scope or so old as to be medically unreliable or even dangerous to use. This is a must have if you would like to grow herbs for serious use. The author is Deni Brown, the publisher Dorling Kindersley Publishing, Inc., and the date of publication, 1995.

Jerusalem Artichoke

See Artichoke, Jerusalem

Kale

Varieties: Dwarf Blue Curled, Chinese, Green Peace, Russian Red, Hanover Salad, Flowering,

	Siberian, Winter Red, Vates, more
Time to Plant:	About 3 months before fall frost is expected--June to July in most areas of the country.
	This is a very cold-hardy veggie that actually improves in flavor after a good, heavy frost.
Distance between Plants:	Seed 1 inch apart and then thin to stand 8 - 12 inches. Eat all thinnings.
Distance between Rows:	18 - 30 inches, depending on variety. The larger varieties require larger spacing.
Planting Depth:	1/4 - 1/2 inch
Special Tips:	Don't try eating kale in the late summer or early fall unless you like strong-tasting veggies. When everything else is dying in your garden, this one is just coming into its prime. Check plant maturity date to determine when to plant. If summer is very hot, plant indoors in flats and transplant out like broccoli in early fall. With a not-too-cold winter, you may be able to harvest all winter long. Check insect control in appendix.
Harvest:	All thinnings can be eaten as soon as you pick them unless it is still too warm out. From mature plants, harvest a leaf or two from each plant, leaving the bulk of each plant in the ground for continual harvest. Time to maturity varies from 50 - 90 days, depending on variety. Plan accordingly.
Yield:	50 - 75 plants/50 ft. of row. Dwarf varieties might yield a pound of leaves/plant while

larger varieties would yield 1 and 1/2 lb. or more each. Unless you are a daily kale eater, you might want to plant a 25 foot row to start out.

Kale is a winter garden celebrity. When the hardy winter lettuces begin looking like wimps against those really cold November and December nights, there's the kale, all bright green and perky, peeking out from under heavy burdens of snow. Pick it right out from under the snow if the temperatures are not too low. What a treat when the freshest things you find in the market at this time of the year usually come from thousands of miles away and are well past their visual and nutritional primes.

As you will be able to tell from its aroma and flavor, kale is another member of the cabbage family and, like all cabbage kin, contains the phytochemicals that help prevent cancer. It also contains high levels of vitamins A and C as well as the minerals, potassium and calcium. One note on the calcium: like spinach, kale contains oxalic acid which inhibits calcium absorption, so all of that calcium is not readily accessed by the body. But the rest is, making kale an outstanding fresh winter vegetable and excellent "food and health insurance" during lean times.

Since many people have never even tasted kale, here are a few ideas for making it a part of your winter meals:

•Saute` it in a bit of olive or canola oil with garlic. Add salt and pepper to taste. If you like things spicy, use cayenne flakes. If not, add a bit of chopped nuts or even some fried potatoes.

•Remove tougher, central petiole of larger leaves. Steam until wilted. Cool in running water. Stuff and roll individual leaves with a favorite stuffing and cook like cabbage rolls.

•Chop into small pieces and put into your favorite soup.

•Saute` cut leaves with oil, garlic, mushrooms and

walnuts. Add a bit of water, salt and pepper and toss with spaghetti or even rice.

At only 45 calories/cup, cooked, kale is hard to beat as a healthy, "off-season" survival and economic security food.

Kohlrabi

Varieties:	Purple Vienna, White Vienna, Gigante, Blue Danish, Blaro, more
Time to Plant:	With the exception of the giant varieties like Gigante, kohlrabi is a fast cropper and can be planted throughout the growing season, from early spring to early fall. In warm winter areas, grow all year long.
Distance between Plants:	Sow 1 inch apart, thin to 3 - 4 inches apart. eat thinnings.
Distance between Rows:	For non-giant varieties, 12 inches, but be sure not to walk between these rows. Can be planted this densely in beds or in double rows with wider, walking rows between each double row. Beds make the best use of space.
Planting Depth:	1/4 to 1/2 inch
Special Hints:	Plant normal size varieties unless you know and love kohlrabi so much that you want to eat it three times a day. The large, Gigante, variety will weigh in at 10 pounds *each* under prime conditions and a 50 foot row of those " babies" is likely more than you'll want unless you are feeding cattle as well as your family. Better to make several

plantings, a few weeks apart for small, fresh harvests all season. See Pesticides for insect control.

Harvest: Most ready in 43 - 65 days. Harvest when young for most tenderness -- about the size of a small apple.

Yield: 75 kohlrabi/25 foot of row

Here's another one of those cabbage relatives with anti-cancer properties, vitamin C, potassium and even some protein to boot. They are very popular in Europe, especially in Germany. If you've never seen them, let alone eat them, kohlrabies look like green or purple, above-ground turnips with lots of leaves branching out of them. I think they are *very* cute, but beauty is definitely in the eye of the beholder. Much milder than turnips, they are very tasty shredded raw in salads or coleslaw, steamed with butter, cooked with potatoes and mashed (smart way to sneak the anti-cancer goodies into children), steamed and marinated in your favorite dressing, cubed into soups or stir-fries, etc. They are sweeter than cabbages and crispy when eaten raw.

Cut off the leaves sticking out of the bulb before storing. Use tender greens in soups or stir-fry. Store bulbs in refrigerator for a few days or in a cold cellar for a few weeks. Don't store with apples unless you want your apples to taste like kohlrabies.

Leeks

See Onions

Lettuce

Heading Varieties:
Cerise, Crispino, Gemini, Sangria, Reine De Glace, Great Lakes, Mission, Empire, Hanson, New York, many more

Butterhead Varieties:
Divina, Brune D'Hiver, Buttercrunch, All-Year-Round, Red Butterhead, Cindy, Nancy, Vista, Boston, Butterking, May King, more

Leaf Varieties:
Prizehead, Black Seeded Simpson, Lolla Rossa, Oak Leaf, Grand Rapids, Dapple, Corado,Red Deer Tongue, Salad Bowl, more

Romaine Varieties:
Augustus, Parris White, Freckles, Rosalita, Valmaine, Rouge D'Hiver, Winter Density, Parris Island Cos, Balloon, Cimarron, more

Time to Plant: Early spring outdoors. Can be started in flats or cups in a cool area indoors in mid-February in cold winter areas for planting out in April *if* they are gradually hardened off to withstand spring frosts. Lettuces prefer cool temperatures of 50 - 60 degrees F though some are more tolerant of heat for a longer period. Plant indoors in a cool area around July 15 - 30 in hot summer regions. Transplant outdoors in early September for fall and early winter harvests. Plan to have wonderful spring and fall lettuce and little or no lettuce during the heat of summer.

Distance between Plants: Depends on variety. Large heading types require more room than upright Romaines.

	Some butterheads and loose leaf types can take up 12 - 16 inches each. Read requirements for varieties you've chosen or choose types depending on space you have to offer.
Distance between Rows:	18 inches to 2 feet, but don't walk in rows this narrow. Plan walking paths to be wider.
Depth to Plant:	1/4 inch
Special Tips:	Keep well watered as lettuce is 95 percent water. Soak at ground level. Watering from above encourages fungal diseases and aphids. And always remember: •Slugs love lettuce more than you do and.... •Slugs love beer better than lettuce. If you live in an area where slugs are a problem, put out pie plates of beer – yes, beer!-- so that the rim of the pie plate is level with the soil. In the morning, remove drunken, drowned slugs to the compost pile or bird feeder. Replace beer and repeat. Remember, lettuce is better for you than beer, so buy them the six-pack and you eat the salad. Like all green, leafy things, lettuce likes lots of nitrogen. Well-rotted manures are great turned into the planned lettuce patch. High nitrogen compost or blood meal are great as a side dressing during rapid growth.
Harvest:	In spring or fall. Hot lettuce plants bolt to seed. (This is your seed collecting time. See appendix for more.) Harvest individual leaves of many different plants for both variety and to extend the harvest as long as possible. Plants remain in the ground to

make more. Cut or pick outer leaves that are in good shape. New ones are produced from the inside, out. If you are interested in growing perfect, crisp head lettuce, hold off on the harvest until heads are nicely rounded and full. Butterhead, romaine and loose leaf types are more suitable to the "pick-a- leaf- or- two" kind of harvest. And always eat those tender, young thinnings. Plant extra-thick just for this treat in the early spring. You can eat them when they are no bigger than a half inch. Guaranteed they'll cure the winter blahs and that late winter cold that you can't seem to get rid of.

Days to harvest range from 45 for some leaf types to 95+ for some heading varieties. This does not take into account that you are eating thinnings and snippings all along.

Yield: About 19 mature lettuce heads / 25 ft. of row but much more if you plant thickly and eat all of the thinnings over time.

Ah, lettuce! What an easy veggie to grow, and what a wonderful way to eat. Pick massive bowls of ten or more lettuce varieties each morning. Add some carrots, thinly sliced onions, even some young beet and endive greens, cover and put in the refrigerator. Dinner: This massive salad, a hunk of high quality, whole wheat bread, a piece of cheese and maybe even a glass of good, red wine. *Then* you will understand what living and eating were meant to be. It couldn't be simpler or more enjoyable.

Growing lettuce is a big step toward achieving food self-sufficiency. Once you have these intitial seed packets, you should never be without it. Barring an ecological disaster, you should always be able to raise some lettuce from your own seed. What's more, some of those seeds from bolted plants (see appendix) will always find their way to the ground and plant themselves for you. If you have a winter that doesn't normally

get down below 10 degrees F. or so, you will be surprised to find some of these "volunteer" lettuces awaiting you on your first venture into the garden in spring. Yes, you can transplant them to a new bed if you like.

As with all greens, lettuce is very good for you, and the darker the green or red, the better for you it is. Iceberg types are notoriously low in vitamins if you don't eat lots of the dark green outer wrapper leaves along with their white "hearts". Those stripped white balls in many supermarkets are just as stripped nutritionally. They are little more than vegetable fiber and water. But dark green or red romaines and rich, thick butterheads are high in vitamin A, iron and lots of trace nutrients. All are excellent sources of fiber.

Keep variety in mind as you choose seeds to plant. Plant as one big salad bowl in a garden bed , if you like, and you will have a wonderful mix of flavors, colors and nutrients with every picking. Always pick lettuce before it wilts in the midday sun as warmer weather arrives. You may be able to extend the picking a bit by shading the bed a bit with some lattice or light shade cloth.

Melons

Cantaloupe Varieties:	Sweet Granite, Amish, Delicious, Kangold, Nutmeg, Minnesota Midget, Hale's Jumbo, Charantais, Harvest Queen, more
Honeydew Varieties:	Honeydew, Honeyloupe, North Carolina, Sharlyn Honeydew, Marygold, more
Crenshaw Varieties:	Crenshaw, Golden Crenshaw, more
Casaba Varieties:	Santa Claus Casaba, Sungold Casaba, Casaba, Golden Beauty Casaba, more

Watermelon Varieties:	Rainbow, Ice Box Midget, Charleston Gray, Big Crimson, Sugar Baby, Moon and Stars, Navajo, Allsweet, Au-Jubilant, more
Time to Plant:	Start indoors in 2-3 inch cups or pots, 4 weeks before last expected spring frost. Transplant out after hardening off (see appendix) when soil is warm, weather is settled and frosts are over. Or sow seed directly into ground 2 - 3 weeks *after* last spring frost and soil is at least 75 degrees F.
Distance between Plants:	2 feet unless they are short-vined, "bush" types. For the latter, 18 inches will do.
Distance between Rows:	6 feet
Planting Depth:	1/2 inch
Special Hints:	Melons started indoors are very tender, so be sure to gradually harden them off to sun and temperature fluctuations. Also avoid disturbing their roots. If more than one seed has sprouted/cup, snip the extras off at soil level so you don't disturb the roots of the remaining, chosen plant. When transplanting, handle root ball lightly and water in thoroughly. Floating row covers add a couple of degrees temperature while also protecting them from insects early on in the season, but need to be removed so bees can pollinate once flowers appear. See insect control notes in appendix.
Harvest:	Days to maturity range from around 65 days to over 100 days, so buy your seeds with this

in mind. Melons are generally ready for harvest when the stem slips easily from the end of melon with gentle thumb pressure. Cantaloupes will turn from green, to tan with a hint of yellow in their skin when ripe, but the "slipping" of stem from fruit is the best clue. If you can smell luscious, ripe melons as you walk down the row, there are probably many very ripe melons ready to pick. Ants will discover the sweet juices oozing from the stem end, so be sure to get there first! Ants around the stem are a good sign of a ready-to-eat melon. Check package directions for specific harvest tips for special melon varieties.

Yield: Depending on variety, you can expect 2 - 5 melons per healthy plant. With about 25 plants/50 ft. of row, that's anywhere from 50 - 125 melons. Though melons can be cut and frozen, they have to be eaten semi-frozen to retain any kind of shape or texture. Most people prefer to eat melon fresh, so be careful not to overplant if you don't like frozen melon balls or cubes. By planting varieties with different maturation dates, you can spread out the harvest and melons over several weeks to avoid being overwhelmed in a shorter time period.

Melons, whether cantaloupes or muskmelons, crenshaws, casabas, charantais or honeydews, are definitely worth trying to grow at least once in your life. A melon left to ripen in the garden until it has reached perfection is a very different fruit than the hard, half-green, corky, netted ones you find in the supermarket. Of course, commercial melons cannot be picked at their peak of ripeness because they would be too soft to ship well and would be prone to molding. Not so, your own. In fact, the complex flavors of a just-picked, warm, sweet, thoroughly ripened cantaloupe or charantais melon rivals the complexity of the finest wines -- without the alcohol, of course.

Most people in the U. S. have not tasted the small, French

Charentais melons. Though often referred to as cantaloupes, they have a far superior flavor, according to those who really know and love their melons.

Nutritionally, cantaloupes are outstanding. As with all fruits and veggies that are deep orange in color, they are high in vitamin A. They also provide potassium, niacin and iron and a day's dose of vitamin C in a quarter of a large cantaloupe. And you can have all of this for only 75 - 85 calories for this size piece or about 80 calories for half of a small fruit.

Honeydew and other melons are also high in vitamin C, niacin, potassium and iron, but their vitamin A content depends on their indvidual fruit colors. The more yellow or orange the flesh of the melon, the more vitamin A. Traditional honeydews are green and others tend more to white. These would have little or low vitamin A profiles. However, new varieties of orange-fleshed melons called honeydews are appearing and would, of course, contain vitamin A levels closer to those of cantaloupe.

Watermelons, like cucumbers, are so cool and refreshing in the summertime because of their high water content. Because of its deep color, watermelon is rich in vitamin A and, like the other melons, also boasts lots of vitamin C and potassium. If you are partial to watermelons, you might stagger a couple of plantings of the icebox varieties because, as their name implies, they are small enough to store in your refrigerator. Staggered harvest times would ensure that you still have room for the milk,

Any of these delicious melons would make an excellent addition to a food self-sufficiency program even if they weren't so delicious. Growing enough to allow each family half a small cantaloupe or a thick, 8 ounce slice of watermelon a day would take care of nearly all of their vitamin A and C requirements for the length of the harvest season.

Onions and Leeks

Bunching, Scallion, or Green Onion Varieties:
White Lisbon, Evergreen White Bunching, Beltsville Bunching, He-Shi-Ko Bunching, Santa Clause, Welsh Onion, Purplette,more

Red/Purple Bulb Varieties:
Benny's Red, Southport Red Globe, Burgundy, Red Bermuda, Red Creole, Red Wethersfield, Redman, Italian Blood Red Bottle, more

White Bulb Varieties:
White Sweet Spanish Utah, Crystal Wax, White Bermuda, Kelsae Sweet Giant, Southport White Globe, Ringmaster, White Ebenezer, White Portugal, White Sweet Spanish, Wonder of Pompeii, more

Yellow/Brown Bulb Varieties:
Texas Grano, Walla Walla Sweet, Australian Brown, Early Yellow Globe, Excel 986, Texas Early Grano 502, Yellow Ebenezer, Yellow Sweet Spanish, Stuttgarter, more

Leek Varieties: Winter Giant, American Flag, French Summer, Elefant, Unique, Elephant Garlic (actually a leek!), Giant Musselburgh, more

Shallot Varieties: French Shallot, Red Shallot, Atlantic, Frog's Legs, Giant Red, Jersey, Odetta's White, more

Egyptian/Topset/ Walking Varieties:
Egyptian Onion, Egyptian Red Onion, more

Time to Plant: Bunching or scallion varieties - plant in early spring for summer use and late summer for fall and early winter use. Some will survive moderate winters. Bulb onions and leeks generally require long seasons (100 + days) so start seed indoors in January in cold areas to plant out about 6 weeks before last spring frost. They can take the cold. Or buy tiny

bulbs called "onion sets" in nurseries or even in some supermarkets for a head start. Some sets are offered in fall for wintering over in milder winter areas. Also available, small, live onion plants. See Special Tips, below. Plant Egyptian or Walking onion bulblets in the early fall.

Distance between Plants: For bunching varieties, 1 - 1 and 1/2 inches apart, final spacing. Eat thinnings in salads. For bulbing varieties, final spacing, 2 - 3 inches, the larger distance for the larger onion types. Leeks, 2 inches apart. Egyptians, thin to allow permanent clumps, 1 - 2 feet apart. Shallots, 6 inches.

Distance between Rows: 12 inches for scallions, 18 inches for bulbs and leeks, but don't walk in rows spaced this narrow. Set aside larger path to walk in.

Planting Depth: Seeds, 1/4 - 1/2 inch. Sets, 2 inches. Shallots, just deep enough to barely cover tip of bulb. Egyptians, in 9 inch trench which you gradually refill as bulblets grow. Produces long, thin, white onion at bottom. Bulb onion transplants, 2 inches.

Special Tips: You will have better bulb onions if you plant them from seed. Larger bulbs, fewer bolting to seed prematurely. Onion sets are merely partially grown onions grown in crowded conditions and harvested prematurely. Many of these tiny bulbs think it's time to make seed when you replant them and send up a seed stalk (bolting). You will likely want some seed for the future, so you might want to let a few of these go, but if its bulbs you're after, you will have a much higher yield of

good size onions from seed. Plants are expensive, even when bought in bulk through catalogs, but they are more reliable bulb producers than sets.

Harvest:

All thinnings, of course, are wonderfully edible and all onions can be eaten at any stage of maturity. Days to maturity vary with onion type and strain. Some scallions are full-sized in 60 days or so. Leeks can be ready in 85 - 150 days. Bulb onions range from 65 days for small ones to 120 or more days. Check the package or catalog descriptions and plan accordingly.

When 50 percent of the tops of bulb onions have fallen over, knock the rest of the tops over as well. Protective skins will form as the onion bulbs mature. Don't water now. Pull when tops brown and lay out on soil to dry and cure in the sun *unless sun is unusually strong and intense.* If that is the case, dry them in a garage, shed or under other airy cover. I once managed to sunscald a beautiful crop of onions I spread on the sunny, south side of a reflective, white house, so it is possible. When onions are dry and necks shriveling, cut tops off at neck.

Yield:

At 5-6 bulb onions/foot, 250 - 300 onions in a 50 foot row. Estimate your yield at about 100 - 120 lbs. of larger bulb varieties per 100 ft. of row. Scallions -- double the plant # yield. Leeks, about the same as bulb onions. Greater actual yield if harvesting all thinnings and immature plants from thick plantings. Actual weight of dry onions harvested depends on type of bulb onions grown.

There is absolutely no reason why you can't have some kind of onion from your garden available year 'round. Wintered over onions can brighten very early spring salads. If you only harvest the outer onions of the clump that Welsh onions form from one seed, you will never need to replant them again. They will dutifully reproduce themselves and will survive all but the harshest of winters. If covered with a good blanket of snow, they'll even shrug off temperatures below zero. Bulb onions are taken indoors for winter use. Leeks can be kept some time in a cold cellar or cut and frozen for winter meals. Scallions are ready as thinnings a mere few weeks from the planting of seeds in spring. The key is to grow some of each type.

What can have an impact on the bulb onions you choose to grow is the variety's classification as a long-day or short-day type. Long-day types, as their name implies, require a long day -- 13 - 16 hours of sunlight to form good bulbs. These conditions are generally met in more northern latitudes. If you live in the southern latitudes, you will want a short-day type bulbing onion because your days tend to have only 12 hours of sunlight. Check the seed package or catalog to see which type it is before buying. A *good* nursery will generally only order seed appropriate for the area, but it is wise to check. If you are still uncertain, call your local Master Gardener program at your state's Cooperative Extension Service, and ask them if your area is categorized as a long-day or short-day area for onion growing. They may even be able to recommend a non-hybrid onion that is known to grow successfully in your climate. Day length is not important to the other onion types.

Shallots, those sweet, mild and expensive "gourmet" onions, are among the easiest to grow and store in an airy, netted onion bag in a cool, dry basement for nearly a year! If you are careful not to eat all of them during the winter, you'll have plenty for planting in the spring. When planted, each shallot bulb you buy at your supermarket or nursery will divide into as many as 10 little bulbs. Yes, you can plant the ones from the grocery store and you don't have to worry about getting hybrids. They will breed true to the parent bulb and they will cost you a fraction of what you have to pay at the nursery. If you plant a pound of shallots that cost you $ 2.00 in the grocer's, you will get

about $ 20.00 of shallots back. Now that's a good investment.

Egyptian or "walking" onions are curious creatures that are fun to grow just to watch, though they are also a very good and reliable source of food. Unlike other onions that set their seeds at the tips of tall seed stalks when they bolt, Egyptian onions set one or two clusters of small onion *bulbs* at the tips of these stems. Often called bulblets, they can be eaten in salads, cooked, frozen whole, or planted in fall to expand your crop. They are very winter hardy. The larger bulbs in the ground may be too strong for some tastes, but a little can go a long way to flavoring a favorite dish. If planted deeply (see Planting Depth on previous page), you can blanch the bottom, white bulb and reduce its pungency.

By the way, their designation as walking onions is also related to this unusual habit of setting bulbs on top. As individual plants get top heavy with maturing bulblets, the tall stem bends down to the ground where, if not harvested, the bulblets plant themselves some 18 inches to 2 feet away from the "mother" plant. The cycle repeats itself over and over again, and it soon appears that the onion plants are "walking" across the complete width of your garden. A great survival tactic for the plant, don't you think?

The green tops of onions are very high in vitamin A and good amounts of vitamin C and potassium. Those of scallions, shallots, Welsh onions and young Egyptian onions are especially suitable for eating. Snippets of the green tops of young bulb onions are also tender enough to eat. The rest of the onion is a fair source of potassium and a good source of fiber.

With so many different types to choose from, its fairly easy to become self-sufficient in this very popular vegetable.

Peas

Shelling Varieties: Alaska, Wando, Lincoln, Tall Telephone, Bikini, Burpeeana Early, Austrian Winter, Early Frosty, Green Arrow, Freezonian, Laxton's Progress No. 9, Little Marvel, Knight, Maestro, Multistar, more

Edible Podded Varieties

Sugar or Snow Peas:	Dwarf Gray Sugar, China Snow Pea, Mammoth Melting Sugar, Honey Pod, Oregon Giant, Oregon Sugar Pod,more
Snap Peas:	Sugar Snap, Sugar Ann, Sugar Daddy, Sugar Pop, Super Sugar Mel, more
Time to Plant:	Just as soon as you can get them into the ground -- late winter, early spring. They know when to grow and love cool soil. One variety, Wando, will tolerate warm or cold weather, but none of them like hot summers. Plant to harvest in by June in hot summer areas. Plant again in mid- to late July for fall crop. If August is hot in your area, Wando is best bet.
Distance between Plants:	1 - 1 and 1/2 inch. Can plant a second row, 3 inches from the first.
Distance between Rows:	18 inches between double (3 inches apart) rows for short-vined varieties; don't walk between rows spaced this closely. Allow 4 - 5 feet between double rows for tall, trellised varieties.
Depth to plant:	1/2 - 1 inch
Special Tips:	Plant two or three times, a couple of weeks apart, in very early spring to allow for uncertain weather. Extended periods of cold, wet weather could result in seed loss. See tips for dry beans. Peas are also legumes and

benefit immensely from inoculation with Rhizobium bacteria. Peas like cool "feet". If weather heats up too soon in spring, cover the soil surrounding pea roots with a couple of inches of grass clippings, old leaves, straw, or even shredded newspaper to keep them cool. This also helps to control evaporation of soil moisture so you'll have to water less.

Harvest: By early summer. For shelling peas, pick when pods are nicely rounded with plump peas. Zip a few open to learn how plump is plump enough. The individual peas should be touching each other and be a nice, bright green in color. Once the pod is turning brown and the peas becoming a dull, white-green, they are better saved for seed or soup. Another clue: taste them. If they are nicely rounded and sweet, its time. See harvest information, below, for snow and snap peas.

Yield: With 6 - 8 plants/foot and 12 - 16 if planted in double rows, you can see that yield will depend on height of plant (they set pods up most of the vine) and size of the individual pods. Figure 35 - 45 lbs. in pods per 100 ft. of row. In general, larger, climbing varieties have larger pods and higher yields per plant. It is not impossible to get half a pound of pods from a single, climbing plant. You could have extra to sell or give away.

Peas are not only one of the first main crops to harvest from your self-sufficiency garden, but shelling peas are among the highest in protein. This is important if you are relying on vegetable sources for your total protein needs.

Since early spring and late fall weather tend to be very

unpredictable, it's wise to plant several different kinds of peas at staggered planting times. If one fails, you can be pretty sure another will do fine. Keep in mind that maturity dates range from a mere 52 days to 65 days from seeding to table. Add a week or two for picking mature pods and out they come. So even if you choose a later variety, this short time in the ground means you will be pulling out those pea plants at about the same time you need the space for summer's heat-lovers like peppers and eggplants. If you like peas, plant lots of them and rest assured that you will be able to get them out of the way by the time the rest of the garden needs the room. If you are having a long, abundant pea-picking season, plant the young heat lovers right in with the peas. When the peas come out, they'll have plenty of space to grow.

Happily, edible podded peas are very easy to grow and highly productive. If these are a favorite and you have the room and a wire fence or trellis for them to grow on, choose a tall variety with large pods. You'll produce enough for a year in no time at all. If you haven't had the snap varieties of edible podded peas before, you will want to try them. Instead of picking them when they are thin, flat and their pea seeds barely visible as you do the snow peas, these are picked when their pods are nicely rounded and filled with swollen peas. Their walls are thick and juicy, yet taste like peas. They are good raw or cooked and definitely give you the highest food yield per foot of row of all of the peas. Since their debut in 1979, snap peas are now available in short or bush varieties and stringless to boot.

Remember to leave some of the pods of each variety on the vine to ripen seed for next year's planting. They can dry indoors after you pull the plants.

Peppers

Hot Pepper Varieties:

Pasilla, Jalapeno, Anaheim, Large Hot Red Cherry, Ancho, Tabasco, Cayenne, Hungarian Hot Wax, Serrano, Habanero, Thai Hot, more

Sweet Pepper Varieties:	California Wonder, Calwonder Early, Jupiter, Early California, Aconcagua, Earlired, Sweet Chocolate, Large Sweet Cherry, Purple Beauty, Sweet Pimento, Paprika, Sweet Red Cherry, Sweet Banana, Pepperoncini, more
Time to Plant:	Outdoors, weather must be fully warm and settled in spring. Plant indoors 6 - 8 weeks before last spring frost. Start at 80 degrees to germinate well. Try on top of a water heater or near another steady heat source. Can buy inexpensive plant heating cable in seed catalogs. They can take 3 - 4 weeks to germinate! Can grow at normal room temperatures. Ready to plant outdoors when 4 - 6 inches tall and weather is warm.
Distance between Plants:	18 inches
Distance between Rows:	2 - 3 feet -- 3 feet if you will use it as a foot path
Planting Depth:	1/4 inch
Special Tips:	Pay attention to the heat requirement for germination. At this time, pepper plants in somewhat limited variety, are available from local nurseries, but many are hybrids, and you can't be self-sufficient if you depend on buying plants each year. See insect pest information in appendix. These are easy to grow after you get past germination.
Harvest:	Days to maturity given on packets and in catalogs usually represent the number of days between transplanting outdoors and the day

you pick your first, mature pepper. Read your seed source carefully and then add 6 - 8 weeks for indoor starting of plants. Plan for your season length. Harvest sweet peppers from time they are half-grown to full size, but walls will be thicker, juicier and sweeter at full size. Let green peppers stay on plant until red, if you like the extra-sweet reds or, if hot peppers, the extra-hot "hots". Most can bring first table peppers in 60 - 65 days from transplants.

Yield: For large, sweet pepper varieties, you can expect to harvest 50 - 60 lbs. /100 ft. of row. For small, hot varieties, 25 - 30 lbs.

Peppers are excellent sources of vitamin C and very good sources of vitamin A. Red peppers are especially high in vitamin A. Since it is difficult for most people to eat *large* quantities of very hot peppers, it's a good idea to grow lots of sweet ones to get the greatest benefits of their high vitamin content. Keep in mind that vitamin C is not heat stable, so plan to eat some sweet green and red pepper strips raw to get the full benefit of this nutrient. You could literally do without the orange juice or other source of vitamin C if you have raw peppers available -- the recommended daily allowance is 60 mg and one small green pepper has about 94 mg. The same pepper also contains about one-third of your daily potassium needs, and, for this purpose, it can be eaten raw or cooked. All of this nutrition can be had for a mere 20-25 calories for a full cup of raw pepper strips. It simply doesn't get much better than that for healthy eating.

If you are unable to eat raw, green peppers, let them ripen to bright red on the plant before picking. The flavor change is incredible, and you may change your mind.

Keep in mind that peppers are among the easiest veggies to store for later use. They can be pickled and canned using only the simplest of canning techniques or, if you have a freezer, can be simply cut up and frozen. No blanching is necessary. They can be dried in the dehydrator or even in the sun with excellent

preservation of nutrients. Hot peppers are especially suitable for drying and flaking as seasoning. Just be very careful that you don't grind or flake them in a food processor or blender once they have dried. You will literally create pepper mace in your kitchen. Take it from one who did just that.

Potatoes

Varieties:	Russet Burbank, Kennebec, Irish Cobbler, Green Mountain, Purple Caribe, Russian Banana, Red Dale, Yukon Gold, Yellow Finn, Carola, Gold Nugget, Peruvian Blue, Butte, Katahdin, Krantz, more
Time to Plant:	Early to mid-spring, 4 - 6 weeks before last frost
Distance between Plants:	9 inches
Distance between Rows:	3 feet
Planting Depth:	4 - 5 inches; mound more soil up around the stems as they grow, leaving about 12 inches showing above the ground.
Special Hints:	Buy certified seed potatoes your first time. The ones in the supermarket are often sprayed with growth inhibiting chemicals so they won't sprout. *If* you happen to find a bag of sprouting potatoes that otherwise appear healthy -- no spots or scabs -- then buy and plant them. There are two general ways to plant potatoes: choose very small potatoes and plant the whole thing (most successful) or buy larger potatoes with many "eyes". Cut each large potato into several chunks containing at least two eyes apiece. Be sure

to leave the eyes plenty of flesh to feed on as they initiate growth of the plant - 2 inch by 2 inch pieces are about right, Spread on a rack or cookie sheet to dry completely in a sunny window or any dry area with good air circulation. When the cut flesh is dried and "healed", a day or two after cutting, plant them outdoors just as you would the whole, small potatoes.

Do not lime the bed in which you will plant your potatoes. Let soil remain on the acid side, and you will discourage potato scab, a fungal ailment they can get from the soil. Read special section on blight, below.

Harvest: See notes on "new" potatoes, below. Most varieties yield mature potatoes within 12 to 16 weeks. There are early, mid-season and late harvest types. The early and mid-season varieties will not keep for the winter, so be sure to grow late season potatoes to see you through late fall and early winter. Examples: Early -- Yukon Gold; Mid-Season - -Urgenta; Late -- Flava, Yellow Finn.

Yield: 2 - 5 lbs. / plant, depending on whether they are large, baking types or small, fingerling types. With about 65 plants per 50 ft. of row, you can expect to dig 130 - 325 lbs. of potatoes in a good, disease-free year. This may be distributed over early, mid- and late season, so it may not seem as high when you harvest an individual type.

You can sneak a few "new potatoes" when the plants are flowering and appear strong. Gently slip your fingers into the soil around a few of them and, without disturbing all of the roots, feel for small, 1 and 1/2 to 2 inch potatoes. Steal one or two, only, from each plant. Cover the roots back up, say "Thank

you", and boil them up for dinner. If you snip some of those green onion tops you grew and toss them and a bit of butter in with the boiled potatoes you'll catch a glimpse of heaven.

Now some bad news: The deadly potato fungus, *Phytophthora infestans,* that caused the infamous Irish Potato Famine, the starvation of one million and the emigration of 1.5 million people from Ireland in the 1840s, is back. It is here in the United States as well as elsewhere, and it is spreading rapidly. There is currently nothing in the global chemical or biological arsenal to beat it. There are no known resistant potato varieties, though that is where much of the research is now focused. At this printing, it is estimated that it will take about three years to develop resistant seed potatoes. According to several U.S. Department of Agriculture experts, it is the worst crisis ever to hit the U.S. potato industry and may be here to stay. The best hope is to breed plant varieties that are resistant to the damage caused by the fungus.

As of 1995, the fungus had been found in areas of Pennsylvania, Minnesota, North Dakota, Idaho, Washington, Oregon, Florida, Georgia and the Mid-Atlantic states. Internationally it is spreading in Africa, in British Columbia and New Brunswick, Canada, in South America, Europe, and Mexico. It is threatening famine in third world countries and dramatic price increases in the United States.

The organism is also called *late blight fungus* and can also attack tomato plants. It thrives in damp conditions and often shows up after a stretch of humid days of 85 degrees or more followed by a cool, wet spell. Dark, watery spots appear on the leaves and soon spreads to stems, the potatoes underground and tomatoes. The disease spreads from plant to plant. If you spot an infected plant, dig it up, bag it immediately and destroy it, preferably by burning in an area far removed from anyone's garden.

A lesser fungal opponent, *Alternaria or Early Blight,* usually infects leaves early in the summer when weather is warm and rainy or humid. Gray or brown-spotted leaves which turn yellow and drop off the plant are its symptoms. Early blight, unlike late blight, can usually be prevented by planting potato varieties resistant to this fungus. These include the excellent Butte, Krantz and Katahdin varieties. Spraying plants

with copper spray as a preventative will also ward off this disease. See appendix and manufacturer's container for details. Copper is an approved spray for organic gardeners.

Prevention, by making your garden inhospitable to both early and late blights, is currently the best weapon at your disposal. Maintain sanitary garden conditions and don't water potato or tomato plants from overhead past the small seedling stage. Clean up all diseased plant material, including dropped tomatoes. If the weather is very humid, don't water the potatoes and tomatoes unless they show signs of water stress -- wilting of either potato or tomato plants, or blossom end rot on tomatoes (see section on Tomatoes). If plants are wilting and it is very hot, take the nozzle off your hose and hold the hose at ground level to water.

Also be sure to plant potatoes from a known, healthy source such as a reliable nursery. Nursery supply houses are aware of disease problems and will go to great lengths to get healthy stock. Be aware of any reports of blight in your area newspapers and from your County Extension Agent, and avoid buying plants, potatoes or tomatoes from those areas.

If you live in an area that tends to have high humidity during the growing season, give fungus-prone plants lots of space to allow breezes to waft through them to encourage evaporation and minimize pooling of moisture on leaf surfaces. And plant potatoes and tomatoes in the sunniest spot in the garden to facilitate drying after periods of rain or high humidity.

A final note: These plant fungi are harmless to people and pets. If your garden is infected, and you catch it early enough to prevent the spread of the fungus to the tomatoes and potatoes, themselves, you could pick, eat or can your produce quickly. With early blight, you may even be able to simply destroy the infected plant and prevent infection of the rest of the crop with copper. Do not give tomatoes or potatoes from these plants away or sell them, however, as this only spreads this plague to others and ensures future problems for yourself as well. Remember -- don't put the infected plants themselves or kitchen trimmings from these vegetables in the compost heap. Burn them.

Radishes

Small Round Varieties:
Champion, Cherry Belle, Crimson Giant, Comet, Red Pak, Early Scarlet Globe, Sparkler Sora, Scarlet Turnip White Tip, more

French Radish Varieties:
D'Avignon, Flamivil, French Breakfast, more

Winter and Oriental (Daikon) Varieties:
Long Black Spanish, China Rose, Round Black Spanish, Miyashige, Minowase, more

Time to Plant: Spring through early fall

Distance between Plants: 1/2 - 1 inch for small, round and French varieties, up to 6 inches for large varieties. Read seed packets and catalog descriptions.

Distance between Rows: 1 foot for small varieties, 18 inches for large ones

Special Hints: Keep bed well watered. Radishes need to grow fast to be crunchy and juicy. They do poorly in hot, dry soil. For a continuous supply of fresh, crispy radishes for salads, stagger small plantings all season.

Harvest: As early as 21 days for the small salad types, to as long as 80 days for the large, Oriental or winter types. When they reach full size, pick them or they can get "woody", hollow, too hot in flavor or otherwise unpleasant.

Yield:	Depends on variety chosen. Small, round radishes will yield about 10/foot of row; large, Daikon or round, winter varieties will yield 3 - 4 / foot.

Radishes are certainly not nutritional powerhouses, at least with respect to those vitamins and minerals we measure. Like most root crops, they do tend to have some potassium and iron, but you would need to eat a good number of small radishes or a sizeable slice of the large, oriental types to provide your daily mineral intake with radishes, alone. It is a similar story with vitamin C. You *could* meet your recommended daily allowance of vitamin C with small, red salad radishes *if* you could down 46 of them a day. Most people would prefer to eat an orange, some strawberries or other high-C alternative, but it is good to know if nothing else was available.

One of the most popular reasons for growing radishes among veteran gardeners is that they are ready to eat in only 20-25 days for the small varieties. If you are eager to have a first taste of something --*anything* -- out of the garden in the spring after a long, cold winter, radishes will happily comply. They are to a vegetable gardener what crocuses are to a flower gardener -- first up and a boost to the spirit -- a sign that spring really is here or just around the corner, anyway.

Another, more practical, purpose for growing radishes is for the service they can provide when interplanted with tiny seeds, like carrots or parsley, that take a while to sprout and are too weak to break through soil that may have dried out or crusted over after a heavy rainfall. Radish seedlings are strong, hardy and eager to push through even crusted soil, so they handily serve as miniature subterranean, jackhammers, breaking the surface for their weaker bed mates. If your soil tends to be low in rich, black humus and high in clay, this may be worth a try. Mix a little radish seed in with your carrot or parsley seed and plant together. Just be careful to harvest the radishes before they get so big that pulling them will pull out the carrot or parsley plants,too. A few "mistakes" serve the purpose of thinning; too many and you may have thrown out the babies with the bath water.

Spinach

Varieties:	Bloomsdale Long Standing, Bloomsdale Dark Green, Giant Nobel or Giant Thick Leaf Nobel, Resistoflay, Northland, Viking, King of Denmark, Giant Winter, more
Time to Plant:	Early spring, as soon as you can work soil.
Distance between Plants:	Thin to 2 - 3 inches apart
Distance between Rows:	12 to 18 inches
Planting Depth:	1/2 inch
Special Tips:	Spinach is sensitive to both day length and soil acidity (see pH section) . Plant early, feed with high nitrogen fertilizers like manure or blood meal to ensure quick, dark green growth. Plant thickly and eat all thinnings -- gives you lots of harvests. Pick leaves a couple at a time off each plant when they get bigger, but harvest whole plant when they show signs of flowering and bolting. If you really love fresh spinach, make staggered plantings, a week apart. Once the longer days of June arrive, all will bolt to seed.
Harvest:	Spinach is an "in and out" crop, 39 - 48 days, on average, from seed to harvest. Harvest all plants before bolting. You'll know they are going to do this when a tight rosette of leaves forms in the center of nearly every plant and tiny, knobby flower clusters can be seen. If you wake up and find they have begun to bolt upward, all is not lost. Pick immediately.

Yield: About 50 lbs./100 ft. of row

No family intent on becoming food self-sufficient should be without spinach in their garden. It's a fast, productive, spring crop which will rapidly relinquish its growing space to a summer vegetable crop. It is exceptionally high in vitamin A, providing well over a full day's worth from a mere two cups of raw, chopped leaves or a few tablespoons of cooked spinach. With so little of this vegetable needed to meet a family's important vitamin A requirements, a little will go a long way. A couple of tablespoons of cooked spinach per person could easily be incorporated into breads, muffins, pasta, stir-fry, soups, etc. for those who don't care to eat it in salads or as a cooked vegetable side dish.

Spinach also contains considerable amounts of the important minerals, magnesium, potassium and iron. Another component, oxalic acid, has the negative effect of binding both iron and calcium, making them unavailable for absorption. For diets containing enough calcium and iron from other sources, this is not a problem. You just would not want to rely on spinach, alone, to provide these two minerals.

If you cannot imagine eating a salad without some spinach in it, you might extend the harvest into the longer days of summer by planting some later in spring, in beds that will be shaded by tall corn or even trees in the afternoon. In other words, corn or trees to the west of the later spinach bed. That may buy you a couple of additional weeks of fresh spinach.

When it is time to harvest, take all of the leaves off the plants and wash them well in a deep basin or pot full of water, allowing the gritty soil to sink to the bottom. Since spinach plants at their prime are low to the ground, every rainfall and hose watering will splash soil up onto the leaves. That's why it is often sandy if not washed well. There are ways to minimize the accumulation of soil on leaves: buy and save the seed of the smoother leafed varieties like Nobel or Giant Thick Leaf Nobel, and mulch the rows of plants with wheat straw when they are very young. In the latter case, the developing leaves will rest on top of the straw, not on soil, so rain will not spatter soil on them.

Since most of the harvest will occur within a day or two,

you could find yourself up to your ears in wonderful green leaves. Keeping in mind that a pound of spinach cooks down to a mere cupful, it is only a temporary situation. But how do you wash all of those leaves with a minimum of fuss and bother? Beg or borrow the kids' wading pool, fill it with clean water and toss in all of those individual leaves. Swirl them all around for a few minutes, lift them off the top of the water into a large pot or basin, give them a final rinse in clean water, steam them down for the freezer, and store some fresh in the refrigerator for salads.

For long-term storage not requiring electricity, spinach can be canned or even dried.

A note about New Zealand "spinach" which you will see in catalogs and nurseries advertised as summer spinach. Though it is not true spinach, the leaves of this plant are a good substitute, especially cooked. What's more, they do grow throughout a long, hot, even dry summer. The seeds can be slow to germinate, so start in mid- to late spring, keep moist and weed free. Or start indoors where you can keep a close eye on them. Like true spinach, New Zealand spinach appreciates lots of nitrogen in the soil.

Squash, Summer

Varieties:	Patty Pan, Golden Scallop, Cocozelle, Gold Rush, Black Zucchini, Golden Zucchini, Yellow Crookneck, French White Zucchini, Vegetable Marrow, more
Time to Plant:	After all danger of frost. Can be planted indoors about 4 weeks before last frost date and transplanted out into warm soil. Must be gradually hardened off to full sun before setting out.
Distance between Plants:	Thin to 1 foot between plants

Distance between Rows:	4 - 5 feet
Planting Depth:	1/2 inch for smaller seed varieties, 1 inch for larger seeds
Special Tips:	Seeds will not germinate in cold or even cool soil. Shoot for soil between 75 and 95 degrees. Stagger plantings every two weeks to ensure steady supply all summer long.
Harvest:	Summer squash can be eaten at any time after they reach an inch long, but for greater food yield, let them grow until 6 - 10 inches for a zucchini type or 3 - 5 inches in diameter for the rounded, scallop types. Keep picked regularly to encourage more to grow. Don't allow them to grow into monster-sized clubs unless they are the ones earmarked for seed production in the fall. Most summer squash will be ready to harvest in 48 - 65 days.
Yield:	Depending on how large you let your zucchinis grow, you can realize anywhere from 5 - 25 lbs. or more from a single plant. A 5 - 10 foot row planted in early spring, followed by another planted mid-summer should keep a family of four in squash all season with lots to sauce, can, bake, dry or freeze for the winter as well.

An old farmer's adage says that if you want to get rid of a bothersome neighbor, or anyone else for that matter, just keep giving them your surplus zucchini every time they visit. Before you know it they'll stop visiting!

Now, it's not that zucchini or other summer squash are in any way undesirable; it's just that, come mid-summer, there are

just so many of them when the plants reach their peak production. You don't dare go to bed without picking them because, if you do, each squash will have doubled in size by sunrise, and you will find yourself with twenty pounds instead of ten, sixty instead of thirty. If well cared for, they are the prolific "rabbits" of the vegetable patch and, as such, real blessings to those bent on becoming more self-sufficient.

The secret is to stagger the planting of short rows a few weeks apart so you will have a steady, manageable supply. When the lettuce and spinach are just passing their prime and you're wondering what you are going to eat fresh from the garden for a couple of weeks until the tomatoes ripen, *voila`*, there are those tender young zukes to cut into thin slices and dress with a bit of salt, garlic, oil and vinegar. Then, when the tomatoes, onions and basil are ready to make cauldrons of tomato sauce to be canned for winter meals, there are all of those medium-sized zucchinis, Patty Pans, and crooknecks virtually crying to be diced and tossed into the sauce to make jarred *prima vera.* What an incredible treat it is to open a quart of "summer-in-a-jar" in the midst of a bitter-cold, February blizzard! Still too much squash? And, yes, of course they can be made into dill pickles just like the cukes those zukes remind you of.

Though very low in calories -- from 25 - 30 calories/cup of raw squash -- these summer veggies are good sources of vitamins C, niacin, and A (leave the skin on for more vitamin A), the mineral, potassium, and a decent dose of bowel-healthy vegetable fiber.

Finally, when the summer garden is past its peak and the cool, night winds hint of fall, there are all of those wonderful zucchini breads, cakes and cookies to make and store in your freezer, or those scooped out squash "boats" stuffed with rice and cheese and baked for hearty fall meals. Then there are the vats of hot vegetable soup you'll make with a bit of every single vegetable growing in your late summer and fall garden. Soups t that will feed the soul as well as the body. Ah, the joys of abundance!

Squash, Winter

Varieties:	Butternut, Waltham Butternut, Delicata, Ponca Butternut, Red Kuri, Blue Hubbard, Golden Hubbard, Green Hubbard, Sweet Meat, Turk's Turban, Mammoth Gold, Boston Marrow, Pink Banana, Queensland Blue, Buttercup, Golden Delicious, Black Forest, Lumina, Mooregold, Sibley, more
Pumpkin Types:	Atlantic Giant, Connecticut Field, Jack Be Little, Small Sugar, Baby Boo, Big Max, Rouge Vif d'Etampes, White Rind Sugar, Omaha, Burgess Giant Pumpkin, more
Time to Plant:	Outdoors, when soil is warm, at least 70 degrees and no danger of frost. Indoors, in small pots, 3 - 4 weeks before last frost. Transplant outdoors when soil is warm.
Distance between Plants:	If planted in rows, thin to 2 ft. apart. If planted in hills, thin to 3 plants/hill.
Distance between Rows:	For rows, 6 - 8 ft. apart, the larger varieties getting the larger spacing. For hills, 8 ft. in all directions of each hill of 3 plants.
Special Tips:	Watch for squash vine borer. See Pests. Winter squashes are heavy feeders and need plenty of water to produce large squashes. This is especially true of the huge varieties. One way to meet these needs is to build your compost heap where you want to grow next year's squash, and plant a hill right in the finished compost. Or dig in large amounts of compost or some well-rotted, composted

manure where each hill will be planted. You will be astounded by the results.

Harvest: Allow to ripen in the field unless frost is expected. Frost damage to skin shortens storage life. Days to harvest range from 70 - 100 days depending on variety grown and location.

Yield: From several pounds per plant to hundreds of pounds, depending on variety. Atlantic Giant pumpkins held world record at 493+ pounds for one pumpkin. Large blue hubbards can reach 15 - 20 pounds for each squash, while butternuts average 4 - 5 pounds each. Each plant can bring several squashes to maturity.

If every other vegetable in your garden were to die of some horrendous vegetable plague and all you were left with were winter squashes and pumpkins, you could survive the winter on these and a bit of high quality meat, dairy or well-balanced plant protein like legumes and wheat. In fact, the Pilgrims and other early American settlers were introduced to these plants by Native Americans who taught them how to dry, grind and cook them for winter survival. Many of the earliest settlers' diaries and journals bore references to pumpkins, and how these vegetables had maintained health or actually prevented widespread starvation during life-threatening winters.

Their recollections were not the unfounded rantings of folks with a bad case of cabin fever. These squashes and pumpkins are powerhouses of beta carotene, the plant chemical that our bodies convert into vitamin A, the cancer-preventing, immunity-boosting, antioxidant. In fact, a mere cupful of cooked pumpkin supplies 15,500 International Units (I.U.) of vitamin A; the recommended daily allowance of this vitamin is only 4000 I.U. As you can see, a bit more than a quarter of a cup of cooked pumpkin a day would meet all of your vitamin A requirements. But that's not all. That same cupful of

pumpkin, or any of the winter squashes, is high in potassium and is a good source of carbohydrate, fiber, iron, folic acid and protein. All of this nutrition can be had for a skinny 80 - 90 calories per cup.

If that's not enough to convince you to grow these super-veggies, consider that they store without any form of preservation in a cool basement all winter long, or can be puree`d and frozen, canned, dried or ground. They can be made into breads, pancakes, muffins, custards, puddings, stews, soups, ice cream and, of course, pies. Nearly all of the winter squashes, with the exception, perhaps, of spaghetti squash, are interchangeable with pumpkin in recipes. They can be seasoned as sweet desserts or as key ingredients in meat and main courses.

What's more, pumpkin or winter squash seeds are delicious dried or roasted and are excellent sources of protein, as well. Two tablespoons of hulled seeds contain about 5 grams of protein. The RDA for protein is 45 grams for non-pregnant, non-lactating women and 56 grams for males age 15 and over.

If you are short of garden space to grow the rambling vines of these plants, there are a couple of options. Choose shorter vined varieties like the smaller, Delicata squashes. Each squash is only about 1 to 1 and 1/2 pounds and the vines can be kept to a space of about 6 feet square. If this is still more space than you have, simply grow your squash hills around the perimeter of your garden and guide the vines out across a lawn or into another non-garden area. Of course you won't be able to mow the lawn directly under the vines, but it is a temporary situation. Other people have been successful growing smaller squash varieties up a fence or trellis. Then, if the squashes grow bigger than the vine seems able to support on its own, they tie flexible slings of fabric or mesh onion bags onto the fence or trellis to support each squash until it matures. Where there's a will, there's usually a way.

Tomatoes

Yellow/Orange Varieties: Caro Rich, Gold Nugget, Jubilee, Mountain Gold, Yellow Pear, Yellow Plum, Sunray,

	Yellow Canary, Sundrop, Persimmon, more
Pink/Purple Varieties:	Brandywine, Bradley, Arkansas Traveler, Oxheart, Dutchman, Pink Mortgage Lifter, Ponderosa, Cherokee Purple, more
Red Varieties:	Bonny Best, Cal Ace, Delicious, Beefsteak Super VFN, Campbell 1327, Abraham Lincoln, Large Red Cherry, Earliana, Earlirouge, Floradade, Gardener's Delight (Sugar Lump), Homestead, Marglobe, Oregon Spring, New Yorker, Rutgers, Sweetie, more
Red Paste or Sauce Varieties:	Roma VF, San Marzano, San Pablo, Super Italian Paste, Roma VFN, Super Roma VF, Roma Long, Ropreco, Rossol VFN, more
Time to Plant:	Indoors, 6 - 7 weeks before outdoor weather will be frost-free and settled. Need warm, 75 - 90 degree soil temperatures to germinate well.
Distance between Plants:	For indeterminate varieties, those generally larger tomato plant types that continue to vine after setting flowers and fruit, 30 - 36 inches apart. For the generally smaller, determinate varieties, 18 - 24 inches apart.
Distance between Rows:	30 - to 36 inches for staked plants, more for plants sprawled on the ground.
Special Tips:	When starting indoors, never let plants get too large for their containers as their roots

will be cramped and the plants stunted. If started in small-celled growing trays, transplant into 2 - 3 inch pots (yogurt cups!) when they are 2 inches tall. If weather is still unsettled at outdoor planting time, transplant again into larger pots or even plastic bags with holes poked in them.

Watch out for blight! See Potatoes listing, now, for watering tips and more on this important topic.

Harvest: Continuously throughout the season, as soon as ripe. Don't let them rot and drop to the ground. As soon as the tomatoes turn from deep green to a softer, more yellow green, they will eventually ripen. This is good to remember as the first fall frosts approach. Hard green ones will never ripen and are destined for fried green tomatoes, pickled green tomatoes, green tomato mincemeat (honest!) or the compost heap. Yellow green ones will ripen slowly indoors or in a warm shed or garage. Most varieties will ripen their first tomatoes 55 - 75 days from the time they are transplanted outdoors.

Yield: Depending on varieties grown, yield is highly variable. An estimated average is 375 - 400 lbs./100 ft. of row or approximately 4 lbs. for every foot of row planted and well cared for. This would be just about right for year round tomatoes for a family of 6.

Hands down, tomatoes are the most popular home grown vegetable on the planet. Not only is their fresh flavor far superior to the tasteless, machine harvested, artificially gas-

ripened commercial varieties, but they make superb cooked dishes that only *begin* with spaghetti sauce. But that's not even half of the story; tomatoes are an outstanding "survival food", containing high levels of vitamin A, niacin and potassium, a day's worth of vitamin C, and good levels of both iron and protein. What's more, they can be sliced thinly and sun-dried during a dry summer and fall, or dried in a home dehydrator. Dried tomatoes will literally store year round with no further preservation or energy.

Having pointed out all of those positives, do be sure to read the section on potatoes in this book. The same blights, early and late, that attack potatoes can infect tomatoes. Simply spraying tomatoes with harmless copper sprays will prevent most blights, but the reappearance of the blight responsible for the Irish Potato Famine in the 1800s is a whole different story and a very scary one at that. You need to learn to identify blight should you ever encounter it. Such disease emergence only reinforces the message that one should always be prepared for the unexpected as far as food is concerned. If you have enough tomatoes and seed in storage to see you through a bad year, you can comfortably sit out a season until the situation improves or you can make plans to grow them elsewhere the following season.

Depending on which varieties you choose to grow, you will need to decide on the type of support you will give your tomato plants. Yes, they can be grown in a natural sprawl all over the soil. If you live in a very dry climate, this can work, but you will lose *many* tomatoes to rot and slugs if you live in a more humid environment. Soil fungi and bacteria, the same ones that break down kitchen scraps into compost, will go to work on any tomato that touches moist soil.

There is one way to get around this problem if staking or other support is not possible, a common dilemma if you are growing a very large number of plants. Three or four inches of wheat or oat straw -- not seedy hay -- placed under all of the tomato plants when the weather and soil are fully warmed in late spring or ealy summer, will minimize the rot problem. Rain water will trickle down below the straw to the soil, effectively allowing the straw to dry out quickly after the rain. Tomatoes resting on clean, dry straw are not nearly as susceptible

to fungal attack as are those on soil. Yes, slugs can still be a problem, but there is always the beer solution for slugs. See Lettuce for details.

There are several other benefits to using straw. Weeds don't have a chance to see the light of day under thick cover, so the weed competition problem is nearly eliminated. When summer heat is really intense, straw helps to moderate soil temperatures, cutting back on evaporation of moisture from the soil and, therefore, on the need to irrigate in dry spells. In short, it can save the day in a drought, especially if you depend on well water. Straw is also a very renewable resource, supporting your self-sufficiency if you have the seed to grow the wheat or oats that provide it. You are then independent of the need to buy or scrounge staking materials. Finally, the straw, itself, will return to the soil as humus. This will occur slowly if left on top of the soil, or more quickly if tilled or turned in every fall. If you live in an area where crop insect pests are abundant, it's better to turn the straw into the soil than to provide a nifty, protected haven for these pests to hang out for winter.

Now all of this is not to detract from the obvious advantages of staking. Well-staked tomato plants yield nice, clean tomatoes with good exposure to the sun though, as more and more ultraviolet penetrates our atmosphere due to the ozone depletion problem, too much sun will result in sunscald. This is already a problem in some areas of the world. Ideally, tomatoes should have partial leaf cover to protect them from too much sun, so keep this in mind if you are trimming for staking.

One of the best support systems for tomatoes is the tomato cage. The smaller, commercial ones that look like teepees that are placed upside down around the plants, are okay for small, Roma type, Italian paste tomatoes or other small, bushy, determinate tomato types. In fact, they are ideal for these kinds of plants. But, for the huge, sprawling, indeterminate varieties, these are inadequate. As the plants get top-heavy with vines and huge tomatoes, these cages topple over in the direction of greatest weight. It can be a sorry scene.

There are other options. Concrete reinforcing wire can be cut to 9 foot lengths and bent into circular cages with long wire "feet" to poke into the ground around each young tomato plant. A big advantage to this method is that the large holes in this

kind of wire allow easy hand access to the tomatoes inside. Though the cost, up front, can be high, they should last for years if taken under cover every winter.

The same wire could be stretched down an entire row of tomatoes, supported by metal fence stakes placed every 6 - 8 feet or so. Then you would need to tie or weave the vines to the wire as the plants grew. Similarly, coated wire fencing materials with large openings could be used, but the large -- 4 inches at least -- openings would be a must to allow easy passage of vines and tomatoes through.

Then there is the simple, tall wooden stake. While adequate when set into the ground deeply and the tomato plants judiciously pruned and tied to maintain a main stem, it can be labor intensive when you are growing a year's supply of tomatoes for a family of four.

A final note: if all of this sounds daunting, it really isn't. There are many solutions to the wonderful "problem" of having too many weighty tomatoes to support easily. You could always just let the plants lie on the ground and "give" half of the crop to the slugs and fungi. Having fifty percent of your tomatoes is better than having none at all, but not the best use of your land and time. Whichever method you choose, you will be richly rewarded for your efforts.

Wheat

Just how much wheat must you grow to provide all of your needs for bread and baking for a year? It's a common question I am asked by people who are striving for food self-sufficiency. Seven pounds of good, hard whole wheat flour will give you six loaves of bread at about one and three-quarters pound each. These are nice, large loaves of whole wheat bread.

A bushel of good wheat weighs about 60 pounds and, depending on your season, weather, etc., an acre of home grown wheat yields about 20 bushels. Some quick math -- that's around 1200 pounds of wheat /acre. Given no losses in the grinding process, that's 1200 pounds of flour/acre. You could make 6 loaves of bread 171.4 times a year with that much flour or 1028 loaves of bread. That's a lot of bread -- almost 3 loaves a day.

If your family needs less than three big loaves of bread a day, you can grow proportionately less wheat. One quarter acre, or a piece of ground measuring 10,890 square feet, would yield 257 loaves of bread a year or about three-quarters of that big loaf/day. A garden plot measuring 110 feet by 100 feet is 11,000 square feet and could provide you with that much bread. That's a big garden plot by city standards, but not out of reach for suburbanites who may have a few times that much planted to lawn.

If you have the room to grow wheat, it is an excellent, practical and rewarding step toward self-reliance. If you don't have the room, then you'll want to store sufficient wheat to provide for at least several months of food in an emergency. Not only can it be used as flour for bread and baked products, but it can also be cooked like rice or sprouted for fresh greens when none are available. In fact, it could even be used to make a simple country wine.

Wheat intended for long-term storage -- months to years -- should not be ground but remain as wheat berries. They should be very dry, snapping cleanly in half or shattering when broken. As an extra precaution, freezing small to medium size batches of seeds in airtight glass or plastic jars for a few days will kill any insects that may be have survived harvest and processing. They can then be stored in the same,

air-tight containers in a cool, dark dry place. On the floor of an unheated cellar or basement is very good. They can also be stored permanently in a freezer, but this is expensive and unreliable in the event of loss of power.

Kept cool, dark and dry in an insect proof, airtight glass or rigid plastic container, wheat will be nutritious and edible indefinitely. As seed for future crops or for sprouting, it will lose germination ability slowly when stored under these conditions. If you plan to keep wheat long-term for planting or sprouting, it should be frozen in the same airtight containers to minimize that slow deterioration in germination rate. Ideally, you would keep some in the freezer as back-up for future crops and plant some to refresh your stock each year. Rotate old seed out of the freezer and new seed in, but *never plant all the seed you have.* In case of crop failure due to any mishap, you will still have stock for the next season.

There are several types of wheat grown throughout the world. Within each type there are varieties that may be especially suited to your specific climate. The best way to find out which variety does well where you live is to call the County Extension Service or Agriculture Department in your area. They are listed in the phone book and with directory assistance. Another option is to call the farm supply stores in your area for the names of local grain suppliers. Or look in the seed catalogs that come out of your general geographic area. A complete listing of seed companies and their specialties is included in this book.

Wheat Types

Soft Red Winter: Grown in areas with milder winters and substantial rainfall. The Pacific Northwest and Midwest can generally grow this type. The flour it produces is lower in protein than other wheat varieties and is used in pastries, cakes and cookies. It can be used to make softer breads.

Hard Red Winter: This is the kind that makes hardy bread. It is higher in protein than soft red winter types and grows in the Great Plains of the United States, Canada and similarly located countries around the world.

Durum: Makes the best pasta and Old World Italian breads. It is a

spring-planted wheat and is usually grown in the Northcentral United States and throughout much of Europe.

Hard Red Spring: The best, highest protein flour for bread. It is planted in spring in those parts of the world where winters are too cold for the survival of winter wheat. Grown in the Northcentral United States.

Soft White: Soft, lower protein wheat best suited for cakes and pastries. It grows well in the Pacific Northwest and California. Can be used to make soft breads.

Growing Wheat

Wheat is easy to grow. Decide on the size of the plot you need to grow your annual supply, or string off a small area where you will grow an experimental patch. . If you have very acidic or alkaline soil, you will want to bring it as close to neutral pH as possible, between 6.5 and 7.0. (See section on pH.) Add amendments if you must and then prepare a nice, loose seed bed, being sure to break up large soil clumps with a garden rake. Smooth out the soil and sprinkle (broadcast) 3.5 - 4.0 pounds of wheat seed/1000 square feet of ground. No rows are necessary. With a short, up-and-down chopping action on the rake, work the seed into the top two inches of soil. Smooth over the bed and mulch to discourage weeds and retain soil moisture. (See section on Mulching). If it is dry, water now.

Depending on the type and variety of wheat recommended for your area, you will either be planting in the fall or the spring. Fall planted winter wheat will soon fill your plot with young, green, grass-like clumps of wheat plants that will be killed back by the first hard freezes. In early spring, they will send out new growth from their surviving roots and literally take off, producing tall, stalky plants topped with heavy seed heads. When the seeds reach maturity depends on where you live and the type of wheat it is. Most will be mature between the first and last

week of June leaving enough time to consider planting a legume cover crop as a green manure, or even a fast crop of fall peas or bush beans.

Spring wheats are planted in spring at about the time of the last predicted heavy frost for your area. Growth then continues throughout spring and summer with harvest -- depending on weather, variety and your location -- sometime in late summer.

Two signs of wheat ready for harvest are yellowing stems and wheat kernels soft enough to dent with your thumb nail but resistant to crushing. This is called the "dough stage". When dry weather is predicted for a few days, cut the wheat near its base with a hand sickle or, if you are lucky enough to have one, a scythe. I know people who have cut *small* plots with grass shears, hedge trimmers or even large, kitchen scissors. I wouldn't recommend these for large plots unless you like blisters and backaches.

Gather up the downed wheat into bundles of about ten inches around, tie them with sisal or other inexpensive string and lean several bundles up against each other to stand and dry as "shocks" in the field. This is labor intensive, especially your first time out, so you may want to ask for the help of friends. When the shocks are all dry and the kernels of wheat can be easily coaxed out of their covers or awns, bring them into a garage, shed or other area with a hard floor. Concrete works best.
Spread the bundles out on the floor so they lie no more that eight inches deep and then begin threshing -- beating the heads until the seed drops free.

The best tool for threshing wheat for the small scale home grower is a simple, homemade flail. Attach a heavy duty eyescrew to both ends of a seven inch piece of medium duty chain. Screw eyescrews into a heavy duty wooden shovel handle on one end and a thick, at least 1 inch dowel or segment of a closet pole on the other. Now beat out all of a year's worth of frustrations on the heads of wheat, dislodging all of those plump berries. Here is another time you may want to invite your best friends over for "fun". When all of the grains in a bundle have been beaten out of their heads, pick up the bundles and give them a good shake to send all of the wheat to the smooth floor. Repeat with all of the bundles.

As the floor accumulates a lot of grain, sweep it up into a shovel or even a dustpan, and put it into a box or tightly woven basket. All of

the leftover wheat straw is now valuable mulching or composting material, a major contribution to a self-sustaining garden and your self-sufficiency. If you have done a good job of removing all of the grain, your straw should be essentially seedless. If you have not, your mulch or compost may sprout wheat. As compost this is not a problem, as turning your pile over periodically will kill the "volunteer" wheat plants. As mulch you can end up with wheat growing next to your tomatoes, so you be the judge. Check out the straw for seed and decide how you will use it. If you have chickens, seedy straw is great as bedding; the chickens remove the seed, enrich it with their manure and turn it over to you for your garden. Life doesn't get much better than this.

Okay, so now you have baskets or boxes filled with wheat berries, pieces of their awns and other plant debris. The latter materials make up the chaff. Now you wait for a good, windy day -- or use a good household fan -- and pour the berries and chaff from their boxes, a bit at a time, into a clean box, letting the wind carry the light chaff away from the berries and you. This is called winnowing. Pouring slowly works best. If the berries in the box are not clean enough, repeat the winnowing process. The better the wind, the easier the job.

Now the wheat is ready for grinding and storing *if* it is dry enough. Again, it must be dry enough to break cleanly in half between your nails or shatter when hit with a hammer or stone. If not, lay it out in a dry area in trays or baking pans to dry. See storage tips at the beginning of this section.

Grind in batches small enough for each baking project. Again, seven pounds will give you about six large loaves of bread. Hand-operated grain mills are available in many farm stores or through their catalogs. Other sources are the catalogs of the larger seed companies that cater to farmers as well as gardeners. Here are a few home grain mill sources:

Country Living Products: 14727 Fifty-sixth Ave. N.W., Stanwood, WA 98292. Ask for information about their Country Living Hand Grain Mill.

The Grist Milling Company: Retsel Corporation, Box 47, McCammon, ID 83250. Has many models to choose from.

In-Tec Equipment Company: Box 123, D.V. Station, Dayton, Ohio 45406 Some very good, heavy duty mills.

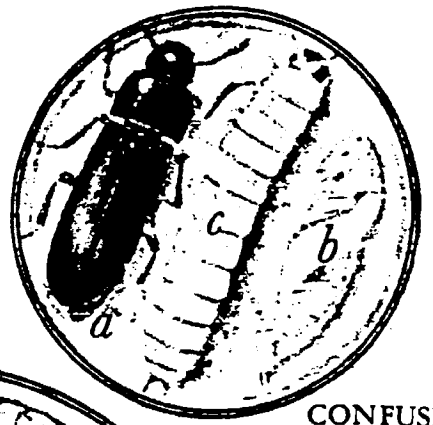
R & R Mill Company, Inc.: 45 West First North, Smithfield, UT 84335. Offers good seleciton, including the popular, affordable Coronas. They will send a catalog and price list.

Before you make a decision on a mill you should ask yourself how committed you are to raising your own grain on a regular basis. If you are committed, buy the best heavy duty mill you can afford. If you only want to have something to see you through unexpected, short-term natural or manmade calamities, buy something that will stand up to heavy work for short time windows. Whichever you decide, I would recommend that you don't want to tie yourself down to an expensive, all electric model because it will obviously do you no good in a no-electricity scenario such as a major earthquake or something equally devastating. If you want the easy way now and the option to go manually later, buy a convertible model. More expensive, but it may be the best solution for you.

A last note: The Hessian Fly is a common wheat pest you will want to avoid if it makes its home in your area. You can plant your wheat after the fly problem passes to avoid this problem. The only way to know if and when you can expect the Hessian Fly is to call your local County Extension Agent or Agriculture Department listed in your phone book. It takes but a few minutes to avoid a crop loss.

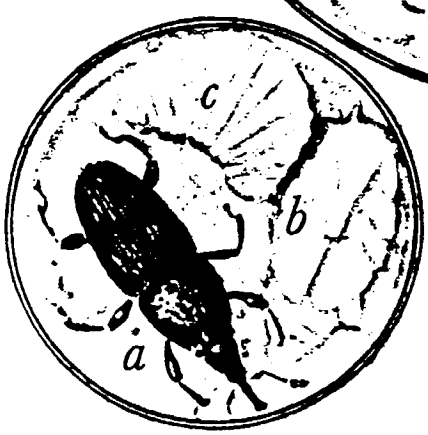
PANTRY PESTS

CIGARETTE BEETLE



CONFUSED FLOUR BEETLE

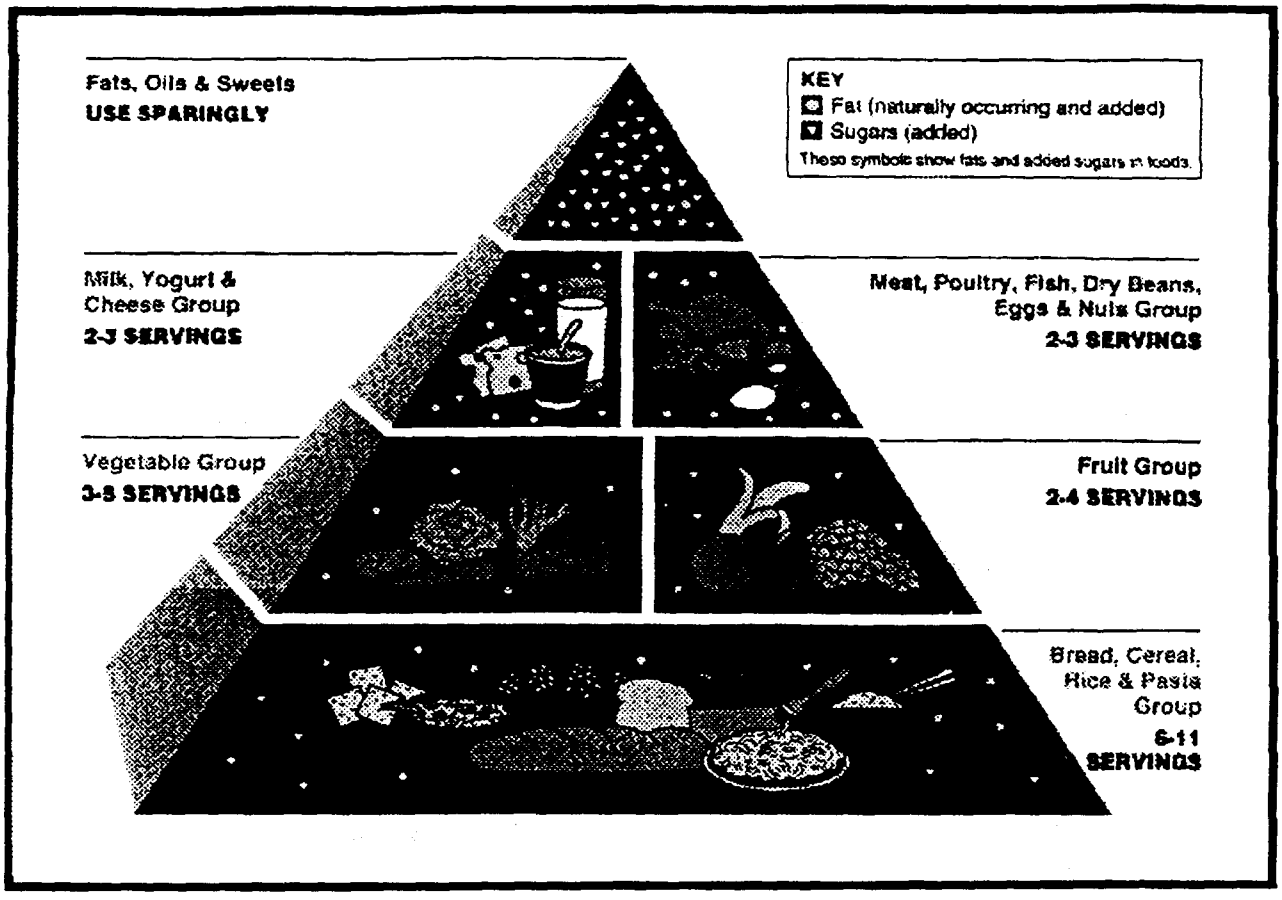
INDIAN-MEAL MOTH



RICE WEEVIL

SAW-TOOTHED GRAIN BEETLE

Nutrition



The USDA Food Guide Pyramid

A Pattern for Daily Food Choices

FOOD GROUP	SUGGESTED DAILY SERVINGS	WHAT COUNTS AS A SERVING?
Breads, Cereals, and Other Grain Products Whole-grain Enriched	**6 - 11** servings from entire group *(Include several servings of whole-grain products daily.)*	▶ 1 slice of bread ▶ ½ hamburger bun or english muffin ▶ a small roll, biscuit, or muffin ▶ 3 to 4 small or 2 large crackers ▶ ½ cup cooked cereal, rice, or pasta ▶ 1 ounce of ready-to-eat breakfast cereal
Fruits Citrus, melon, berries Other fruits	**2 - 4** servings from entire group	▶ a whole fruit such as a medium apple, banana, or orange ▶ a grapefruit half ▶ a melon wedge ▶ ¾ cup of juice ▶ ½ cup of berries ▶ ½ cup cooked or canned fruit ▶ ¼ cup dried fruit
Vegetables Dark-green leafy Deep-yellow Dry beans and peas (legumes) Starchy Other vegetables	**3 - 5** servings from entire group *(Include all types regularly; use dark-green leafy vegetables and dry beans and peas several times a week.)*	▶ ½ cup of cooked vegetables ▶ ½ cup of chopped raw vegetables ▶ 1 cup of leafy raw vegetables, such as lettuce or spinach
Meat, Poultry, Fish, and Alternates (eggs, dry beans and peas, nuts, and seeds)	**2 - 3** servings from entire group	Amounts should total 5 to 7 ounces of cooked lean meat, poultry, or fish a day. Count 1 egg, ½ cup cooked beans, or 2 tablespoons peanut butter as 1 ounce of meat.
Milk, Cheese, and Yogurt	**2** servings from entire group *(3 servings for women who are pregnant or breastfeeding and for teens; 4 servings for teens who are pregnant or breastfeeding)*	▶ 1 cup of milk ▶ 8 ounces of yogurt ▶ 1½ ounces of natural cheese ▶ 2 ounces of process cheese
Fats, Sweets, and Alcoholic Beverages	Avoid too many fats and sweets. If you drink alcoholic beverages, do so in moderation.	

EATING RIGHT THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

VITAMIN A

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

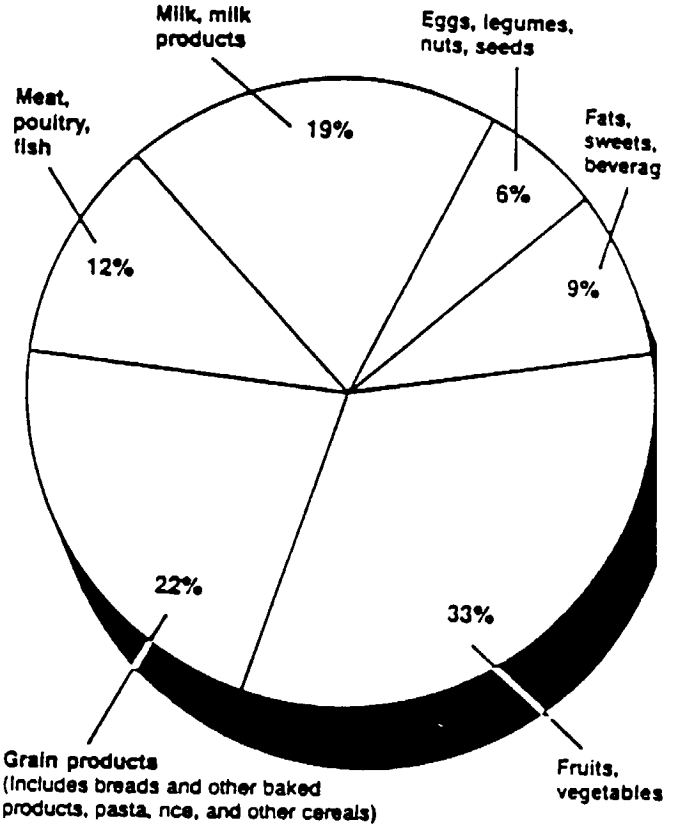
What Is Meant By a Good Food Source?

A good food source of vitamin A contains a substantial amount of vitamin A and/or carotenes (converted to vitamin A in the body) in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Daily Allowance (U.S. RDA) for vitamin A in a selected serving size or a unit of measure considered easy for the consumer to use. The U.S. RDA for vitamin A is 1,000 retinol equivalents per day.[1]

The U.S. RDA for vitamin A is the amount of the vitamin used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 800 retinol equivalents per day for women 19 to 50 years of age and 1,000 retinol equivalents for men 19 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Vitamin A?



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986. Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age. The percentages provided by the various food groups may not add up to 100 because of rounding.

As you can see, in 1985 and 1986, 33 percen of the vitamin A (including carotenes) in the diets of women came from fruits and vegeta- bles. Dark-green vegetables and deep-yellow fruits and vegetables provided about half of

the vitamin A in the form of carotenes coming from this group. Grain products and milk and milk products each supplied about 20 percent of the vitamin A consumed. Foods that contain small amounts of vitamin A but are not considered good sources can contribute significant amounts of vitamin A to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Vitamin A?

Vitamin A, a fat-soluble vitamin, is involved in the formation and maintenance of healthy skin, hair, and mucous membranes. Vitamin A helps us to see in dim light and is necessary for proper bone growth, tooth development, and reproduction.

Do We Get Enough Vitamin A?

According to recent USDA surveys, the average intake of vitamin A (and carotenes) by women and men 19 to 50 years of age met the RDA for vitamin A.

How Can We Get Enough Vitamin A?

Eating a variety of foods that contain vitamin A (and carotenes) is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. In fact, too much vitamin A can be toxic. The list of foods will help you select those that are good sources of vitamin A as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Vitamin A

Vitamin A can be lost from foods during preparation, cooking, or storage. To retain vitamin A:

- Serve fruits and vegetables raw whenever possible.
- Keep vegetables (except sweet potatoes and winter squash) and fruits covered and refrigerated during storage.
- Steam vegetables and braise, bake, or broil meats instead of frying. Some vitamin A is lost in the fat during frying.

What About Fortified Foods?

Lowfat and skim milks are often fortified with vitamin A because it was removed from milk with the fat. Margarine is fortified to make its vitamin A content the same as butter.

Most ready-to-eat and instant-prepared cereals are fortified with vitamin A. Fortified ready-to-eat cereals usually contain at least 25 percent of the U.S. RDA for vitamin A. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of a nutrient in a serving depends on the weight of the serving. For example, 1/2 cup of a cooked vegetable contains more vitamin A than 1/2 cup of the same vegetable served raw, because a serving of the cooked vegetable weighs more. Therefore, the cooked vegetable may appear on the list while the raw form does not. The raw vegetable provides the nutrient—but just not enough in a 1/2-cup serving to be considered a good source.

What Are Good Sources Of Vitamin A?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS[2]		
Oatmeal, instant, fortified, prepared	⅔ cup	+ + +
Ready-to-eat cereals, fortified	1 ounce	+ +
FRUITS		
Apricot nectar	½ cup	+
Apricots:		
Canned, juice-pack	About 3 halves	+
Dried, cooked, unsweetened	½ cup	+ +
Dried, uncooked	About 9 halves	+
Cantaloup, raw	About ½ cup diced	+ +
Mandarin orange sections, canned or frozen, juice-pack	½ cup	+
Mango, raw	½ medium	+ + +
Melon balls (cantaloup and honeydew), frozen, unsweetened	½ cup	+
Nectarine, raw	1 medium	+
Plums, canned, juice-pack	½ cup	+
Watermelon, raw	About 1¾ cups diced	+
VEGETABLES		
Broccoli, cooked	½ cup	+
Carrots:		
Cooked	½ cup	+ + +
Raw	4 3-inch strips	+ + +
Chard, cooked	½ cup	+
Collards, cooked	½ cup	+
Endive, chicory, romaine, or escarole; raw	1 cup	+
Escarole, cooked	½ cup	+
Kale, cooked	½ cup	+ + +
Mustard greens, cooked	½ cup	+
Peas and carrots, cooked	½ cup	+ + +
Pepper, sweet, red:		
Cooked	½ cup	+ +
Raw	1 small	+ + +
Plantain, green or ripe, boiled	1 medium	+
Pumpkin, cooked	½ cup	+
Spinach:		
Cooked	½ cup	+ + +
Raw	1 cup	+
Squash, winter, cooked, mashed	½ cup	+ + +
Sweetpotato:		
Baked or boiled	1 medium	+ + +
Canned	½ cup	+ + +
Tomatoes:		
Cooked	½ cup	+
Raw	1 medium	+
Tomato juice, canned	¾ cup	+
Tomato-vegetable juice cocktail	¾ cup	+
Turnip greens or turnip greens with turnips, cooked	½ cup	+ + +
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Liver, braised:		
Beef, calf, or pork	3 ounces	+ + +
Chicken or turkey	½ cup diced	+ + +
Fish and Seafood		
Mackerel, canned, drained	3 ounces	+
MILK, CHEESE, AND YOGURT		
Milk, lowfat or skim	1 cup	+

[1]A selected serving size contains—
- \+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2]See section on fortified foods.

EATING RIGHT
THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

VITAMIN B-6

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

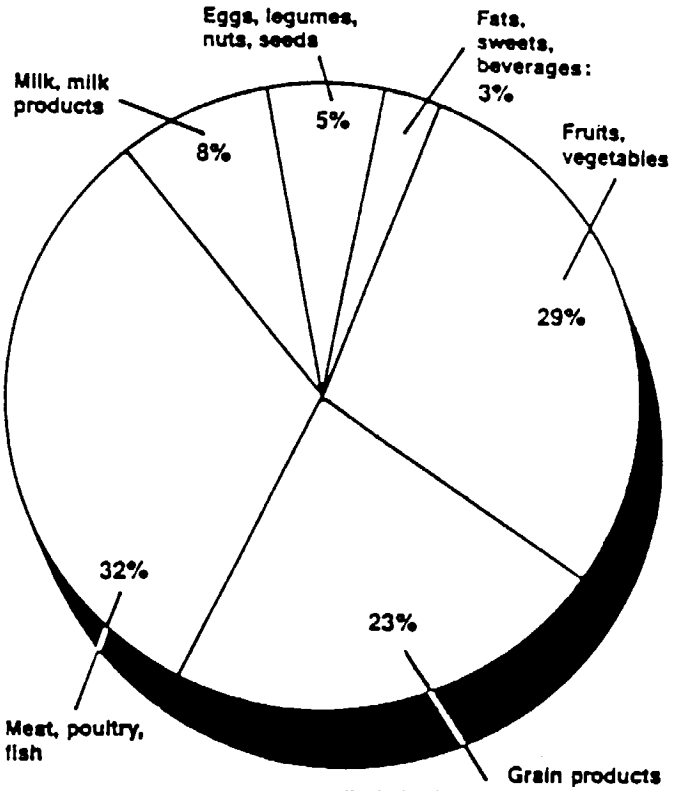
What Is Meant By a Good Food Source?

A good food source of vitamin B-6 contains a substantial amount of vitamin B-6 in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Daily Allowance (U.S. RDA) for vitamin B-6 in a selected serving size. The U.S. RDA for vitamin B-6 is 2 milligrams per day.[1]

The U.S. RDA for vitamin B-6 is the amount of the vitamin used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 1.6 milligrams per day for women 19 to 50 years of age and 2 milligrams for men 19 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Vitamin B-6?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986, Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age.

As you can see, in 1985 and 1986, 32 percent of the vitamin B-6 in the diets of women came from meat, poultry, and fish; 29 percent from fruits and vegetables; and 23 percent from grain products. Foods that contain small amounts of vitamin B-6 but are not considered good sources can contribute significant amounts of vitamin B-6 to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Vitamin B-6?

Vitamin B-6, a water-soluble vitamin, helps use protein to build body tissue and aids in the metabolism of fat. The need for vitamin B-6 is directly related to protein intake. As the intake of protein increases, the need for vitamin B-6 increases.

Do We Get Enough Vitamin B-6?

According to recent USDA surveys, the average intake of vitamin B-6 by Americans was below the RDA. The average intake for women 19 to 50 years of age was about 70 percent of the recommended amount. Men tended to have higher intakes than women of the same age, averaging above 90 percent of the recommendations for men.

How Can We Get Enough Vitamin B-6?

Eating a variety of foods that contain vitamin B-6 is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. Intakes of vitamin B-6 tend to be low in relation to recommendations, and there aren't that many foods that are really good sources; thus, it may take special care to ensure an adequate intake. The list of foods will help you select those that are good sources of vitamin B-6 as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information from recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Vitamin B-6

Vitamin B-6 can be lost in preparation, cooking, or storage. Cooking losses occur when some vitamin B-6 is dissolved in the cooking liquid. To retain vitamin B-6:

- Serve fruits raw.
- Cook foods in a minimal amount of water.
- Cook for the shortest possible time.
- Roast or broil meat and poultry.

What About Fortified Foods?

Most ready-to-eat and instant-prepared cereals are fortified with vitamin B-6. Fortified ready-to-eat cereals usually contain at least 25 percent of the U.S. RDA for vitamin B-6. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, 1/2 cup of a cooked vegetable contains more vitamin B-6 than 1/2 cup of the same vegetable served raw, because a serving of the cooked vegetable weighs more. Therefore, the cooked vegetable may appear on the list while the raw form does not. The raw vegetable provides the nutrient—but just not enough in a 1/2-cup serving to be considered a good source.

What Are Good Sources Of Vitamin B-6?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS[2]		
Oatmeal, instant, fortified, prepared	⅔ cup	+ +
Ready-to-eat cereals, fortified	1 ounce	+ +
FRUITS		
Banana, raw	1 medium	+ +
Prunes, dried, cooked, unsweetened	½ cup	+
Prune juice, unsweetened	½ cup	+
Watermelon, raw	About 1¾ cups diced	+
VEGETABLES		
Plantain, green or ripe, boiled	1 medium	+ +
Potato, baked or boiled, with skin	1 medium	+
Spinach, cooked	½ cup	+
Sweetpotato, baked or boiled	1 medium	+
Tomato juice, tomato-juice cocktail, or tomato-vegetable juice cocktail; canned	¾ cup	+
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Beef:		
Brisket, braised, lean only	3 ounces	+
Ground; extra lean, lean, or regular; baked or broiled	1 patty	+
Pot roast, braised, lean only	3 ounces	+
Roast, rib, roasted, lean only	3 ounces	+
Shortribs, braised, lean only	3 ounces	+
Steak; baked, broiled, or braised; lean only	3 ounces	+
Stew meat, simmered, lean only	3 ounces	+
Chicken, without skin:		
Breast:		
Broiled	½ breast	+
Roasted	½ breast	+ +
Leg (thigh and drumstick), broiled or roasted	1 leg	+
Cornish hen, roasted, without skin	½ hen	+ +
Ham, fresh, roasted, lean only	3 ounces	+
Liver, braised:		
Beef	3 ounces	+ +
Calf or pork	3 ounces	+
Chicken	½ cup	+
Pork, lean only:		
Chop, baked or broiled	1 chop	+
Roast, loin, roasted	3 ounces	+
Turkey, light or dark meat, roasted, without skin	3 ounces	+
Veal, chop, braised, lean only	1 chop	+
Fish and Seafood		
Cod, croaker, haddock, mackerel, ocean perch, porgy, or sea bass; baked or broiled	3 ounces	+
Mackerel, canned, drained	3 ounces	+
Mullet or trout, baked or broiled	3 ounces	+
Salmon, canned, drained	3 ounces	+
Swordfish steak, baked or broiled	3 ounces	+

[1] A selected serving size contains—
+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2] See section on fortified foods.

VITAMIN B-12

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

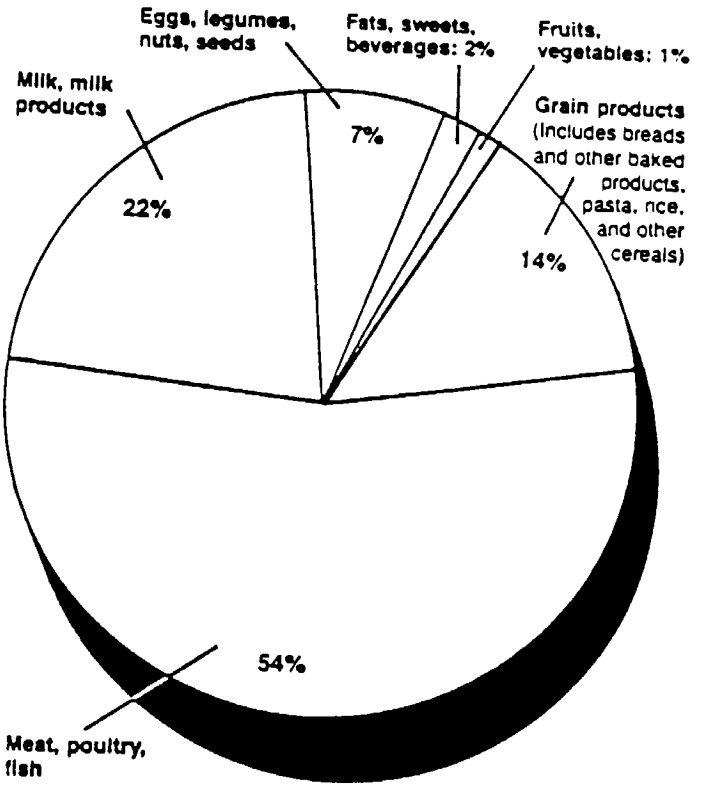
What Is Meant By A Good Food Source?

A good food source of vitamin B-12 contains a substantial amount of vitamin B-12 in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Daily Allowance (U.S. RDA) for vitamin B-12 in a selected serving size. The U.S. RDA for vitamin B-12 is 6 micrograms per day.[1]

The U.S. RDA for vitamin B-12 is the amount of the vitamin used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 2 micrograms per day for both women and men 19 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Vitamin B-12?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986 Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age.

As you can see, in 1985 and 1986, 54 percent of the vitamin B-12 in the diets of women came from meat, poultry, and fish and 22 percent came from milk and milk products. Although grain products contributed 14 percent of the vitamin B-12 consumed by women, the B-12 in these products was provided by the meat, poultry, fish, eggs, and milk they may contain. Likewise, the vitamin B-12 contributed by vegetables and fruits, legumes, nuts, and seeds, and by fats, sweets, and beverages comes from added animal products. Vitamin B-12 is found only

in animal products. Foods that contain small amounts of vitamin B-12 but are not considered good sources can contribute significant amounts of vitamin B-12 to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Vitamin B-12?

Vitamin B-12, a water-soluble vitamin, aids in forming red blood cells and in building genetic material. Vitamin B-12 also helps in the functioning of the nervous system and in metabolizing protein and fat in the body.

Do We Get Enough Vitamin B-12?

According to recent USDA surveys, the majority of Americans met their RDA for vitamin B-12.

How Can We Get Enough Vitamin B-12?

Eating a variety of foods that contain vitamin B-12 is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. However, vegetarians who do not eat any animal products may need a supplemental source of vitamin B-12. The list of foods will help you select those that are good sources of vitamin B-12 as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Vitamin B-12

Some vitamin B-12 can be lost from foods during cooking. To retain vitamin B-12, roast or broil meat or fish.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amounts eaten of some meats may be easier to estimate by the piece rather than by weight. For example, the selected serving size for lamb is 1 chop weighing 2-3/4 ounces, 1 patty weighing 3-1/4 ounces, or 3 ounces of roast shoulder.

What Are Good Sources Of Vitamin B-12?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Beef:		
Brisket, braised, lean only	3 ounces	+ +
Ground, baked or broiled:		
Extra lean	1 patty	+ + +
Lean or regular	1 patty	+ +
Pot roast, braised, lean only	3 ounces	+ +
Roast, rib, roasted, lean only	3 ounces	+ +
Shortribs, braised, lean only	3 ounces	+ + +
Steak, lean only:		
Baked or broiled	3 ounces	+ + +
Braised	3 ounces	+ +
Stew meat, simmered, lean only	3 ounces	+ +
Frankfurter, beef	1	+
Lamb:		
Chop, shoulder; braised, broiled, or baked; lean only	1 chop	+ + +
Ground, cooked	1 patty	+ +
Roast, shoulder, roasted, lean only	3 ounces	+ +
Liver, braised:		
Beef, calf, or pork	3 ounces	+ + +
Chicken or turkey	½ cup diced	+ + +
Liverwurst	1 ounce	+ + +
Pork, lean only:		
Chop, baked or broiled	1 chop	+
Roast, loin, roasted	3 ounces	+
Tongue, braised	3 ounces	+ + +
Veal, roast, leg, roasted, lean only	3 ounces	+ +
Fish and Seafood		
Carp, cod, flounder, haddock, ocean perch, pompano, or porgy; baked or broiled	3 ounces	+
Catfish, perch, pike, or whiting; baked or broiled	3 ounces	+ +
Clams; steamed, boiled, or canned; drained	3 ounces	+ + +
Crabmeat, steamed	3 ounces	+ + +
Croaker, baked or broiled	3 ounces	+ + +
Lobster, steamed or boiled	3 ounces	+ + +
Mackerel; baked, broiled, or canned; drained	3 ounces	+ + +
Mussels, steamed, boiled, or poached	3 ounces	+ + +
Oysters:		
Baked, broiled, or steamed	3 ounces	+ + +
Canned, undrained	3 ounces	+ + +
Salmon:		
Baked or broiled	3 ounces	+ +
Steamed, poached, or canned; drained	3 ounces	+ + +
Scallops:		
Baked or broiled	3 ounces	+
Boiled or steamed	3 ounces	+
Shrimp; broiled, steamed, boiled, or canned; drained	3 ounces	+
Swordfish steak, baked or broiled	3 ounces	+ +
Trout, baked or broiled	3 ounces	+ + +
Tuna, canned, drained	3 ounces	+ +
Eggs		
Egg, whole, cooked	1 large egg	+
MILK, CHEESE, AND YOGURT		
Cottage cheese, regular or lowfat	½ cup	+
Ice milk, soft-serve, not chocolate	½ cup	+
Milk; whole, lowfat, or skim	1 cup	+
Yogurt:		
Flavored or fruit, made with whole or lowfat milk	8 ounces	+
Frozen	8 ounces	+
Plain:		
Made with whole milk	8 ounces	+
Made with lowfat or nonfat milk	8 ounces	+

[1]A selected serving size contains—
+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

EATING RIGHT THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

VITAMIN C

(Ascorbic Acid)

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

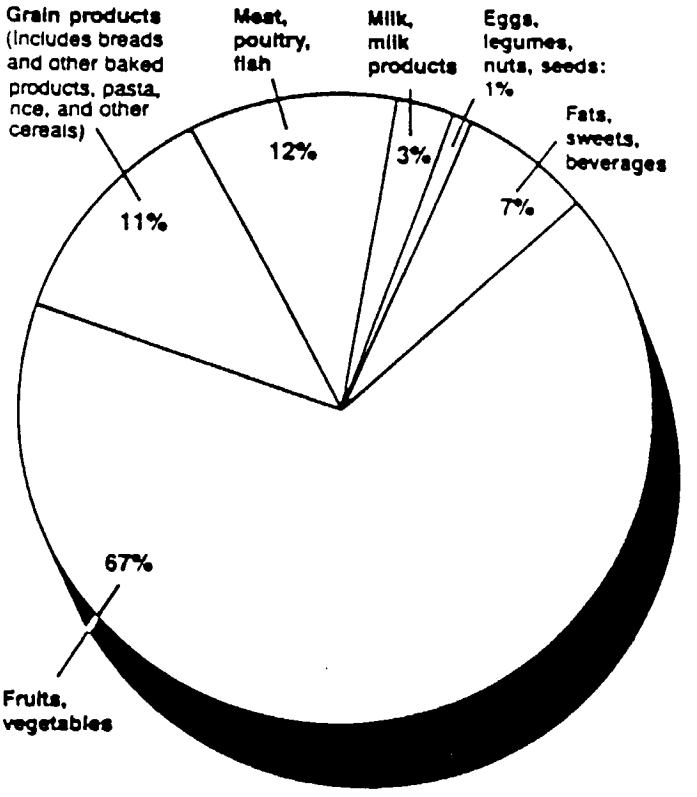
What Is Meant By a Good Food Source?

A good food source of vitamin C contains a substantial amount of vitamin C in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Daily Allowance (U.S. RDA) for vitamin C in a selected serving size. The U.S. RDA for vitamin C is 60 milligrams per day.[1]

The U.S. RDA for vitamin C is the amount of the vitamin used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 60 milligrams per day for women and men 19 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Vitamin C?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986. Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age. The percentages provided by the various food groups may not add up to 100 because of rounding.

As you can see, in 1985 and 1986, 67 percent of the vitamin C in the diets of women came from fruits and vegetables. Citrus fruits and tomatoes contributed almost half of the vitamin C provided by the fruits and vegetables group. Almost all of the vitamin C supplied by the fats, sweets, and beverages group came from beverages. Foods that contain small amounts of vitamin C but are not considered good sources can contribute significant amounts of vitamin C to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Vitamin C?

tamin C, a water-soluble vitamin, is important in forming collagen, a protein that gives structure to bones, cartilage, muscle, and blood vessels. It also helps to maintain capillaries, bones, and teeth and aids in the absorption of iron.

Do We Get Enough Vitamin C?

According to recent USDA surveys, average intake of vitamin C by women 19 to 50 years of age was over the RDA for vitamin C. Women tended to consume less than men of the same age. Most nutrition scientists believe that there are no known advantages in consuming excessive amounts of vitamin C.

How Can We Get Enough Vitamin C?

ıting a variety of foods that contain vitamin C is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. The list of foods will help you select those that are good sources of vitamin C as you follow the Dietary Guidelines. The list of food sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Vitamin C

Vitamin C can be readily lost from foods during preparation, cooking, or storage. To retain vitamin C:

- Serve fruits and vegetables raw whenever possible.
- Steam, boil, or simmer foods in a minimal amount of water, or microwave them for the shortest time possible.
- Cook potatoes in their skins.
- Refrigerate prepared juices, and store them for no more than 2 to 3 days.
- Store cut raw fruits and vegetables in an airtight container and refrigerate—do not soak or store in water. Vitamin C will be dissolved in the water.

What About Fortified Foods?

Some juices not normally a source of vitamin C, such as grape and apple, have vitamin C added. A 3/4-cup (juice glass) serving of these fortified juices may provide 40 percent or more of the U.S. RDA for vitamin C. Check the label for the exact amount. Vitamin C (ascorbic acid) is added to frozen peaches to prevent discoloration.

Most ready-to-eat cereals are fortified with vitamin C. Fortified ready-to-eat cereals usually contain at least 25 percent of the U.S. RDA for vitamin C. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, 1/2 cup of a cooked vegetable contains more vitamin C than 1/2 cup of the same vegetable served raw, because a serving of the cooked vegetable weighs more. Therefore, the cooked vegetable may appear on the list while the raw form does not. The raw vegetable provides the nutrient—but just not enough in a 1/2-cup serving to be considered a good source.

What Are Good Sources Of Vitamin C?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS		
Ready-to-eat cereals, fortified[2]	1 ounce	+ +
FRUITS		
Apples:		
Baked, unsweetened	1 medium	+
Raw	1 medium	+
Apple juice[3]	¾ cup	+ + +
Banana, raw	1 medium	+
Blackberries, raw	½ cup	+ +
Blueberries, raw	½ cup	+
Cantaloup:		
Frozen balls, unsweetened	½ cup	+ + +
Raw	About ½ cup diced	+ + +
Cranberry juice cocktail[3]	1 cup	+ + +
Grapefruit, raw	½ medium	+ + +
Grapefruit juice: fresh, canned, or reconstituted frozen; unsweetened	¾ cup	+ + +
Grapefruit and orange sections, canned, unsweetened	½ cup	+ + +
Grapefruit and orange juice, unsweetened	¾ cup	+ + +
Grape juice, unsweetened[3]	¾ cup	+ + +
Honeydew melon, raw	About ¾ cup diced	+ + +
Kiwifruit, raw	1 medium	+ + +
Mandarin orange sections, canned or frozen, juice-pack	½ cup	+ + +
Mango, raw	½ medium	+ + +
Nectarine, raw	1 medium	+
Orange, raw	1 medium	+ + +
Orange juice, fresh, canned, or reconstituted frozen; unsweetened	¾ cup	+ + +
Papaya, raw	¼ medium	+ + +
Peaches:		
Frozen, unsweetened[3]	½ cup	+ + +
Raw	1 medium	+
Pear, raw	1 medium	+
Pineapple:		
Canned, chunks, juice-pack	½ cup	+
Raw	½ cup	+
Pineapple juice, canned, unsweetened	¾ cup	+ +
Pineapple-grapefruit juice: canned or reconstituted frozen; unsweetened	¾ cup	+ + +
Pineapple-orange juice, canned or reconstituted frozen, unsweetened	¾ cup	+ + +
Plum, raw	1 medium	+
Pomegranate, raw	1 medium	+
Raspberries:		
Frozen, unsweetened	½ cup	+ +
Raw	½ cup	+ +
Strawberries: raw, frozen, or canned; unsweetened	½ cup	+ + +
Tangelo, raw	1 medium	+ + +
Tangerine, raw	1 medium	+ + +
Watermelon, raw	About 1¾ cups diced	+ + +
VEGETABLES		
Artichoke, globe (french), cooked	1 medium	+
Asparagus, cooked	½ cup	+ + +
Beans, green or yellow, cooked	½ cup	+
Beans, lima, cooked	½ cup	+
Bean sprouts, raw or cooked	½ cup	+
Broccoli, raw or cooked	½ cup	+ + +
Brussels sprouts, cooked	½ cup	+ + +
Cabbage:		
Chinese, cooked	½ cup	+ +
Green, raw or cooked	½ cup	+ +
Red, raw or cooked	½ cup	+ + +
Cauliflower, raw or cooked	½ cup	+ + +
Chard, cooked	½ cup	+
Collards, cooked	½ cup	+
Endive, chicory, escarole, or romaine; raw	1 cup	+
Dandelion greens, raw	½ cup	+
Kale, cooked	½ cup	+ + +
Kohlrabi, cooked	½ cup	+ + +
Mustard greens, cooked	½ cup	+ +
Okra, cooked	½ cup	+
Onion, spring:		
Cooked	1 large	+
Raw	1 medium	+
Parsnips, cooked	½ cup	+
Peas, green, cooked	½ cup	+
Pepper, sweet, green or red, raw or cooked	½ cup	+ + +
Plantain, green or ripe, boiled	1 medium	+ + +
Poke greens, cooked	½ cup	+ + +
Potato, with skin:		
Baked	1 medium	+ +
Boiled	1 medium	+ +
Pumpkin, cooked	½ cup	+
Radishes, raw	6 large	+
Rutabagas, cooked	½ cup	+ +
Snow peas, raw or cooked	½ cup	+ + +
Spinach:		
Cooked	½ cup	+
Raw	1 cup	+
Squash:		
Summer, yellow, raw	½ cup	+
Winter, cooked, mashed	½ cup	+
Sweetpotato:		
Baked or boiled	1 medium	+ + +
Canned	½ cup	+ + +

Continued

What Are Good Sources of Vitamin C?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
Tomatoes:		
Cooked	½ cup	+ +
Raw	1 medium	+ +
Tomato juice or tomato-vegetable juice cocktail, canned	¾ cup	+ + +
Turnip greens with turnips, cooked	½ cup	+
Turnips, cooked	½ cup	+
Watercress, raw	½ cup	+
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Liver, braised:		
Beef or pork	3 ounces	+ +
Chicken	½ cup diced	+
Fish and Seafood		
Clams; steamed, boiled, or canned; drained	3 ounces	+
Mussels, steamed, boiled, or poached	3 ounces	+

[1]A selected serving size contains—

- \+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2]See section on fortified foods.

[3]Contains added vitamin C.

EATING RIGHT
THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

VITAMIN E

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

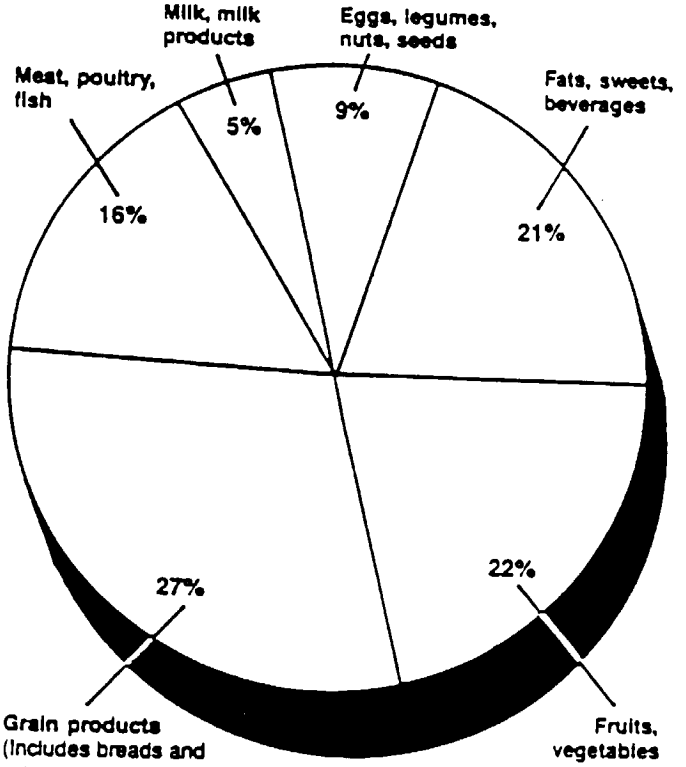
- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

What Is Meant By a Good Food Source?

A good food source of vitamin E contains a substantial amount of vitamin E in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Daily Allowance (U.S. RDA) for vitamin E in a selected serving size. The U.S. RDA for

The U.S. RDA for vitamin E is the amount of the vitamin used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 8 milligrams per day for women 19 to 54 years of age and 10 milligrams for men 19 to 50 years of age.

Where Do Women Get Vitamin E?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986. Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age.

As you can see, in 1985 and 1986, 27 percent of the vitamin E in the diets of women came from grain products and 22 percent came from fruits and vegetables. Foods that contain small amounts of vitamin E but are not considered good sources can contribute significant amounts of vitamin E to an individual's diet if these foods are eaten often or in large amounts.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Why Do We Need Vitamin E?

Vitamin E, a fat-soluble vitamin, protects vitamin A and essential fatty acids from oxidation in the body cells and prevents breakdown of body tissues.

Do We Get Enough Vitamin E?

According to recent USDA surveys, the intake of vitamin E by women 19 to 50 years of age averaged less than 90 percent of the RDA. Men of the same age had intakes close to 100 percent of the RDA.

How Can We Get Enough Vitamin E?

Eating a variety of foods that contain vitamin E is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. The list of foods will help you select those that are good sources of vitamin E as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods-tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Vitamin E

Vitamin E can be lost from foods during cooking, processing, or storage. To retain vitamin E:

- Use whole-grain flours.
- Store foods in airtight containers and avoid exposing them to light.

What About Fortified Foods?

Most ready-to-eat cereals are fortified with vitamin E. Fortified ready-to-eat cereals usually contain at least 40 percent of the U.S. RDA for vitamin E. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, 1/2 cup canned fruit contains more vitamin E than 1/2 cup of the same fruit served raw, because a serving of the canned fruit weighs more. Therefore, the canned fruit may appear on the list while the raw form does not. The raw fruit provides the nutrient—but just not enough in a 1/2-cup serving to be considered a good source.

What Are Good Sources Of Vitamin E?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREAD, CEREALS, AND OTHER GRAIN PRODUCTS		
Multigrain cereal, cooked	⅔ cup	+
Ready-to-eat cereals, fortified[2]	1 ounce	+ + +
Wheat germ, plain	2 tablespoons	+ +
FRUITS		
Apple, baked, unsweetened	1 medium	+
Apricots, canned, juice-pack	½ cup	+
Nectarine, raw	1 medium	+
Peaches, canned, juice-pack	½ cup	+
VEGETABLES		
Chard, cooked	½ cup	+
Dandelion greens, cooked	½ cup	+
Kohlrabi, cooked	½ cup	+
Mustard greens, cooked	½ cup	+
Pumpkin, cooked	½ cup	+
Turnip greens, cooked	½ cup	+
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Liver, chicken, or turkey, braised	½ cup diced	+
Fish and Seafood		
Clams: steamed, boiled, or canned; drained	3 ounces	+
Croaker, mackerel, mullet, or ocean perch; baked or broiled	3 ounces	+
Mackerel, canned, drained	3 ounces	+
Salmon:		
Baked, broiled, steamed, or poached	3 ounces	+
Canned, drained	3 ounces	+
Scallops, baked or broiled	3 ounces	+
Shrimp:		
Broiled, steamed or boiled	3 ounces	+ +
Canned, drained	3 ounces	+
Nuts and Seeds		
Almonds, unroasted	2 tablespoons	+ + +
Brazil nuts	2 tablespoons	+
Filberts (hazelnuts)	2 tablespoons	+ + +
Peanuts, roasted or dry-roasted	2 tablespoons	+
Peanut butter	2 tablespoons	+ +
Sunflower seeds, hulled, roasted or dry-roasted	2 tablespoons	+ + +

[1]A selected serving size contains—
- \+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2]See section on fortified foods.

EATING RIGHT
THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

FOLATE
(Folacin, Folic Acid)

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

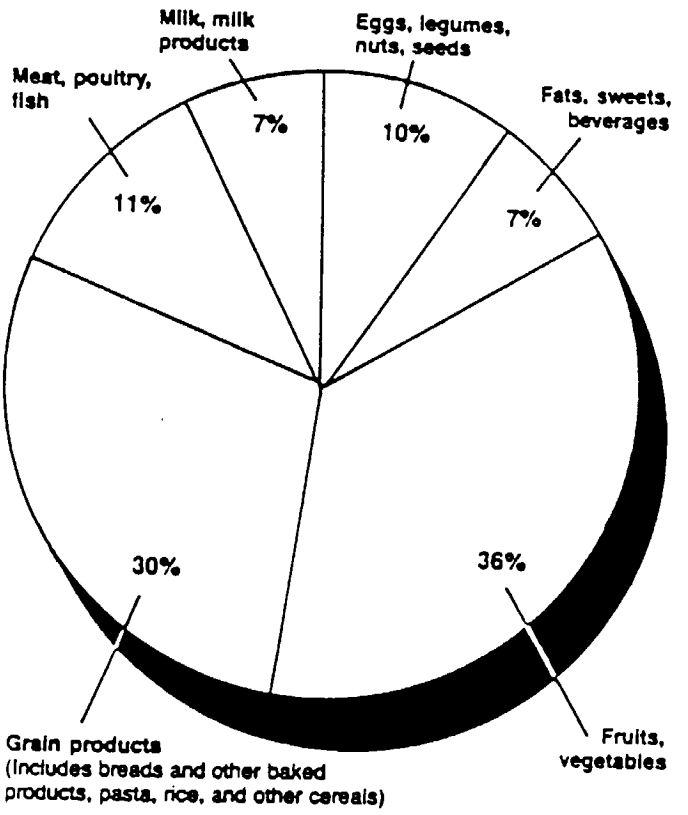
What Is Meant By a Good Food Source?

A good food source of folate contains a substantial amount of folate in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Dietary Allowance (U.S. RDA) for folate in a selected serving size. The U.S. RDA for folate is 400 micrograms per day.[1]

The U.S. RDA for folate is the amount of the vitamin used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 180 micrograms per day for women 19 to 50 years of age and 200 micrograms for men 19 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Folate?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986, Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age. The percentages provided by the various food groups may not add up to 100 because of rounding.

As you can see, in 1985 and 1986, over one-third of the folate in the diets of women was provided by fruits and vegetables. Of this group, citrus fruits and tomatoes and vegetables—other than dark-green or deep-yellow vegetables or potatoes—contributed the most to folate intakes. Grain products were also important sources. Foods that contain small amounts of folate but are not considered good sources can contribute significant amounts of folate to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Folate?

Folate, a water-soluble vitamin, helps the body form red blood cells and aids in the formation of genetic material within every body cell.

Do We Get Enough Folate?

According to recent USDA surveys, the average intake of folate by women and men 19 to 50 years of age met their RDA for folate.

How Can We Get Enough Folate?

Eating a variety of foods that contain folate is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. The list of foods will help you select those that are good sources of folate as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Folate

Folate can be lost from foods during preparation, cooking, or storage. To retain folate:

- Serve fruits and vegetables raw whenever possible.
- Steam, boil, or simmer vegetables in a minimal amount of water.
- Store vegetables in the refrigerator.

What About Fortified Foods?

Most ready-to-eat cereals are fortified with folate. Fortified ready-to-eat cereals usually contain at least 25 percent of the U.S. RDA for folate. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, 1/2 cup of a cooked vegetable contains more folate than a 1/2 cup serving of the same vegetable served raw, because a serving of cooked vegetable weighs more. Therefore, the cooked vegetable may appear on the list while the raw form does not. The raw vegetable provides the nutrient—but just not enough in a 1/2-cup serving to be considered a good source.

What Are Good Sources Of Folate?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS		
English muffin, whole-wheat	1	+
Pita bread, whole-wheat	1 small	+
Ready-to-eat cereals, fortified[2]	1 ounce	+ +
Wheat germ, plain	2 tablespoons	+
FRUITS		
Grapefruit and orange juice, frozen, reconstituted	¾ cup	+
Orange juice:		
Fresh	¾ cup	+
Frozen, reconstituted	¾ cup	+
VEGETABLES		
Artichoke, globe (french), cooked	1 medium	+
Asparagus, cooked	½ cup	+
Beets, cooked	½ cup	+
Broccoli, cooked	½ cup	+
Brussels sprouts, cooked	½ cup	+
Cauliflower, cooked	½ cup	+
Chinese cabbage, cooked	½ cup	+
Corn, cream style, cooked	½ cup	+
Endive, chicory, escarole, or romaine; raw	1 cup	+
Mustard greens, cooked	½ cup	+
Okra, cooked	½ cup	+
Parsnips, cooked	½ cup	+
Peas, green, cooked	½ cup	+
Spinach:		
Cooked	½ cup	+ +
Raw	1 cup	+
Turnip greens, cooked	½ cup	+

Food	Selected Serving Size	Percentage of U.S. RDA[1]
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Liver, braised:		
Beef or calf	3 ounces	+ + +
Pork	3 ounces	+ +
Chicken or turkey	½ cup diced	+ + +
Fish and Seafood		
Crabmeat, steamed	3 ounces	+
Dry Beans, Peas, and Lentils		
Beans, cooked:		
Bayo, black, brown, calico, chickpeas (garbanzo beans), lima, mexican, pinto, or white	½ cup	+
Black-eyed peas (cowpeas)	½ cup	+ + +
Red kidney	½ cup	+ +
Lentils, cooked	½ cup	+ + +
Peas, split, green or yellow, cooked	½ cup	+

[1]A selected serving size contains—
- \+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2]See section on fortified foods.

NIACIN

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

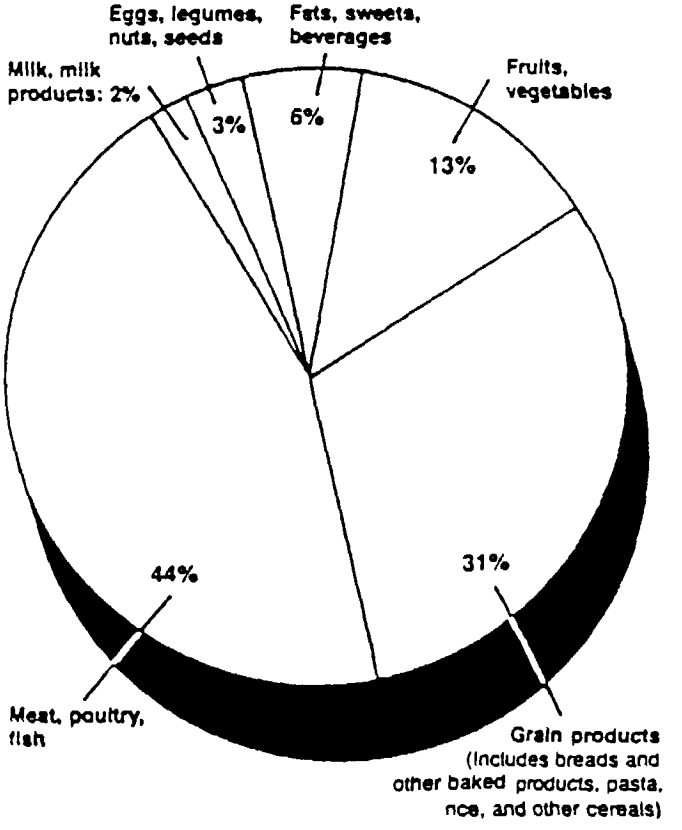
What Is Meant By a Good Food Source?

A good food source of niacin contains a substantial amount of niacin in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Daily Allowance (U.S. RDA) for niacin in a selected serving size. The U.S. RDA for niacin is 20 milligrams per day.[1]

The U.S. RDA for niacin is the amount of the vitamin used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 15 milligrams per day for women 19 to 50 years of age and 19 milligrams for men 19 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Niacin?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986, Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age. The percentages provided by the various food groups may not add up to 100 because of rounding.

As you can see, in 1985 and 1986, 44 percent of the niacin in the diets of women came from meat, poultry, and fish. Grain products such as breads and cereals supplied about 31 percent of the niacin consumed. Foods that contain small amounts of niacin but are not considered good sources can contribute significant amounts of niacin to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Niacin?

Niacin, a water-soluble vitamin, helps the body release energy from protein, fat, and carbohydrate during metabolism.

Do We Get Enough Niacin?

According to recent USDA surveys, the intake of niacin by American women and men 19 to 50 years of age averaged above the RDA.

Niacin can be formed in the body from tryptophan, an essential amino acid found in meat, poultry, fish, and eggs. Therefore, if your diet contains these foods, your need for niacin from other sources will be reduced.

How Can We Get Enough Niacin?

Eating a variety of foods that contain niacin is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. The list of foods will help you select those that are good sources of niacin as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Niacin

Niacin is fairly stable, but some niacin can be lost during cooking as it dissolves in the cooking liquid. Losses in preparation and storage are slight. To retain niacin:

- Cook vegetables in a minimal amount of water.
- Roast or broil beef, veal, lamb, and poultry. (Pork keeps about the same amount of niacin regardless of cooking method.)

What About Enriched Or Fortified Foods?

Pasta and most breads made from refined flours are enriched with niacin because niacin is one of the nutrients lost in processing. Other nutrients added to refined flours and pasta are iron, thiamin, and riboflavin. Enriched products or products made from enriched flour are labeled as such.

Most ready-to-eat and instant-prepared cereals are fortified with niacin. Fortified ready-to-eat cereals usually contain at least 25 percent of the U.S. RDA for niacin. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, 3 ounces of cooked lean pork loin roast contains more niacin than a cooked pork chop, because the chop has less than 3 ounces of lean meat. Therefore, a serving of the pork loin roast has 25 percent of the U.S. RDA while the pork chop has less than 20 percent.

What Are Good Sources Of Niacin?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS[2]		
Bagel, plain or whole-wheat	1 medium	+
Bulgur, cooked or canned	⅔ cup	+
English muffin, plain or whole-wheat	1	+
Muffin, bran	1 medium	+
Oatmeal, instant, fortified, prepared	⅔ cup	+
Pita bread, plain or whole-wheat	1 small	+
Pretzel, soft	1	+
Ready-to-eat cereals, fortified	1 ounce	+ +
Roll, hoagie or submarine	1	+
VEGETABLES		
Mushrooms, cooked	½ cup	+
Potato, boiled, with skin	1 medium	+
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Beef:		
Brisket, braised, lean only	3 ounces	+
Ground; extra lean, lean, or regular; baked or broiled	1 patty	+
Roast, rib, roasted, lean only	3 ounces	+
Steak, baked or broiled, lean only	3 ounces	+
Stew meat, simmered, lean only	3 ounces	+
Chicken, without skin:		
Breast, broiled or roasted	½ breast	+ + +
Leg (thigh and drumstick), broiled or roasted	1 leg	+ +
Light or dark meat, broiled, roasted, or stewed	3 ounces	+ +
Cornish hen, roasted, without skin	½ hen	+ + +
Ham, roasted, lean only:		
Fresh	3 ounces	+
Smoked or cured	3 ounces	+
Lamb, lean only:		
Chop, shoulder; baked, braised, or broiled	1 chop	+ +
Roast, shoulder, roasted	3 ounces	+
Liver, braised:		
Beef, calf, or pork	3 ounces	+ +
Chicken	½ cup diced	+
Liverwurst	1 ounce	+
Pork, lean only:		
Chop, baked or broiled	1 chop	+
Roast, loin, roasted	3 ounces	+ +
Turkey:		
Ground, cooked	3 ounces	+
Light or dark meat, roasted, without skin	3 ounces	+
Veal, lean only:		
Chop, braised	1 chop	+ + +
Roast, leg, roasted	3 ounces	+ +
Fish and Seafood		
Catfish, flounder, haddock, pompano, or pike; baked or broiled	3 ounces	+
Crabmeat, steamed	3 ounces	+
Croaker, porgy, or trout; baked or broiled	3 ounces	+
Mackerel:		
Baked or broiled	3 ounces	+ + +
Canned, drained	3 ounces	+ +
Mullet, baked or broiled	3 ounces	+ +
Salmon:		
Baked, broiled, poached, or steamed	3 ounces	+ +
Canned, drained	3 ounces	+ +
Shrimp; boiled, broiled, steamed, or canned; drained	3 ounces	+
Swordfish steak, baked or broiled	3 ounces	+ + +
Tuna, canned, drained	3 ounces	+
Nuts and Seeds		
Peanuts, roasted or dry-roasted	2 tablespoons	+
Peanut butter	2 tablespoons	+

[1] A selected serving size contains—
- \+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2] Breads and cereals listed are enriched unless otherwise noted. See section on enriched or fortified foods.

EATING RIGHT
THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

RIBOFLAVIN

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

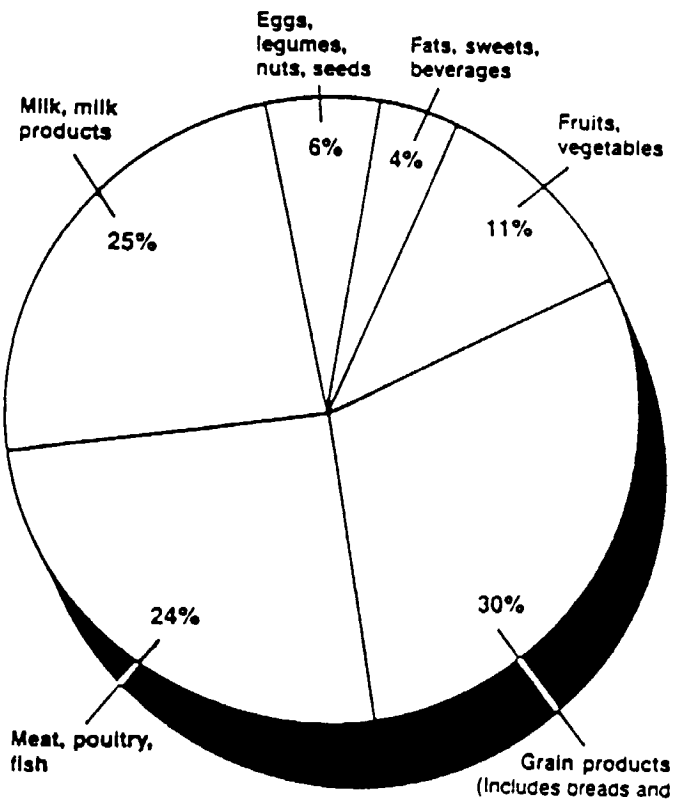
What Is Meant By a Good Food Source?

A good food source of riboflavin contains a substantial amount of riboflavin in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Daily Allowance (U.S. RDA) for riboflavin in a selected serving size. The U.S. RDA for riboflavin is 1.7 milligrams per day.[1]

The U.S. RDA for riboflavin is the amount of the vitamin used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 1.3 milligrams per day for women 19 to 50 years of age and 1.7 milligrams for men 19 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Riboflavin?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986, Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age.

As you can see, in 1985 and 1986, 30 percent of the riboflavin in the diets of women came from grain products such as breads and cereals. Milk and milk products supplied about 25 percent and meat, poultry, and fish provided about 24 percent. Foods that contain small amounts of riboflavin but are not considered good sources can contribute significant amounts of riboflavin to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Riboflavin?

Riboflavin, a water-soluble vitamin, helps the body release energy from protein, fat, and carbohydrates during metabolism.

Do We Get Enough Riboflavin?

According to recent USDA surveys, the intake of riboflavin by American women and men 19 to 50 years of age averaged above the RDA.

How Can We Get Enough Riboflavin?

Eating a variety of foods that contain riboflavin is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. The list of foods will help you select those that are good sources of riboflavin as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Riboflavin

Riboflavin can be lost from foods during storage and cooking. To retain riboflavin:

- Store foods in containers through which light cannot pass.
- Cook vegetables in a minimal amount of water.
- Roast or broil meat.

What About Enriched Or Fortified Foods?

Pasta and most breads made from refined flours are enriched with riboflavin because riboflavin is one of the nutrients lost in processing. Other nutrients added to refined flours and pasta are iron, thiamin, and niacin. Enriched products or products made from enriched flour are labeled as such.

Most ready-to-eat and instant-prepared cereals are fortified with riboflavin. Fortified, ready-to-eat cereals usually contain at least 25 percent of the U.S. RDA for riboflavin. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, the edible part of a cooked chicken leg (thigh and drumstick) weighs more than the edible part of a cooked chicken breast half. Therefore, the chicken leg appears on the list while the chicken breast half does not. The chicken breast half provides the nutrient—but just not enough to be considered a good source.

What Are Good Sources Of Riboflavin?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS[2]		
Bagel, plain, pumpernickel, or whole-wheat	1 medium	+
English muffin, plain	1	+
Multigrain cereal, cooked	⅔ cup	+
Oatmeal, instant, fortified, prepared	⅔ cup	+
Pancakes, plain	2 4-inch pancakes	+
Pita bread, plain	1 small	+
Ready-to-eat cereals, fortified	1 ounce	+ +
Waffles, plain or bran	2 4-inch squares	+
VEGETABLES		
Broccoli, cooked	½ cup	+
Mushrooms, cooked	½ cup	+
Spinach, cooked	½ cup	+
Sweetpotato, boiled	1 medium	+
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Beef:		
Ground, extra lean or lean, baked or broiled	1 patty	+
Steak, baked or broiled, lean only	3 ounces	+
Stew meat, simmered, lean only	3 ounces	+
Chicken leg (thigh and drumstick), broiled or roasted without skin	1 leg	+
Cornish hen, roasted, without skin	½ hen	+
Ham, fresh, roasted, lean only	3 ounces	+
Lamb, lean only:		
Chop, shoulder; braised, broiled, or baked	1 chop	+
Roast, shoulder, roasted	3 ounces	+
Liver, braised:		
Beef, calf, or pork	3 ounces	+ + +
Chicken or turkey	½ cup diced	+ + +
Liverwurst	1 ounce	+ +
Pork, lean only:		
Chop, baked or broiled	1 chop	+
Roast, loin or shoulder, roasted	3 ounces	+
Tongue, braised	3 ounces	+
Turkey, dark meat, roasted, without skin	3 ounces	+
Veal, roast, leg, roasted, lean only	3 ounces	+
Fish and Seafood		
Clams; steamed, boiled, or canned; drained	3 ounces	+
Mackerel or trout, baked or broiled	3 ounces	+
Mackerel, canned, drained	3 ounces	+
Mussels, steamed, boiled, or poached	3 ounces	+
Oysters, canned, undrained	3 ounces	+
Nuts and Seeds		
Almonds, roasted	2 tablespoons	+
MILK, CHEESE, AND YOGURT		
Cheese:		
Cottage, regular or lowfat	½ cup	+
Feta	1 ounce	+
Ice milk, soft-serve, not chocolate	½ cup	+
Milk:		
Buttermilk	1 cup	+
Chocolate	1 cup	+
Evaporated, whole or skim, diluted	1 cup	+
Whole, lowfat, or skim	1 cup	+
Yogurt:		
Frozen	8 ounces	+
Plain:		
Made with whole milk	8 ounces	+
Made with lowfat or nonfat milk	8 ounces	+ +

[1]A selected serving size contains—
- \+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2]Breads and cereals listed are enriched unless otherwise noted. See section on enriched or fortified foods.

January 1990

EATING RIGHT
THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

THIAMIN

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

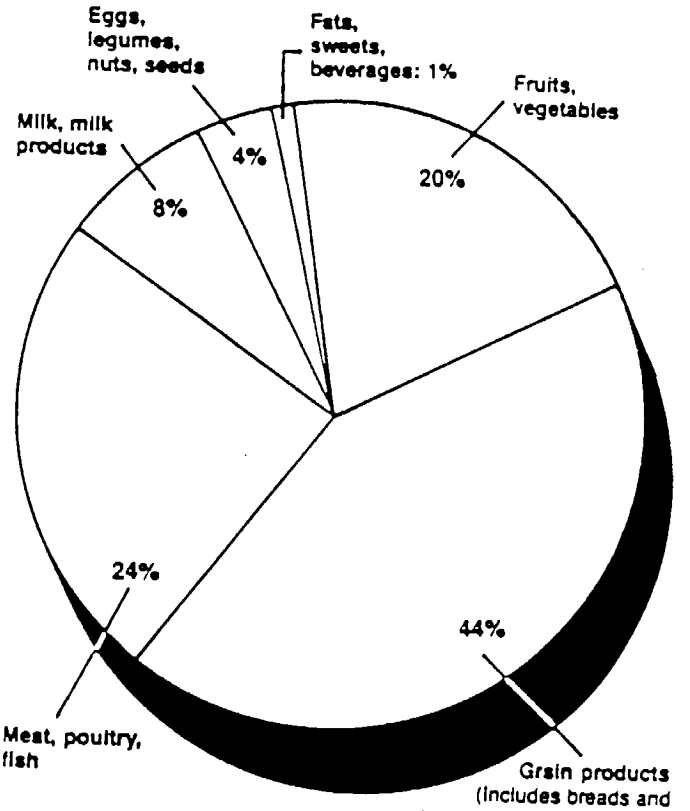
What Is Meant By a Good Food Source?

A good food source of thiamin contains a substantial amount of thiamin in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Daily Allowance (U.S. RDA) for thiamin in a selected serving size. The U.S. RDA for thiamin is 1.5 milligrams per day.[1]

The U.S. RDA for thiamin is the amount of the vitamin used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 1.1 milligrams per day for women 19 to 50 years of age and 1.5 milligrams for men 19 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Thiamin?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986, Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age. The percentages provided by the various food groups may not add up to 100 because of rounding.

As you can see, in 1985 and 1986, grain products—including breads, cereals, pasta, and rice—supplied 44 percent of the thiamin in the diets of women. Other food groups providing considerable thiamin were meat, poultry, and fish (24 percent) and fruits and vegetables (20 percent). Foods that contain small amounts of thiamin but are not considered good sources can contribute significant amounts of thiamin to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Thiamin?

Thiamin, a water-soluble vitamin, helps the body release energy from carbohydrates during metabolism. Thus, persons who expend more energy and have a higher intake of calories need more thiamin than those who eat fewer calories. Thiamin also plays a vital role in the normal functioning of the nervous system.

Do We Get Enough Thiamin?

According to recent USDA surveys, men 19 to 50 years of age met their RDA for thiamin. The average intake by women of the same age was slightly below the RDA.

How Can We Get Enough Thiamin?

Eating a variety of foods that contain thiamin is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. The list of foods will help you select those that are good sources of thiamin as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Thiamin

Some thiamin can be lost from foods during preparation and cooking because thiamin may be dissolved in the cooking liquid. Storage losses are small. To retain thiamin:

- Use enriched or whole-grain pasta or rice and do not wash before cooking or rinse after cooking.
- Cook vegetables in a minimal amount of water.
- Roast meat at a moderate temperature and cook only until it is done—overcooking at a high temperature destroys thiamin.

What About Enriched Or Fortified Foods?

Pasta and most breads made from refined flours are enriched with thiamin because thiamin is one of the nutrients lost in processing. Other nutrients added to refined flours and pasta are iron, niacin, and riboflavin. Enriched products or products made from enriched flour are labeled as such.

Most ready-to-eat and instant-prepared cereals are fortified with thiamin. Fortified ready-to-eat cereals usually contain at least 25 percent of the U.S. RDA for thiamin. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amounts eaten of some meats may be easier to estimate by the piece rather than by weight. For example, a selected serving size for pork is 1 chop, weighing about 2-1/2 ounces, or 3 ounces of pork depending on the cut.

What Are Good Sources Of Thiamin?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS[2]		
Bagel, plain, pumpernickel, or whole-wheat	1 medium	+
Bread, raisin, rye, or white	2 slices	+
Cornbread	1 piece, 2½ inches square	+
Farina, regular or quick, cooked	⅔ cup	+
English muffin, plain, plain with raisins, or whole-wheat	1	+
Grits, corn or hominy, regular or instant, cooked	⅔ cup	+
Macaroni, noodles, or spaghetti, cooked	1 cup	+
Oatmeal:		
Instant, fortified, prepared	⅔ cup	+ +
Regular or quick, cooked	⅔ cup	+
Pita bread, plain or whole-wheat	1 small	+
Pretzel, soft	1	+
Ready-to-eat cereals, fortified	1 ounce	+ +
Rice, white, cooked	⅔ cup	+
Rolls:		
Hamburger or frankfurter	1	+
White, hard	1 medium	+
Waffles, plain	2 4-inch squares	+
Wheat germ, plain	2 tablespoons	+
FRUITS		
Melon balls (cantaloup and honeydew), frozen, unsweetened	½ cup	+
Orange juice, fresh	¾ cup	+
Watermelon, raw	About 1¾ cups diced	+
VEGETABLES		
Corn, cooked	½ cup	+
Jerusalem artichoke, raw	½ cup	+
Peas, green, cooked	½ cup	+
Peas and carrots, cooked	½ cup	+

Food	Selected Serving Size	Percentage of U.S. RDA[1]
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Ham, roasted, lean only:		
Fresh	3 ounces	+ +
Smoked or cured	3 ounces	+ + +
Liver, beef or pork, braised	3 ounces	+
Pork:		
Chop, baked or broiled, lean only	1 chop	+ + +
Ground, cooked	3 ounces	+ +
Roast, loin, roasted, lean only	3 ounces	+ + +
Steak or cutlet, baked or broiled, lean only	3 ounces	+ + +
Fish and Seafood		
Mackerel or salmon, baked or broiled	3 ounces	+
Mussels, steamed, boiled, or poached	3 ounces	+
Oysters:		
Steamed	3 ounces	+
Canned, undrained	3 ounces	+
Pompano, baked or broiled	3 ounces	+ +
Dry Beans, Peas, and Lentils		
Peas, split, green or yellow, cooked	½ cup	+
Nuts and Seeds		
Brazil nuts	2 tablespoons	+
Pine nuts (pignolias)	2 tablespoons	+
Sunflower seeds, hulled, unroasted	2 tablespoons	+ +

[1]A selected serving size contains—
+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2]Breads, pasta, cereals, and grits listed are enriched unless otherwise noted. See section on enriched or fortified foods.

EATING RIGHT The Dietary Guidelines Way

GOOD SOURCES OF NUTRIENTS

COPPER

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

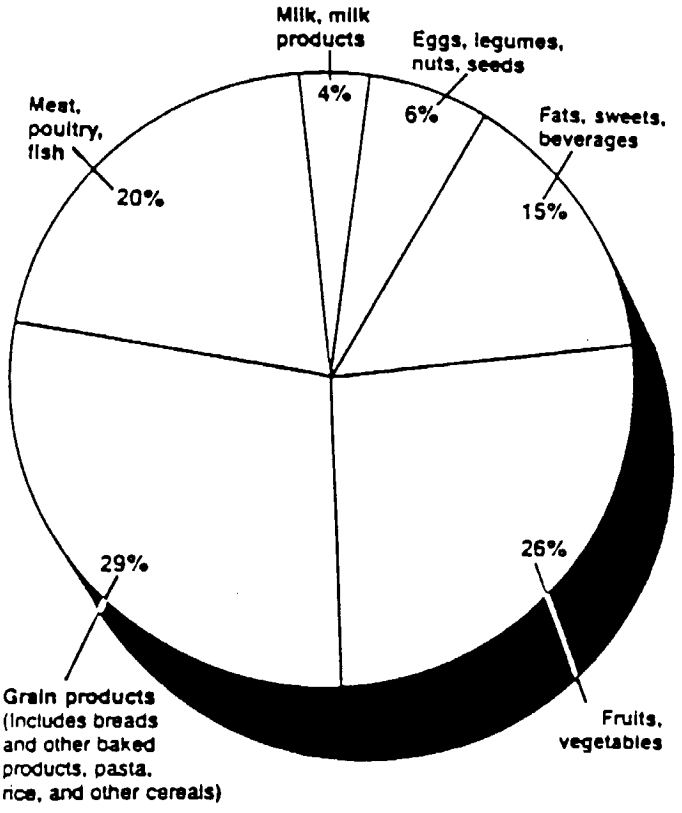
What Is Meant By a Good Food Source?

A good food source of copper contains a substantial amount of copper in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Dietary Allowance (U.S. RDA) for copper in a selected serving size. The U.S. RDA for copper is 2 milligrams per day.[1]

The U.S. RDA for copper is the amount of the mineral used as a standard in nutrition labeling of foods. This allowance is based on the 1968 estimate of need made by the Food and Nutrition Board of the National Academy of Sciences. The 1989 range of Estimated Safe and Adequate Intakes for adults is 1.5 to 3 milligrams per day.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Copper?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986. Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age.

As you can see, in 1985 and 1986, 29 percent of the copper in the diets of women was supplied by grain products and 26 percent was furnished by fruits and vegetables. Of the fruits and vegetables, white potatoes provided more copper than any of the other types. Foods that contain small amounts of copper but are not considered good sources can contribute significant amounts of copper to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Copper?

Copper, a mineral, is necessary (along with iron) for the formation of hemoglobin. It also helps keep bones, blood vessels, and nerves healthy.

Do We Get Enough Copper?

According to recent USDA surveys, the average intake of copper by women 19 to 50 years of age was about 1 milligram, and that of men of the same age was about 1.6 milligrams. For women, this amount is less than the 1.5- to 3-milligram range of Estimated Safe and Adequate Daily Dietary Intakes recommended by the Food and Nutrition Board of the National Academy of Sciences.

How Can We Get Enough Copper?

Eating a variety of foods that contain copper is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. Intakes of copper tend to be low in relation to recommendations, and there aren't that many foods that are really good sources; thus, it may take special care to ensure an adequate intake. The list of foods will help you select those that are good sources of copper as you follow the Dietary Guidelines. The list of good sources was derived from the nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Copper

Copper is lost in cooking some foods even under the best conditions. To retain copper:

- Cook foods in a minimal amount of water.
- Cook for the shortest possible time.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, 1/2 cup of cooked mushrooms contains more copper than 1/2 cup of mushrooms served raw, because a serving of cooked mushrooms weighs more. Therefore, cooked mushrooms appear on the list while the raw form does not. Raw mushrooms provide the nutrient—but just not enough in a 1/2-cup serving to be considered a good source.

What Are Good Sources Of Copper?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS		
Barley, cooked	⅔ cup	+ +
English muffin, whole-wheat	1	+
Muffin, bran	1 medium	+
Pita bread, whole-wheat	1 small	+
FRUITS		
Prunes, dried, cooked, unsweetened	½ cup	+
VEGETABLES		
Beans, lima, cooked	½ cup	+
Mushrooms, cooked	½ cup	+
Potato, baked or boiled, with skin	1 medium	+
Sweetpotato, baked or boiled	1 medium	+
Tomato juice cocktail	¾ cup	+
Turnip greens, cooked	½ cup	+
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Liver, braised:		
Beef or calf	3 ounces	+ + +
Chicken or turkey	½ cup diced	+
Fish and Seafood		
Clams: steamed, boiled, or canned; drained	3 ounces	+
Crabmeat, steamed	3 ounces	+ +
Lobster, steamed or boiled	3 ounces	+ + +
Oysters:		
Baked, broiled, or steamed	3 ounces	+ + +
Canned, undrained	3 ounces	+ + +
Shrimp; broiled, steamed, boiled, or canned; drained	3 ounces	+
Dry Beans, Peas, and Lentils		
Beans, black-eyed peas (cowpeas) or soybeans, cooked	½ cup	+
Lentils, cooked	½ cup	+
Nuts and Seeds		
Almonds or cashews, roasted or dry-roasted	2 tablespoons	+
Brazil nuts, english walnuts, filberts (hazelnuts), pine nuts (pignolias)	2 tablespoons	+
Mixed nuts, dry-roasted	2 tablespoons	+
Peanuts, roasted	2 tablespoons	+
Pistachio nuts, unroasted	2 tablespoons	+
Pumpkin or squash seeds, hulled, roasted	2 tablespoons	+
Sesame seeds	2 tablespoons	+
Sunflower seeds, hulled; roasted, dry-roasted, or unroasted	2 tablespoons	+

[1]A selected serving size contains—
+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

EATING RIGHT
THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

CALCIUM

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

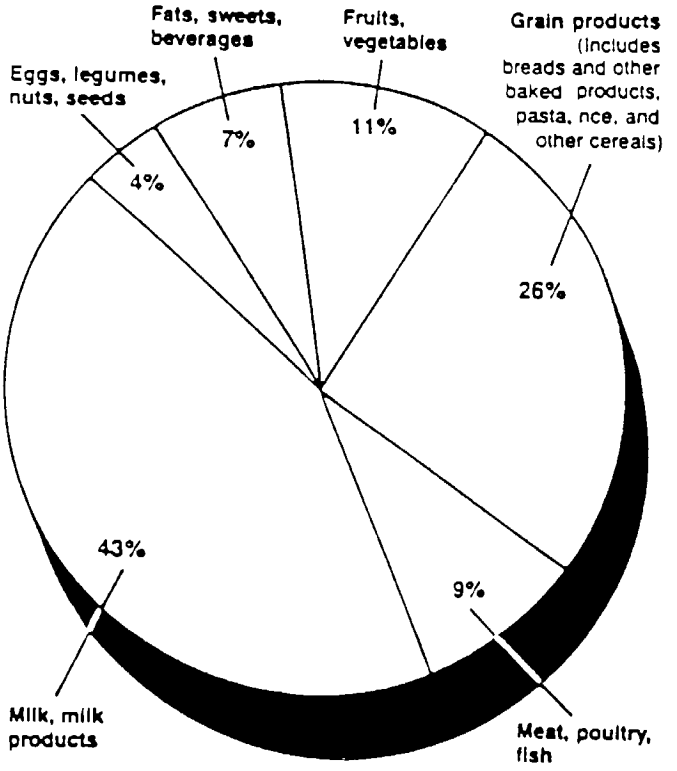
What Is Meant By a Good Food Source?

A good food source of calcium contains a substantial amount of calcium in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Dietary Allowance (U.S. RDA) for calcium in a selected serving size. The U.S. RDA for calcium is 1,000 milligrams per day.[1]

The U.S. RDA for calcium is the amount of the mineral used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 1,200 milligrams per day for women and men 19 to 24 years of age and 800 milligrams for women and men 25 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Calcium?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986. Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age.

As you can see, in 1985 and 1986, almost one-half of the calcium in the diets of women was provided by milk and milk products and 26 percent of the calcium was supplied by grain products. Foods that contain small amounts of calcium but are not considered good sources can contribute significant amounts of calcium to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Calcium?

Calcium, a mineral, is used for building bones and teeth and in maintaining bone strength. Calcium is also used in muscle contraction, blood clotting, and maintenance of cell membranes.

Do We Get Enough Calcium?

According to recent USDA surveys, average calcium intakes for women and younger men are below their RDA. The average calcium intake by women 19 to 34 years of age was about 665 milligrams per day, and the intake by women 35 to 50 years of age was about 565 milligrams. Average calcium intake by men 19 to 34 years of age was 975 milligrams.

Calcium absorption is dependent upon the calcium needs of the body, the foods eaten, and the amount of calcium in the foods eaten. Vitamin D, whether from diet or exposure to the ultraviolet light of the sun, increases calcium absorption. Calcium absorption tends to decrease with increased age for both men and women.

How Can We Get Enough Calcium?

Eating a variety of foods that contain calcium is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. The list of foods will help you select those that are good sources of calcium as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Calcium

Calcium is lost in cooking some foods even under the best conditions. To retain calcium:

- Cook foods in a minimal amount of water.
- Cook for the shortest possible time.

What About Fortified Foods?

Some foods, such as orange juice, bread, and ready-to-eat cereals, are not normally good sources of calcium but may have had calcium added. Most instant-prepared cereals are fortified with calcium. Since these products vary in the amount of calcium provided, check the label on the carton or package for the percentage of the U.S. RDA for a specific product.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, 1/2 cup of cooked vegetable contains more calcium than 1/2 cup of the same vegetable served raw, because a serving of cooked vegetable weighs more. Therefore, the cooked vegetable may appear on the list while the raw form does not. The raw vegetable provides the nutrient—but just not enough in a 1/2-cup serving to be considered a good source.

What Are Good Sources Of Calcium?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS		
English muffin, plain with raisins	1	+
Muffin, bran	1 medium	+
Oatmeal, instant, fortified, prepared[2]	⅔ cup	+
Pancakes, plain, fruit, buckwheat, or whole-wheat	2 4-inch pancakes	+
Waffles:		
Bran, commeal, or fruit	2 4-inch squares	+
Plain	2 4-inch squares	+ +
VEGETABLES		
Broccoli, cooked	½ cup	+
Spinach, cooked	½ cup	+
Turnip greens, cooked	½ cup	+
MEAT, POULTRY, FISH, AND ALTERNATES		
Fish and Seafood		
Mackerel, canned, drained	3 ounces	+
Ocean perch, baked or broiled	3 ounces	+
Salmon, canned, drained	3 ounces	+
Dry Beans, Peas, and Lentils		
Tofu (bean curd)[3]	½ cup cubed	+ +
MILK, CHEESE, AND YOGURT		
Cheese, natural:		
Blue, brick, camembert, feta, gouda, monterey, mozzarella, muenster, provolone, or roquefort	1 ounce	+
Cheese, natural (continued):		
Gruyere or swiss	1 ounce	+ +
Parmesan (hard) or romano	1 ounce	+ +
Cheese, process, cheddar or swiss	¾ ounce	+
Cheese, ricotta	½ cup	+ +
Ice cream or ice milk, soft-serve	½ cup	+
Milk:		
Buttermilk	1 cup	+ +
Chocolate	1 cup	+ +
Dry, nonfat, reconstituted	1 cup	+ +
Evaporated, whole or skim, diluted	1 cup	+ +
Lowfat or skim	1 cup	+ +
Whole	1 cup	+ +
Yogurt:		
Flavored or fruit, made with whole or lowfat milk	8 ounces	+ +
Frozen	8 ounces	+ +
Plain:		
Made with whole milk	8 ounces	+ +
Made with lowfat or nonfat milk	8 ounces	+ + +

[1]A selected serving size contains—
- \+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2]See section on fortified foods.

[3]If made with calcium sulfate.

EATING RIGHT THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

IRON

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

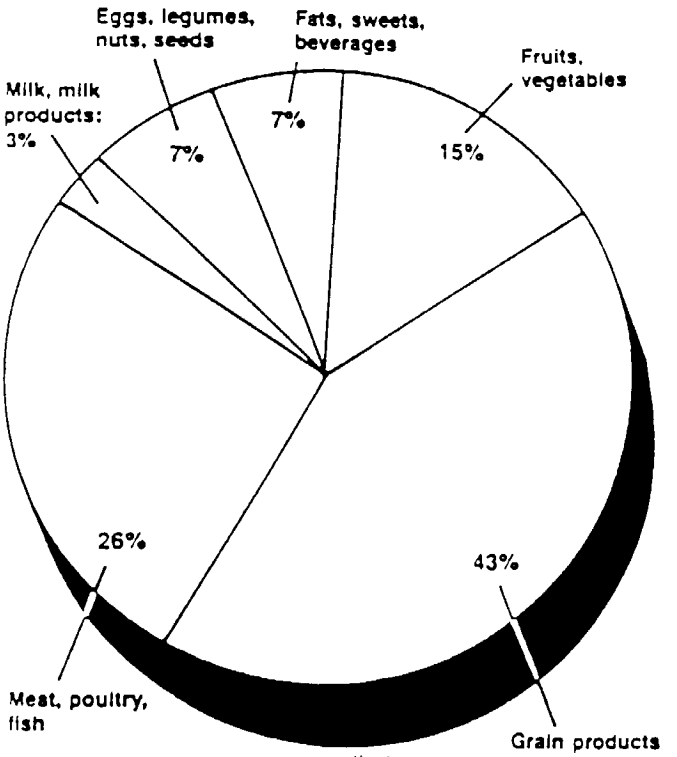
What Is Meant By a Good Food Source?

A good food source of iron contains a substantial amount of iron in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Dietary Allowance (U.S. RDA) for iron in a selected serving size. The U.S. RDA for iron is 18 milligrams per day.[1]

The U.S. RDA for iron is the amount of the mineral used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 15 milligrams per day for women 19 to 50 years of age and 10 milligrams for men 25 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Iron?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986, Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age. The percentages provided by the various food groups may not add up to 100 because of rounding.

As you can see, in 1985 and 1986, 43 percent of the iron in the diets of women was contributed by grain products and 26 percent was supplied by meat, poultry, and fish. Foods that contain small amounts of iron but are not considered good sources can contribute significant amounts of iron to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Iron?

Iron, a mineral, functions primarily as a carrier of oxygen in the body, both as a part of hemoglobin in the blood and of myoglobin in the muscles.

Do We Get Enough Iron?

According to recent USDA surveys, over three-fourths of American women 19 to 50 years of age had iron intakes below 80 percent of their RDA. Average iron intake was 67 percent of the RDA. Men of the same age met their RDA.

The ability of the body to absorb and utilize iron from different foods varies. The iron in meat, poultry, and fish is absorbed and utilized more readily than iron in other foods. The presence of these animal products in a meal increases the availability of iron from other foods. The presence of vitamin C (ascorbic acid) in a meal also increases iron absorption. The body increases or decreases iron absorption according to need. The body absorbs iron more efficiently when iron stores are low and during growth spurts or pregnancy. The most common indication of poor iron status is iron deficiency anemia, a condition in which the size and number of red blood cells are reduced. This condition may result from inadequate intake of iron or from blood loss.

How Can We Get Enough Iron?

Eating a variety of foods that contain iron is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. Intakes of iron tend to be low in relation to recommendations, and there aren't that many foods that are really good sources; thus, it may take special care to ensure an adequate intake. Many doctors recommend feeding a fortified milk formula or breakfast cereal or giving an iron supplement to infants and toddlers, because it is especially difficult to meet their iron needs. Doctors usually prescribe iron supplements for pregnant or lactating women. The list of foods will help you select those that are good sources of iron as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Iron

Iron is lost in cooking some foods even under the best conditions. To retain iron:

- Cook foods in a minimal amount of water.
- Cook for the shortest possible time.

What About Enriched or Fortified Foods?

Pasta, white rice, and most breads made from refined flours are enriched with iron, because iron is one of the nutrients lost in processing. Other nutrients added to refined flours and pasta are thiamin, niacin, and riboflavin. Enriched products or products made from enriched flour are labeled as such. Minimum and maximum enrichment levels are specified for thiamin, riboflavin, and niacin, but only a minimum level of iron is required in farina. Thus, iron enrichment levels for farina vary from brand to brand.

Most ready-to-eat and instant-prepared cereals are fortified with iron. Fortified ready-to-eat cereals usually contain at least 25 percent of the U.S. RDA for iron. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, 1/2 cup of cooked spinach contains more iron than a 1/2-cup serving of spinach served raw, because the cooked spinach weighs more. Therefore, the cooked spinach appears on the list while the raw form does not. Raw spinach provides the nutrient—but just not enough in a 1/2-cup serving to be considered a good source.

What Are Good Sources Of Iron?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS[2]		
Bagel, plain, pumpernickel, or whole-wheat	1 medium	+
Farina, regular or quick, cooked	⅔ cup	+ +
Muffin, bran	1 medium	+
Noodles, cooked	1 cup	+
Oatmeal, instant, fortified, prepared	⅔ cup	+ +
Pita bread, plain or whole-wheat	1 small	+
Pretzel, soft	1	+
Ready-to-eat cereals, fortified	1 ounce	+ +
Rice, white, regular or converted, cooked	⅔ cup	+
FRUITS		
Apricots, dried, cooked, unsweetened	½ cup	+
VEGETABLES		
Beans, lima, cooked	½ cup	+
Spinach, cooked	½ cup	+
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Beef:		
Brisket, braised, lean only	3 ounces	+
Ground; extra lean, lean, or regular; baked or broiled	1 patty	+
Pot roast, braised, lean only	3 ounces	+
Roast, rib, roasted, lean only	3 ounces	+
Shortribs, braised, lean only	3 ounces	+
Steak; baked, broiled, or braised; lean only	3 ounces	+
Stew meat, simmered, lean only	3 ounces	+
Liver, braised:		
Beef	3 ounces	+ +
Calf	3 ounces	+
Pork	3 ounces	+ + +
Chicken or turkey	½ cup diced	+ +
Liverwurst	1 ounce	+
Tongue, braised	3 ounces	+
Turkey, dark meat, roasted, without skin	3 ounces	+
Fish and Seafood		
Clams; steamed, boiled, or canned; drained	3 ounces	+ + +
Mackerel, canned, drained	3 ounces	+
Mussels, steamed, boiled, or poached	3 ounces	+
Oysters:		
Baked, broiled, or steamed	3 ounces	+ +
Canned, undrained	3 ounces	+ +
Shrimp; broiled, steamed, boiled, or canned; drained	3 ounces	+
Trout, baked or broiled	3 ounces	+
Dry Beans, Peas, and Lentils		
Beans; black-eyed peas (cowpeas), chickpeas (garbanzo beans), red kidney, or white; cooked	½ cup	+
Lentils, cooked	½ cup	+
Soybeans, cooked	½ cup	+ +
Nuts and Seeds		
Pine nuts (pignolias)	2 tablespoons	+
Pumpkin or squash seeds, hulled, roasted	2 tablespoons	+

[1] A selected serving size contains—
+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2] Breads, pasta, and cereals listed are enriched unless otherwise noted. See section on enriched or fortified foods.

EATING RIGHT THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

MAGNESIUM

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

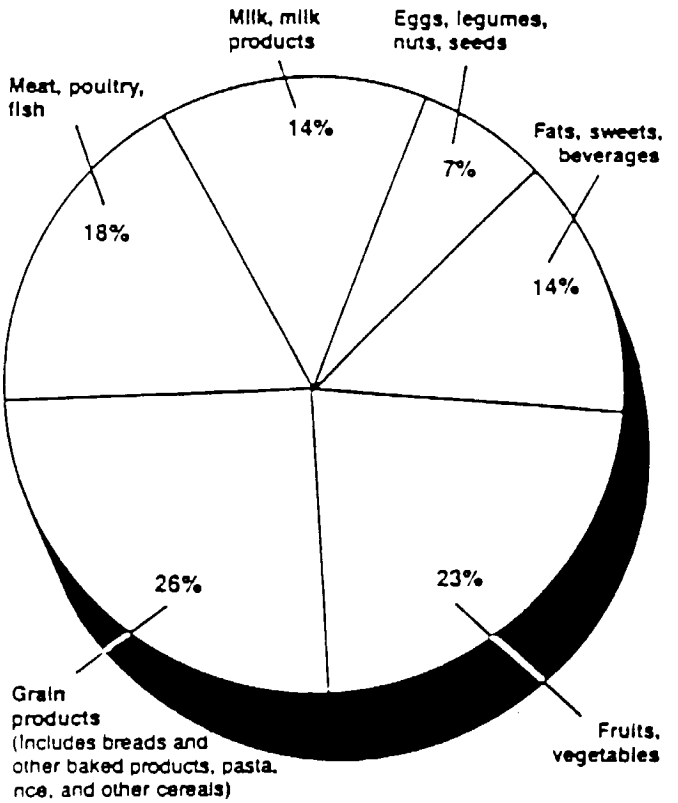
What Is Meant By a Good Food Source?

A good food source of magnesium contains a substantial amount of magnesium in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Dietary Allowance (U.S. RDA) for magnesium in a selected serving size. The U.S. RDA for magnesium is 400 milligrams per day.[1]

The U.S. RDA for magnesium is the amount of the mineral used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 280 milligrams per day for women 19 to 50 years of age and 350 milligrams for men 19 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Magnesium?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986. Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age. The percentages provided by the various food groups may not add up to 100 because of rounding.

As you can see, in 1985 and 1986, about 25 percent of the magnesium in diets of women was supplied by grain products and another 25 percent by fruits and vegetables. Meat, poultry, and fish provided about 18 percent of the magnesium. Fats, sweets, and beverages supply 14 percent of the magnesium; however, they are not considered in our list of "good sources" because they are high in calories compared to the amounts of vitamins and minerals they provide. Foods that con-

tain small amounts of magnesium but are not considered good sources can contribute significant amounts of magnesium to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Magnesium?

Magnesium, a mineral, is used in building bones, manufacturing proteins, releasing energy from muscle storage, and regulating body temperature.

Do We Get Enough Magnesium?

According to recent USDA surveys, the average intake of magnesium by women 19 to 50 years of age was about 74 percent of the RDA. Men of the same age got about 94 percent of the recommended amount. About 50 percent of women had intakes below 70 percent of their RDA.

How Can We Get Enough Magnesium?

Eating a variety of foods that contain magnesium is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. Intakes of magnesium tend to be low in relation to recommendations, and there aren't that many foods that are really good sources; thus, it may take special care to ensure an adequate intake. The list of foods will help you select those that are good sources of magnesium as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Magnesium

Magnesium is lost in cooking some foods even under the best conditions. To retain magnesium:

- Cook foods in a minimal amount of water.
- Cook for the shortest possible time.

What About Whole-Grain Cereals?

Whole-grain ready-to-eat cereals usually contain 10 percent of the U.S. RDA for magnesium. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, 1/2 cup of a cooked vegetable contains more magnesium than 1/2 cup of the same vegetable served raw, because a serving of the cooked vegetable weighs more. Therefore, the cooked vegetable may appear on the list while the raw form does not. The raw vegetable provides the nutrient—but just not enough in a 1/2-cup serving to be considered a good source.

What Are Good Sources Of Magnesium?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS		
Bread, whole-wheat	2 slices	+
English muffin, whole-wheat	1	+
Muffin, bran	1 medium	+
Multigrain cereal, cooked	⅔ cup	+
Noodles, whole-wheat, cooked	1 cup	+
Pita bread, whole-wheat	1 small	+
Ready-to-eat cereals, whole-grain[2]	1 ounce	+
Rice, brown, cooked	⅔ cup	+
Spaghetti, high-protein, cooked	1 cup	+
Wheat germ, plain	2 tablespoons	+
VEGETABLES		
Artichoke, globe (french), cooked	1 medium	+
Beans, lima, cooked	½ cup	+
Broccoli, cooked	½ cup	+
Chard, cooked	½ cup	+
Okra, cooked	½ cup	+
Plantain, green or ripe, boiled	1 medium	+
Spinach, cooked	½ cup	+
MEAT, POULTRY, FISH, AND ALTERNATES		
Fish and Seafood		
Croaker, mackerel, or sea bass: baked or broiled	3 ounces	+
Oysters:		
Baked, broiled, or steamed	3 ounces	+
Canned, undrained	3 ounces	+
Scallops, baked, broiled, boiled, or steamed	3 ounces	+
Dry Beans, Peas, and Lentils		
Beans: black-eyed peas (cowpeas), chickpeas (garbanzo beans), soybeans, or white; cooked	½ cup	+
Soy milk (not baby formula)	1 cup	+
Tofu (bean curd)[3]	½ cup cubed	+
Nuts and Seeds		
Almonds: roasted, dry-roasted, or unroasted	2 tablespoons	+
Brazil nuts, filberts (hazelnuts), or pine nuts (pignolias)	2 tablespoons	+
Cashews, roasted or dry-roasted	2 tablespoons	+
Mixed nuts, roasted	2 tablespoons	+
Peanut butter	2 tablespoons	+
Pumpkin or squash seeds, hulled, unroasted	2 tablespoons	+
Sesame seeds	2 tablespoons	+
Sunflower seeds, hulled, unroasted	2 tablespoons	+
MILK, CHEESE, AND YOGURT		
Milk, chocolate, made with skim milk	1 cup	+
Yogurt, plain, made with nonfat milk	8 ounces	+

[1]A selected serving size contains—
- \+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2]See section on whole-grain cereals.

[3]If made with magnesium chloride or nigari (a coagulant derived from seawater).

EATING RIGHT THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

PHOSPHORUS

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

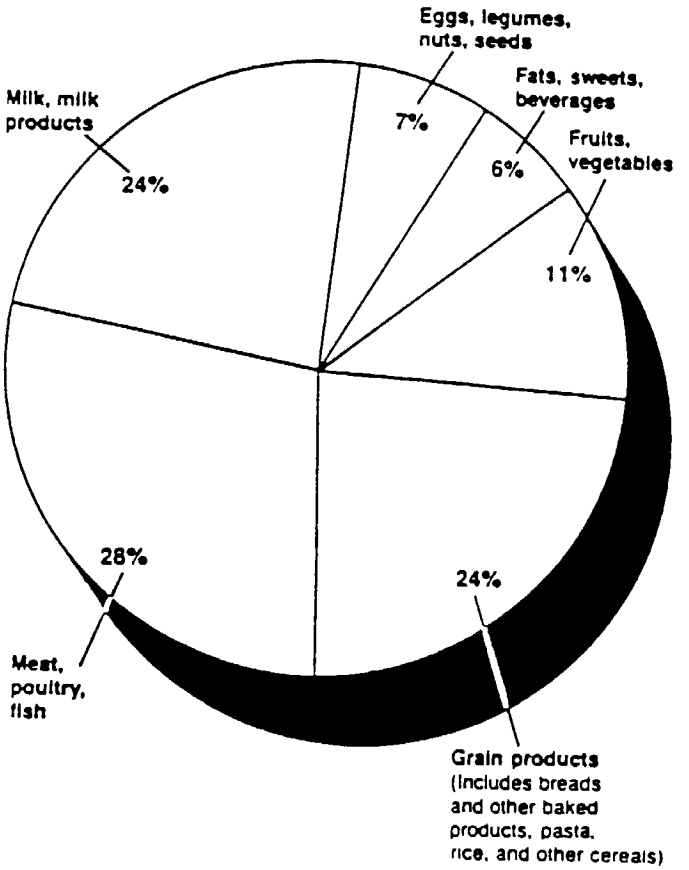
What Is Meant By a Good Food Source?

A good food source of phosphorus contains a substantial amount of phosphorus in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Dietary Allowance (U.S. RDA) for phosphorus in a selected serving size. The U.S. RDA for phosphorus is 1,000 milligrams per day.[1]

The U.S. RDA for phosphorus is the amount of the mineral used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 1,200 milligrams per day for women and men 19 to 24 years of age and 800 milligrams for women and men 25 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Phosphorus?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986 Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age.

As you can see, in 1985 and 1986, 28 percent of the phosphorus in the diets of women was supplied by meat, poultry, and fish. Grain products and milk and milk products each contributed 24 percent of the phosphorus. Much of the phosphorus provided by the fats, sweets, and beverages group comes from carbonated beverages; however, they are not considered in our list of "good sources" because they are high in calories compared to

the amounts of vitamins and minerals they provide. These beverages often contain phosphorus in the form of phosphates. Foods that contain small amounts of phosphorus but are not considered good sources can contribute significant amounts of phosphorus to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Phosphorus?

Phosphorus, a mineral, helps build strong bones and teeth. Phosphorus is also involved in the release of energy from fat, protein, and carbohydrates during metabolism, and in the formation of genetic material, cell membranes, and many enzymes.

Do We Get Enough Phosphorus?

According to recent USDA surveys, the intake of phosphorus by women 35 to 50 years of age and men 19 to 50 years of age averaged above their RDA. Average phosphorus intake by women 19 to 34 years of age was about 1,000 milligrams per day.

How Can We Get Enough Phosphorus?

Eating a variety of foods that contain phosphorus is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. The list of foods will help you select those that are good sources of phosphorus as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Phosphorus

Phosphorus is lost in cooking some foods even under the best conditions. To retain phosphorus:

- Cook foods in a minimal amount of water.
- Cook for the shortest possible time.
- Roast or broil lamb, veal, pork, and poultry. (Beef keeps the same amount of phosphorus regardless of cooking method.)

What About Whole-Grain Cereals?

Whole-grain ready-to-eat cereals usually contain 10 percent of the U.S. RDA for phosphorus. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amounts eaten of some meats may be easier to estimate by the piece rather than by weight. For example, the selected serving size for lamb is 1 chop weighing 3-1/4 ounces, 1 patty weighing 2-3/4 ounces, or 3 ounces of roast shoulder.

What Are Good Sources of Phosphorus?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS		
Bread, whole-wheat	2 slices	+
Bulgur, cooked or canned	⅔ cup	+
Muffin, whole-wheat	1 medium	+
Oatmeal, regular or quick, cooked	⅔ cup	+
Pancakes, plain	2 4-inch pancakes	+
Ready-to-eat cereals, whole-grain[2]	1 ounce	+
Roll, whole-wheat	1 medium	+
Waffles, plain	2 4-inch squares	+ +
Wheat germ, plain	2 tablespoons	+
VEGETABLES		
Beans, lima, cooked	½ cup	+
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Beef:		
Brisket, braised, lean only	3 ounces	+
Ground: extra lean, lean, or regular; baked or broiled	1 patty	+
Pot roast, braised, lean only	3 ounces	+
Roast, rib, roasted, lean only	3 ounces	+
Shortribs, braised, lean only	3 ounces	+
Steak: baked, braised, or broiled; lean only	3 ounces	+
Stew meat, simmered, lean only	3 ounces	+
Chicken, without skin:		
Breast, broiled or roasted	½ breast	+
Leg (thigh and drumstick), broiled or roasted	1 leg	+
Ham, roasted, lean only:		
Fresh	3 ounces	+
Smoked or cured	3 ounces	+
Lamb:		
Chop, loin or shoulder; baked, braised, or broiled; lean only	1 chop	+
Ground, cooked	1 patty	+
Roast, shoulder, roasted, lean only	3 ounces	+
Liver, braised:		
Beef or calf	3 ounces	+ +
Chicken	½ cup diced	+
Pork:		
Chop, baked or broiled, lean only	1 chop	+
Pork (continued):		
Ground, cooked	3 ounces	+
Roast, roasted, lean only:		
Loin	3 ounces	+
Shoulder	3 ounces	+
Steak or cutlet, baked or broiled, lean only	3 ounces	+
Turkey:		
Ground, cooked	3 ounces	+
Light or dark meat, roasted, without skin	3 ounces	+
Veal:		
Cutlet or steak, pan-broiled, lean only	3 ounces	+
Ground, cooked	1 patty	+
Roast, leg, roasted, lean only	3 ounces	+
Fish and Seafood		
Carp, baked or broiled	3 ounces	+ + +
Catfish, cod, croaker, mackerel, mullet, ocean perch, pike, pompano, porgy, trout, or whiting; baked or broiled	3 ounces	+
Clams; steamed, boiled, or canned; drained	3 ounces	+
Crabmeat, steamed	3 ounces	+
Flounder, haddock, perch, or sea bass; baked or broiled	3 ounces	+
Lobster, steamed or boiled	3 ounces	+
Mackerel, canned, drained	3 ounces	+ +
Mussels, steamed, boiled, or poached	3 ounces	+
Oysters:		
Baked, broiled, or steamed	3 ounces	+
Canned, undrained	3 ounces	+
Salmon:		
Baked, broiled, steamed, or poached	3 ounces	+
Canned, drained	3 ounces	+ +
Scallops:		
Baked or broiled	3 ounces	+
Boiled or steamed	3 ounces	+
Shrimp:		
Broiled	3 ounces	+
Steamed, boiled, or canned, drained	3 ounces	+
Swordfish steak, baked or broiled	3 ounces	+ +
Tuna, canned, drained	3 ounces	+

Continued

What Are Good Sources of Phosphorus?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
Dry Beans, Peas, and Lentils		
Beans: calico, chickpeas (garbanzo beans), lima, mexican, mung, pinto, or red kidney; cooked	½ cup	+
Lentils, cooked	½ cup	+
Soy milk (not baby formula)	1 cup	+
Nuts and Seeds		
Almonds, roasted	2 tablespoons	+
Brazil nuts	2 tablespoons	+
Peanut butter	2 tablespoons	+
Pine nuts (pignolias)	2 tablespoons	+
Sesame seeds	2 tablespoons	+
Sunflower seeds, hulled; roasted, unroasted, or dry-roasted	2 tablespoons	+
MILK, CHEESE, AND YOGURT		
Cheese, natural: blue, brick, cheddar, colby, edam, gouda, gruyere, havarti, limburger, monterey, mozzarella, muenster, parmesan (hard), port du salut, provolone, roquefort, swiss, tilsit	1 ounce	+
Cheese, process, cheddar or swiss	¾ ounce	+
Cheese, ricotta	½ cup	+
Cheese spread, cheddar	1 tablespoon	+
Cottage cheese, regular or lowfat	½ cup	+
Ice milk, soft-serve	½ cup	+
Milk:		
Chocolate	1 cup	+ +
Dry, lowfat, or nonfat; reconstituted	1 cup	+
Evaporated, diluted:		
Skim	1 cup	+
Whole	1 cup	+ +
Whole, lowfat, or skim	1 cup	+
Yogurt:		
Flavored or fruit, made with whole or lowfat milk	8 ounces	+ +
Frozen	8 ounces	+
Plain:		
Made with whole milk	8 ounces	+
Made with lowfat or nonfat milk	8 ounces	+ +

[1]A selected serving size contains—
- \+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2]See section on whole-grain cereals.

POTASSIUM

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

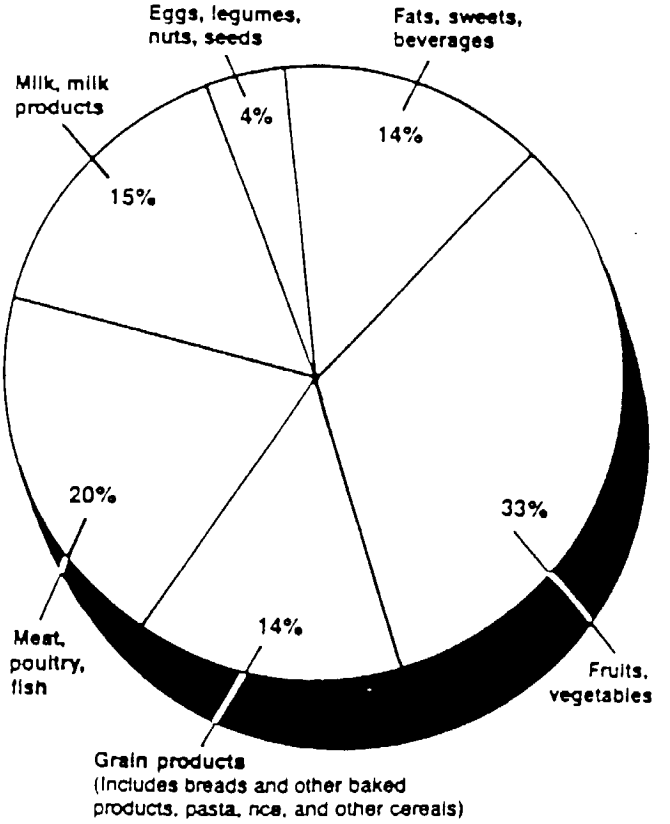
- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

What Is Meant By a Good Food Source?

A good food source of potassium contains a substantial amount of potassium in relation to its calorie content and contributes at least 200 milligrams of potassium in a selected serving size.

The Food and Nutrition Board of the National Academy of Sciences has estimated the minimum requirement for potassium for men and women over 18 years of age to be 2,000 milligrams per day.

Where Do Women Get Potassium?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986. Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age.

As you can see, in 1985 and 1986, one-third of the potassium in the diets of women came from fruits and vegetables. Within this food group, white potatoes provided about one-third of the potassium. Meat, poultry, and fish supplied 20 percent of the potassium. Foods that contain small amounts of potassium but are not considered good sources can contribute significant amounts of potassium to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Potassium?

Potassium, a mineral, assists in muscle contraction and in maintaining fluid and electrolyte balance in body cells. Potassium is also important in sending nerve impulses as well as releasing energy from protein, fat, and carbohydrates during metabolism.

Do We Get Enough Potassium?

According to recent USDA surveys, the average intake of potassium by women and men 19 to 50 years of age was above the minimum requirement estimated by the Food and Nutrition Board of the National Academy of Sciences.

How Can We Get Enough Potassium?

Eating a variety of foods that contain potassium is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. The list of foods can help you select those that are good sources of potassium as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Potassium

Potassium is lost in cooking some foods even under the best conditions. To retain potassium:

- Cook foods in a minimal amount of water.
- Cook for the shortest possible time.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, 1/2 cup of a cooked vegetable contains more nutrients than 1/2 cup of the same vegetable served raw, because a serving of the cooked vegetable weighs more. Therefore, the cooked vegetable may appear on the list while the raw form does not. The raw vegetable provides the nutrient—but just not enough in a 1/2-cup serving to be considered a good source.

What Are Good Sources Of Potassium?

Food	Selected Serving Size	Potassium Per Serving[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS		
Ready-to-eat cereals:		
Oat flakes, fortified with soy flour	1 ounce	+
100-percent-bran cereals[2]	1 ounce	+ +
FRUITS		
Apricots:		
Dried, cooked, unsweetened	½ cup	+ + +
Dried, uncooked	¼ cup	+ +
Banana, raw	1 medium	+ +
Cantaloup, raw	About ½ cup diced	+
Grapefruit juice:		
Canned or reconstituted frozen, unsweetened	¾ cup	+
Fresh	¾ cup	+
Honeydew melon, raw	About ¾ cup diced	+
Melon balls (cantaloup and honeydew), frozen, unsweetened	½ cup	+
Nectarine, raw	1 medium	+
Orange juice:		
Canned	¾ cup	+
Fresh or reconstituted frozen, unsweetened	¾ cup	+ +
Peaches:		
Dried, cooked, unsweetened	½ cup	+ +
Dried, uncooked	¼ cup	+ +
Pears, dried, cooked, unsweetened	½ cup	+
Pomegranate, raw	1 medium	+ +
Prunes, dried, cooked, unsweetened	½ cup	+ +
Prune juice, unsweetened	½ cup	+ +
Raisins	¼ cup	+
Watermelon, raw	About 1¾ cups diced	+
VEGETABLES		
Artichoke, globe (french), cooked	1 medium	+
Asparagus, cooked	½ cup	+
Beans:		
Green, cooked	½ cup	+
Lima, cooked	½ cup	+ + +
Cauliflower, cooked	½ cup	+
Chard, cooked	½ cup	+ +
Corn, cooked	½ cup	+
Jerusalem artichoke, raw	½ cup	+
Mushrooms, cooked	½ cup	+
Parsnips, cooked	½ cup	+
Peas, green, cooked	½ cup	+
Plantain, green or ripe, boiled	1 medium	+ + +
Potato:		
Baked or boiled, with skin	1 medium	+ + +
Baked or boiled, without skin	1 medium	+ +
Pumpkin, cooked	½ cup	+ +
Rutabaga, cooked	½ cup	+
Spinach, cooked	½ cup	+ +
Squash, winter, cooked, mashed	½ cup	+ + +
Sweetpotato:		
Baked	1 medium	+ +
Boiled	1 medium	+
Tomatoes:		
Raw	1 medium	+
Stewed	½ cup	+ +
Tomato juice, canned	¾ cup	+ +
Tomato-vegetable juice or tomato juice cocktail, canned	¾ cup	+ +
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Beef:		
Brisket, braised, lean only	3 ounces	+
Ground; extra lean, lean, or regular; baked or broiled	1 patty	+
Pot roast, braised, lean only	3 ounces	+
Roast, rib, roasted, lean only	3 ounces	+
Shortribs, braised, lean only	3 ounces	+
Steak, lean only:		
Baked or broiled	3 ounces	+
Braised	3 ounces	+
Stew meat, simmered, lean only	3 ounces	+
Chicken, without skin:		
Breast, broiled or roasted	½ breast	+
Leg (thigh and drumstick), broiled or roasted	1 leg	+
Cornish hen, roasted, without skin	½ hen	+
Ham, roasted, lean only:		
Fresh	3 ounces	+
Smoked or cured	3 ounces	+
Lamb, lean only:		
Chop, shoulder; baked, braised, or broiled	1 chop	+
Roast, leg or shoulder, roasted	3 ounces	+

Continued

What Are Good Sources Of Potassium?

Food	Selected Serving Size	Potassium Per Serving[1]
Pork:		
Chop, baked or broiled, lean only	1 chop	+
Cutlet or steak, baked or broiled, lean only	1 cutlet	+ +
Ground, cooked	3 ounces	+
Roast, roasted, lean only:		
Loin	3 ounces	+
Shoulder	3 ounces	+
Turkey, light or dark meat, roasted, without skin	3 ounces	+
Veal, lean only:		
Chop, braised	1 chop	+
Cutlet or steak, pan broiled	1 cutlet	+ +
Roast, leg, roasted	3 ounces	+
Fish and Seafood		
Carp, catfish, flounder, or mullet; baked or broiled	3 ounces	+ +
Haddock, mackerel, or porgy; baked or broiled	3 ounces	+
Clams:		
Canned, drained	3 ounces	+
Steamed or boiled	3 ounces	+
Cod, croaker, pompano, or trout; baked or broiled	3 ounces	+ +
Crabmeat, steamed	3 ounces	+
Lobster, steamed or boiled	3 ounces	+
Mussels, steamed, boiled, or poached	3 ounces	+
Ocean perch, perch, pike, sea bass, or whiting; baked or broiled	3 ounces	+
Oysters:		
Canned, undrained	3 ounces	+
Steamed	3 ounces	+
Salmon:		
Baked or broiled	3 ounces	+
Steamed, poached, or canned; drained	3 ounces	+
Scallops:		
Baked or broiled	3 ounces	+
Boiled or steamed	3 ounces	+
Swordfish steak, baked or broiled	3 ounces	+
Tuna, canned, drained	3 ounces	+

Food	Selected Serving Size	Potassium Per Serving[1]
Dry Beans, Peas, and Lentils		
Beans, cooked:		
Bayo, black, brown, or red kidney	½ cup	+ +
Calico, chickpeas (garbanzo beans), mung, or pinto	½ cup	+
Lima, soybeans, or white	½ cup	+ +
Lentils, cooked	½ cup	+ +
Peas, split, green or yellow, cooked	½ cup	+ +
Soy milk (not baby formula)	1 cup	+
MILK, CHEESE, AND YOGURT		
Milk:		
Buttermilk	1 cup	+ +
Chocolate, made with whole or skim milk	1 cup	+ +
Skim	1 cup	+ +
Whole or lowfat	1 cup	+ +
Milk-based fruit drinks	1 cup	+ + +
Yogurt:		
Flavored, made with lowfat milk	8 ounces	+ +
Frozen	8 ounces	+ +
Fruit, made with lowfat or nonfat milk	8 ounces	+ +
Plain:		
Made with whole milk	8 ounces	+ +
Made with lowfat milk	8 ounces	+ + +

[1] A selected serving size contains at least—
- \+ 200-349 milligrams
- \+ + 350-499 milligrams
- \+ + + 500 or more milligrams

[2] Most 100-percent-bran cereals contain at least 350 milligrams of potassium.

EATING RIGHT
THE DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

ZINC

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

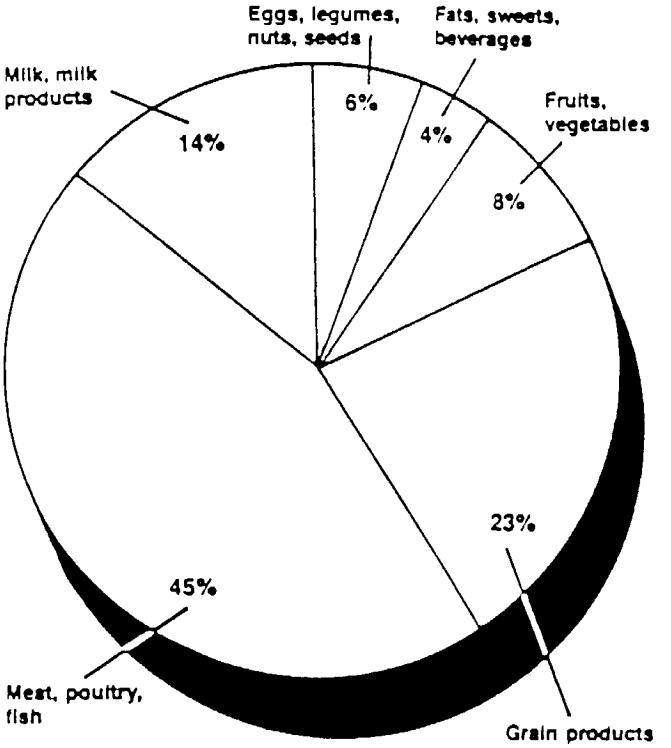
What Is Meant By a Good Food Source?

A good food source of zinc contains a substantial amount of zinc in relation to its calorie content and contributes at least 10 percent of the U.S. Recommended Dietary Allowance (U.S. RDA) for zinc in a selected serving size. The U.S. RDA for zinc is 15 milligrams per day.[1]

The U.S. RDA for zinc is the amount of the mineral used as a standard in nutrition labeling of foods. This allowance is based on the 1968 Recommended Dietary Allowances (RDA) for 24 sex-age categories set by the Food and Nutrition Board of the National Academy of Sciences. The 1989 RDA has been set at 12 milligrams per day for women 19 to 50 years of age and 15 milligrams for men 19 to 50 years of age.

[1]The U.S. RDA given is for adults (except pregnant or lactating women) and children over 4 years of age.

Where Do Women Get Zinc?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986, Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age.

As you can see, in 1985 and 1986, almost one-half of the zinc in the diets of women was supplied by meat, poultry, and fish. Grain products were also good food sources of zinc; they contributed almost 25 percent. Foods that contain small amounts of zinc but are not considered good sources can contribute significant amounts of zinc to an individual's diet if these foods are eaten often or in large amounts.

Why Do We Need Zinc?

Zinc, a mineral, plays an important role in the formation of protein in the body and thus assists in wound healing, blood formation, and general growth and maintenance of all tissues. Zinc is a component of many enzymes and thus is involved in most metabolic processes.

Do We Get Enough Zinc?

According to recent USDA surveys, the average intake of zinc by women 19 to 50 years of age was less than 75 percent of their RDA while that of men of the same age averaged about 95 percent of their RDA. Over one-half of women had intakes less than 70 percent of the RDA.

How Can We Get Enough Zinc?

Eating a variety of foods that contain zinc is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. Intakes of zinc tend to be low in relation to recommendations, and there aren't many foods that are really good sources; thus, it may take special care to ensure an adequate intake. The list of foods will help you select those that are good sources of zinc as you follow the Dietary Guidelines. The list of good sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Zinc

Zinc is lost in cooking some foods even under the best cooking conditions. To retain zinc:

- Cook foods in a minimal amount of water.
- Cook for the shortest possible time.

What About Fortified Foods?

Most fortified ready-to-eat cereals usually contain at least 10 percent of the U.S. RDA for zinc. Since cereals vary, check the label on the package for the percentage of the U.S. RDA for a specific cereal.

What Is a Serving?

The serving sizes used on the list of good sources are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, the edible part of a cooked chicken leg (thigh and drumstick) weighs more than the edible part of a cooked chicken breast half. Therefore, the chicken leg appears on the list while the chicken breast half does not. The chicken breast half provides the nutrient—but just not enough to be considered a good source.

What Are Good Sources Of Zinc?

Food	Selected Serving Size	Percentage of U.S. RDA[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS		
Ready-to-eat cereals, fortified[2]	1 ounce	+
Wheat germ, plain	2 tablespoons	+
MEAT, POULTRY, FISH, AND ALTERNATES		
Meat and Poultry		
Beef:		
Brisket, braised, lean only	3 ounces	+ +
Ground; extra lean, lean, or regular; baked or broiled	1 patty	+ +
Pot roast, braised, lean only	3 ounces	+ + +
Roast, rib, roasted, lean only	3 ounces	+ +
Shortribs, braised, lean only	3 ounces	+ + +
Steak, lean only:		
Baked or broiled	3 ounces	+ +
Braised	3 ounces	+ + +
Stew meat, simmered, lean only	3 ounces	+ + +
Chicken, leg (thigh and drumstick), broiled or roasted, without skin	1 leg	+
Ham, fresh, smoked or cured, roasted, lean only	3 ounces	+
Lamb:		
Chop, shoulder; braised, broiled, or baked; lean only	1 chop	+ +
Ground, cooked	1 patty	+
Roast, shoulder, roasted, lean only	3 ounces	+ +
Liver, braised:		
Beef or pork	3 ounces	+ +
Calf	3 ounces	+ + +
Chicken or turkey	½ cup diced	+
Pork:		
Chop, baked or broiled, lean only	1 chop	+
Ground, cooked	3 ounces	+
Roast, loin, roasted, lean only	3 ounces	+
Pork (continued):		
Roast, shoulder, roasted, lean only	3 ounces	+
Tongue, braised	3 ounces	+ +
Turkey:		
Ground, cooked	3 ounces	+
Light or dark meat, roasted, without skin	3 ounces	+
Veal:		
Chop, braised, lean only	1 chop	+
Ground, cooked	1 patty	+
Roast, leg, roasted, lean only	3 ounces	+ +
Fish and Seafood		
Carp, baked or broiled	3 ounces	+
Crabmeat, steamed	3 ounces	+
Lobster, steamed or boiled	3 ounces	+
Mussels, steamed, boiled, or poached	3 ounces	+
Oysters:		
Baked, broiled, or steamed	3 ounces	+ + +
Canned, undrained	3 ounces	+ + +
Nuts and Seeds		
Pumpkin or squash seeds, hulled, roasted	2 tablespoons	+
MILK, CHEESE, AND YOGURT		
Cheese, ricotta	½ cup	+
Yogurt:		
Flavored, made with whole or lowfat milk	8 ounces	+
Plain, made with lowfat or nonfat milk	8 ounces	+

[1] A selected serving size contains—
- \+ 10-24 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + 25-39 percent of the U.S. RDA for adults and children over 4 years of age
- \+ + + 40 percent or more of the U.S. RDA for adults and children over 4 years of age

[2] See section on fortified cereals.

EATING RIGHT the DIETARY GUIDELINES WAY

GOOD SOURCES OF NUTRIENTS

DIETARY FIBER

This is one in a series of fact sheets containing information to help you select foods that provide adequate daily amounts of vitamins, minerals, and dietary fiber as you follow the Dietary Guidelines for Americans. The Guidelines are—

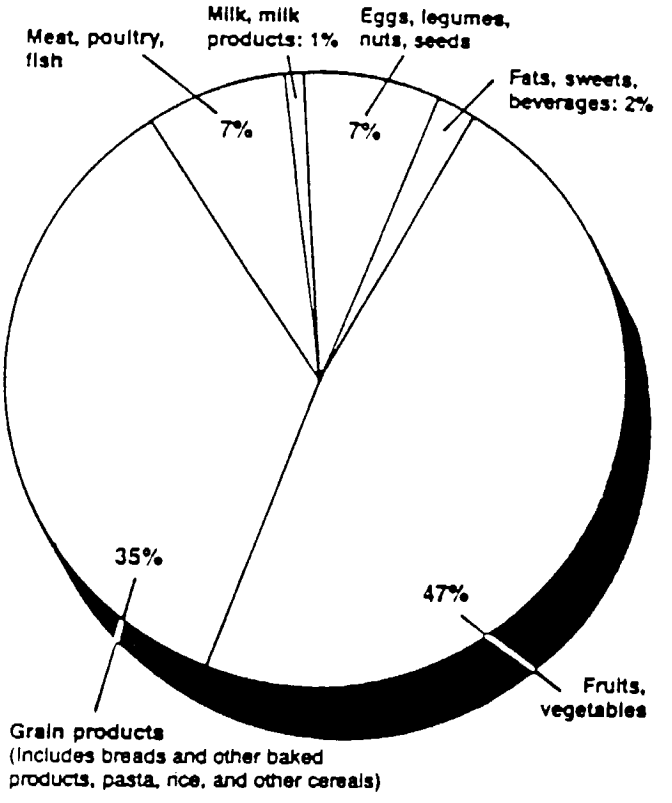
- *Eat a Variety of Foods*
- *Maintain Desirable Weight*
- *Avoid Too Much Fat, Saturated Fat, and Cholesterol*
- *Eat Foods with Adequate Starch and Fiber*
- *Avoid Too Much Sugar*
- *Avoid Too Much Sodium*
- *If You Drink Alcoholic Beverages, Do So in Moderation*

What Is Meant By a Food Source Of Dietary Fiber?

In this fact sheet, a significant source of dietary fiber is defined as a food that contains a substantial amount of dietary fiber in relation to its calorie content and contributes at least 2 grams of dietary fiber in a selected serving size.

The Food and Nutrition Board of the National Academy of Sciences has not set a Recommended Dietary Allowance (RDA) for dietary fiber. However, the importance of dietary fiber has been stressed by several health organizations and the Federal Government. The Dietary Guidelines for Americans published jointly by the U.S. Departments of Agriculture and Health and Human Services recommend eating foods that have adequate amounts of fiber, and one organization, the National Cancer Institute, recommends 20 to 30 grams of fiber per day with an upper limit of 35 grams. For this list of fiber sources, the Human Nutrition Information Service, along with the Food and Drug Administration, decided to use a level of at least 2 grams of dietary fiber per serving.

Where Do Women Get Dietary Fiber?[1]



Source: U.S. Department of Agriculture, Human Nutrition Information Service. Unpublished data from 1985 and 1986. Continuing Survey of Food Intakes by Individuals, 4 days.

[1]Women 19-50 years of age. The percentages provided by the various food groups may not add up to 100 because of rounding.

As you can see, in 1985 and 1986, almost one-half of dietary fiber in the diets of women was supplied by fruits and vegetables and another 35 percent by grain products. Dietary fiber is not found in animal products,

such as milk and meats. The fiber shown in the chart as coming from these groups was contributed by grain products or vegetables added to them. Even foods that contain small amounts of dietary fiber can make an important contribution to an individual's diet if these foods are eaten often or in large amounts.

What Is Dietary Fiber?

Dietary fiber is a complex mixture of plant materials that are resistant to breakdown (digestion) by the human digestive system. There are two major kinds of dietary fiber—insoluble (cellulose, hemicellulose, lignin) and soluble (gums, mucilages, pectins). Insoluble fiber is most frequently found in whole-grain products such as whole-wheat bread. Foods containing soluble fibers are fruits, vegetables, dry beans and peas, and some cereals such as oats.

Why Do We Need Dietary Fiber?

Insoluble fiber promotes normal elimination by providing bulk for stool formation and thus hastening the passage of the stool through the colon. Insoluble fiber also helps to satisfy appetite by creating a full feeling. Some studies indicate that soluble fibers may play a role in reducing the level of cholesterol in the blood.

How Much Dietary Fiber Do Americans Eat?

According to recent USDA surveys, the average intake of dietary fiber by women 19 to 50 years of age is about 12 grams. Intake by men of the same age is about 17 grams.

How Can We Get Enough Dietary Fiber?

Eating a variety of foods that contain dietary fiber is the best way to get an adequate amount. Healthy individuals who eat a balanced diet rarely need supplements. The list of foods will help you select those that are significant sources of dietary fiber as you follow the Dietary Guidelines. The list of sources was derived from the same nutritive value of foods tables used to analyze information for recent food consumption surveys of the U.S. Department of Agriculture, Human Nutrition Information Service.

How To Prepare Foods To Retain Dietary Fiber

Dietary fiber can be reduced in foods during preparation and cooking. To retain dietary fiber:

- Serve fruits and vegetables with edible skins and seeds.
- Use whole-grain flours.

What Is a Serving?

The serving sizes used on the list of sources of dietary fiber are only estimates of the amounts of food you might eat. The amount of nutrient in a serving depends on the weight of the serving. For example, 1/2 cup of a cooked vegetable contains more fiber than 1/2 cup of the same vegetable served raw, because a serving of cooked vegetable weighs more. Therefore, the cooked vegetable may appear on the list while the raw form does not. The raw vegetable provides dietary fiber—but just not enough in a 1/2-cup serving to be a significant source of dietary fiber.

What Are Sources Of Dietary Fiber?

Food	Selected Serving Size[1]
BREADS, CEREALS, AND OTHER GRAIN PRODUCTS	
Bagel, whole-wheat	1 medium
Biscuit, whole-wheat	1 medium
Breads, multigrain, pumpernickel, rye, white and whole-wheat blend, whole-wheat, or whole-wheat with raisins	2 regular slices
Bulgur, cooked or canned	⅔ cup
English muffin, whole-wheat	1
Muffins, bran or whole-wheat	1 medium
Oatmeal:	
Instant, fortified, prepared	⅔ cup
Regular or quick, cooked	⅔ cup
Pita bread, whole-wheat	1 small
Ready-to-eat bran cereals	1 ounce
Rolls:	
Multigrain	1 large
Whole-wheat	1 medium
FRUITS	
Apples:	
Dried, cooked, unsweetened	½ cup
Raw	1 medium
Applesauce, unsweetened	½ cup
Apricots, dried:	
Cooked, unsweetened	½ cup
Uncooked	¼ cup
Banana, raw	1 medium
Blackberries, raw or frozen, unsweetened	½ cup
Blueberries, frozen, unsweetened	½ cup
Dates, chopped	¼ cup
Fruit mixture, dried	¼ cup
Guava, raw	1
Kiwifruit, raw	1 medium
Mango, raw	½ medium
Nectarine, raw	1 medium
Orange, raw	1 medium
Peaches, dried:	
Cooked, unsweetened	½ cup
Uncooked	¼ cup
Pears:	
Canned, juice-pack	½ cup
Dried, cooked, unsweetened	½ cup
Dried, uncooked	¼ cup
Raw	1 medium
Prunes, dried:	
Cooked, unsweetened	½ cup
Uncooked	¼ cup
Raisins	¼ cup
Raspberries, raw or frozen, unsweetened	½ cup
Strawberries, frozen, unsweetened	½ cup
Tangelo, raw	1 medium
VEGETABLES	
Artichoke, globe (french), cooked	1 medium
Beans, green or lima, cooked	½ cup
Beets, cooked	½ cup
Broccoli, cooked	½ cup
Brussels sprouts, cooked	½ cup
Cabbage, cooked	½ cup
Carrots, cooked	½ cup
Okra, cooked	½ cup
Parsnips, cooked	½ cup
Peas, green, cooked	½ cup
Potato, boiled, with skin	1 medium
Snow peas, raw or cooked	½ cup
Spinach, cooked	½ cup
Squash, winter, cooked, mashed	½ cup
Sweetpotato, baked or boiled	1 medium
Tomatoes, stewed	½ cup
MEAT, POULTRY, FISH, AND ALTERNATES	
Dry Beans, Peas, and Lentils	
Beans: black-eyed peas (cowpeas), calico, chickpeas (garbanzo beans), lima, mexican, pinto, red kidney, or white; cooked	½ cup
Lentils, cooked	½ cup
Peas, split, green or yellow, cooked	½ cup
Nuts and Seeds	
Almonds or chestnuts, roasted	2 tablespoons
Peanut butter	2 tablespoons
Pine nuts (pignolias)	2 tablespoons
Pumpkin or squash seeds, hulled, roasted	2 tablespoons
Sesame seeds	2 tablespoons
Sunflower seeds, hulled, unroasted	2 tablespoons

[1] A selected serving size contains at least 2 grams of dietary fiber

Nutrition in the Fast Lane

Good nutrition is vital for top performance. Both the competitive athlete and the individual involved in a fitness program benefit from a nutritious diet—there's no magic involved!

A diet which supplies enough, but not too much, carbohydrate, fat, protein, vitamins, minerals and water is important to all athletes.

Exercise and Energy Use

- Glucose is the primary fuel source for high-intensity, short-duration exercise.
- When exercise continues for five minutes or longer, both glucose and fat are used for fuel.
- If exercise continues, fat becomes the major fuel for muscles.
- Endurance events use the glycogen (a form of glucose) stored in muscles and the liver.
- Carbohydrate loading is a dietary manipulation used to increase muscle and liver glycogen stores. The larger these stores are, the longer fatigue may be avoided.

Caution: Carbohydrate loading causes unpleasant side effects—fatigue, nausea, irritability, water retention, and weight gain. Exercise during depletion may cause heart irregularities.

Carbohydrate loading should be used **only** by endurance athletes under the supervision of an expert.

- High-protein and fat foods don't compose the best pre-game meal; they take longer to digest than carbohydrates and may cause stomach upsets.

Carbohydrate

- provides energy for body processes
- is the preferred fuel for muscles.
- is the most economical source of energy.

Fat

- supplies the essential fatty acid.
- provides fat soluble vitamins.
- is a concentrated source of energy. It has twice the calories of carbohydrate or protein.

Protein

- is necessary for growth, repair, and maintenance of body tissues.
- is necessary for the production of hormones, enzymes and antibodies.
- overconsumption may cause stress on the liver and kidneys.
- overconsumption does not build extra muscle nor give a competitive edge.

Vitamins and Minerals

- Rely on a variety of foods to supply the necessary vitamins and minerals.
- Mega-doses may interfere with the use of other nutrients.
- Iron deficiency may affect performance because insufficient oxygen reaches muscles to allow them to work efficiently.
- Women and growing children may lack enough iron in their diets.

Water

- is necessary for all body processes.
- prevents dehydration during strenuous exercise and warm weather.
- can be provided by diluted fruit juice. Athletic beverages are not needed.

Activity and Energy Needs

Activity Level	Calories used per minute
Sleeping	1
Very light exercise. Office work, drinking, reading, watching TV, studying, telephoning, typing	2
Light exercise. Housework, shopping, golf, volleyball, walking slowly, fishing, riding horseback at a walk	2—5
Moderate exercise. Walking fast, playing tennis, gardening, skiing downhill, bicycling slowly, hiking, dancing slowly, swimming leisurely, playing baseball	5—7
Heavy exercise. Playing basketball, weight lifting, playing football, running, cross-country skiing, bicycle racing, horseback riding at a gallop	7—12

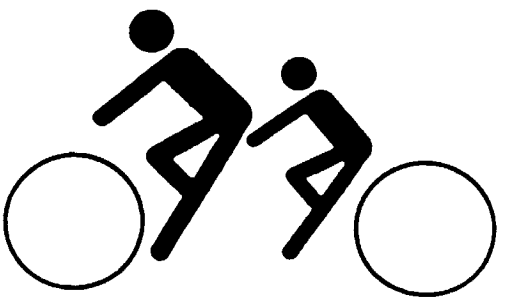
Supplements

- Protein supplements don't enhance performance and may cause dehydration or create stress on the liver and kidneys.
- Supplements of vitamins or minerals in the form of pills, liquids, powders or highly fortified foods are unnecessary, don't aid performance, and may be dangerous to your health.

No one food or dietary product will enhance performance.

Use this information as a foundation for good nutrition—and better performance. Follow these guidelines in designing your food plan.

After selecting minimum amounts from these basic foods, choose additional food and beverages to meet your energy needs. If you exercise regularly you may need to eat 500 to 1,000 calories a day more than a person who doesn't exercise—just to maintain your ideal weight.



Oregon State University Extension Service

Combinations for Complete Vegetable Proteins

The following combinations of vegetable and dairy foods will provide protein that is nutritionally complete for human needs. This is not an all-inclusive table. Many similar combinations using other grains, legumes or dairy products will work as well. These *quantities* do not have to be eaten at one meal but the combinations must be eaten together at the same time.

Wheat

1 cup whole wheat flour + 1/4 cup soy flour
1 cup whole wheat flour + 1/2 cup milk
3 cups wholewheat flour + 1/2 cup beans
5 slices whole wheat bread + 1 cup milk

Rice (brown or converted, not "minute", pre-cooked)

3/4 cup rice + 1 cup milk
2/3 cup rice + 1/4 cup beans
1 cup rice + 1/3 cup sesame seeds
1 cup rice + 4 Tablespoons brewers yeast
1 and 1/4 cup rice + 2 Tablespoons soy beans (soy grits or 3 T. whole)

Corn

1 cup cornmeal + 1/4 cup beans
1 cup cornmeal + 1/4 cup soy grits or beans + 1/4 cup milk

Nuts and Seeds

1 cup sunflower seeds + 3/4 cup peanuts
1 and 1/4 cup sesame seeds + 1 cup milk
1/2 cup sesame seeds + 6 ounces tofu (soybean curd or "cheese")

Potatoes

1 medium potato + 1 cup milk

Recommended Shelf Life of Canned, Jarred & Bottled Foods

Below are the *recommended* shelf lives of many commonly canned and jarred fruits, juices and vegetables. These storage times do not mean that the contents of cans and jars of produce must be disposed of after this time. In fact, modern canning techniques render most of these products essentially sterile, so as long as the product remains intact, that is, no loosened jar lids, broken seals, punctured or badly dented cans, etc., there should be no bacterial or fungal contamination. Cases of botulism occur due to improper heat and pressure processing.

Figures were provided by numerous producers of these products, and in all cases, they pointed out that many of their canned products would really be safe and nutritious to eat indefinitely. One reason they impose any shelf life limitations is to ensure performance of the product in recipes, e.g. evaporated milks which tend to chemically separate or become darkened in old cans and can't be depended on for proper baking performance. Yet, the milk would be safe to drink and provide the original nutritional benefits if stored in a cool, dry location.

Another reason for specifying a shelf life limitation is to allow for the possibility that the product, itself, will begin to interact with the can in which it was packed. Though most producers said they used coated cans, they indicated that any imperfection in the integrity of the coating opened up the possibility of interaction. This is more likely in high acid products such as grapefruit and pineapple juices and, I was told, in canned green beans. Note that the shelf lives of most fruits and vegetables is longer when they are canned in glass jars and bottles versus metal cans. Jars eliminate the

metal interaction problem with the possible exception of a poorly coated metal lid screwed onto a glass jar.

Darkened, discolored contents or a distinct metallic taste, the latter even in the absence of darkening, are key indicators of this type of interaction. Such food should be disposed of. If it was only recently bought, it should be returned to the store. It is possible that the store sold you canned goods long past their pull dates, increasing the likelihood of a can in which metal interactions had occurred.

A last point -- the keys to long-term storage of any canned foods are cool, dark and dry conditions. Cool and dark slow down potential vitamin losses and dry ensures that metal containers and lids will not rust. If you have met these conditions, most of these products will be safe and nutritious well after these recommended dates.

Vegetables	**Shelf Life in Months****
Asparagus	24
Beans, green	24
Beans, wax	24
Beans, 3-bean mix	24
Beans, garbanzo	24
Beans, kidney	24
Beans, lima	24
Beans, pork and	24
Beets	24
Cabbage, red	24
Carrots	24
Corn Niblets	24
Corn, creamed	24
Mixed vegetables	24
Mushrooms	24
Peas	24
Peas and carrots	24
Potatoes, white	24

Potatoes, sweet	24
Pumpkin	24
Sauerkraut	18
Succotash	24
Tomatoes	24
Tomato Sauces	24

Miscellaneous

Evaporated Milk, skimmed	9
Evaporated Milk, lowfat	12
Evaporated Milk, regular	15
Sweetened Condensed Milk	12
Meats	24
Salmon	24
Stews	24
Tuna	24

Fruit Juices	Bottles	Cans
Apple	18	12
Cranberry	18	12
Cranapple	18	12
Cranraspberry	18	12
Crangrape	18	12
Grape, concord	18	12
Grape, white	18	12
Grapefruit, regular	18	12
Grapefruit, pink	18	12
Lemon	18	12
Orange	18	12
Orange pineapple	18	12
Pineapple	18	12

Fruits	Jars	Cans
Apples	24	18
Applesauce	24	12
Applesauce, plastic "spoon- pack"	18	---
Apricots	24	18
Blackberries	24	24
Blueberries	24	24
Cherries	24	24
Cranberry sauce	24	18
Grapefruit	24	18
Oranges	24	18
Peaches	24	24
Pears	24	24
Pineapple	24	12
Plums	24	24
Raspberries	24	24
Rhubarb	24	18

**Shelf lives are calculated from the time the product is canned. The numbers imprinted or embossed on can or jar lids are coded to indicate the year, month and even the day, in some cases, on which the product was packed. If you call the consumer relations departments indicated on most products, they will be happy to decode it for you and tell you how to read their dates on your own. If you buy all of your canned goods from a reputable, high volume grocery store, you are far more likely to receive "fresh" products.

Food Poisoning Chart

	Salmonellosis and Campylobacterosis	Perfringens Poisoning	Staphylococcal Poisoning
Cause	*Salmonella and Campylobacter.* Bacteria widespread in nature; live and grow in intestinal tracts of humans and animals.	*Clostridium perfringens.* Spore-forming bacteria that grow in the absence of oxygen. Temperatures reached in thorough cooking of most foods are sufficient to destroy vegetative cells, but heat-resistant spores can survive.	*Staphylococcus aureus.* Bacteria growing in food produce a toxin that is extremely resistant to heat.
Examples of foods involved	Poultry, red meat, eggs, and dairy products.	Cooked meat and poultry, stews, soups, gravies left at 60–125°F several hours or cooled slowly.	Custards, egg salad, potato salad, chicken salad, macaroni salad, ham, salami, cheese, cooked poultry, and dressing.
Transmission	Eating contaminated food, or contact with infected persons or carriers of the infection. Also transmitted by insects, rodents, and pets.	Eating food contaminated with large numbers of the bacteria.	Eating food containing the toxin. Food handlers can carry the bacteria in infected cuts and wounds.
Symptoms	Severe headache, followed by vomiting, diarrhea, abdominal cramps, and fever. Infants, elderly people, persons with low resistance are most susceptible. Severe infections cause high fever and may even cause death.	Diarrhea, abdominal cramps, and flatulence.	Vomiting, diarrhea, prostration, abdominal cramps, retching, weakness. Onset usually sudden.
Onset	Usually within 12–36 hours.	Usually within 8–20 hours.	Usually within 2–8 hours.
Duration	2–7 days.	May persist for 24 hours.	1–2 days.
Prevention	Cook foods thoroughly. The bacteria are destroyed by heating the food to 140°F for 10 minutes or to higher temperatures for less time—for instance, 155° for a few seconds. Chill foods rapidly in small quantities. Refrigerate at 40° F. Wash hands, work surfaces and equipment after touching raw meat or poultry.	Cool food rapidly and refrigerate promptly at 40°F or below, or hold above 140°F to prevent growth of surviving bacteria in cooked meats, gravies, and meat casseroles to be eaten later. Reheat leftover foods to 165°F.	Growth of bacteria that produce toxin is stopped by keeping hot foods above 140°F and cold foods at or below 40°F. Chill food rapidly in small quantities. Once the toxin is formed, it is not easily destroyed by heat. Mishandled foods cannot be made safe by reheating.

	Botulism	Listeriosis	Vibriosis
Cause	*Clostridium botulinum*. Spore-forming organisms that grow and produce toxin in the absence of oxygen, such as in a sealed container or below the surface of food.	*Listeria monocytogenes*. Bacteria widespread in nature that can live in soil as well as intestinal tracts of humans and animals.	*Vibrio parahaemolyticus*. Bacteria common in seawater. Other *Vibrio* species found in seawater (including *Vibrio cholera*) also cause foodborne disease.
Examples of foods involved	Improperly canned low-acid food (vegetables, fish, meat, poultry), smoked fish, and improperly handled low-acid cooked foods.	Raw milk, unripened and other soft cheese, undercooked meat and poultry.	Raw seafood such as oysters, shrimp, crabs, and clams.
Transmission	Eating food containing the toxin.	Eating food contaminated with the bacteria.	Eating seafood contaminated with large numbers of bacteria.
Symptoms	Headache, double vision, inability to swallow, speech difficulty, and progressive respiratory paralysis. Fatality rate is about 20%.	Headache, fever, and nausea. Can lead to meningitis. Can result in miscarriage or stillbirth. Pregnant women, infants, and persons with low resistance to infections (such as cancer patients) are most susceptible. Can result in death unless there is antibiotic therapy.	Diarrhea, cramps, weakness, nausea, chills, and headache.
Onset	Usually 12–36 hours or longer.	Usually within 24 hours but can occur up to 12 days after ingestion.	3–76 hours (an average of 17 hours).
Duration	Recovery is prolonged.	2–7 days.	1–8 days.
Prevention	Follow reliable instructions for time and temperature for home canning low-acid vegetables, meat, fish, and poultry. Bacterial spores in these foods are destroyed only by high temperatures obtained in the pressure canner. Toxin is destroyed by boiling 10 minutes or heating in the oven to 185° F. Refrigerate cooked low-acid foods promptly.	Cook foods of animal origin thoroughly. Buy pasteurized milk. Prevent recontamination of cooked foods by cleaning hands, surfaces, and equipment that come into contact with raw animal foods. Do not use animal manure or sewage sludge in your vegetable garden.	Keep raw and cooked seafood refrigerated. Cook seafood thoroughly. Prevent cross-contamination between raw and cooked seafood.

Walton Feed

Walton Feed of Montpelier, Idaho, is one example of a company that specializes in providing both food and seed, in bulk quantities, in oxygen-free cans for long-term storage. I have asked for their permission to print a portion of their extensive catalog offerings for your information. Their addresses and phone are listed, below, if you would like to ask them for a catalog.

Item GO1 Contains the Following Packets in a #10 Can

25 packets total

	In Can	Wt		In Can	Wt		In Can	Wt		In Can	Wt
Tomato	1	3 gm	Carrots	1	3 gm	Squash	1	4.5 gm	Cabbage	1	3 gm
String Beans	4	.75 oz	Peas	4	.75 oz	Onion	1	3 gm	Corn	4	.75 oz
Zucchini	1	3 gm	Swiss Chard	1	3 gm	Cucumber	1	3 gm	Lettuce	1	3 gm
Radish	1	3 gm	Pepper	1	3 gm	Beet	1	3 gm	Spinach	1	4 gm

Item GO2 Contains the Following Packets in a #2.5 Can

16 packets total

	In Can	Wt		In Can	Wt		In Can	Wt		In Can	Wt
Tomato	1	3 gm	Carrots	1	3 gm	Squash	1	4.5 gm	Cabbage	1	3 gm
String Beans	1	.75 oz	Peas	1	.75 oz	Onion	1	3 gm	Corn	1	.75 oz
Zucchini	1	3 gm	Swiss Chard	1	3 gm	Cucumber	1	3 gm	Lettuce	1	3 gm
Radish	1	3 gm	Pepper	1	3 gm	Beet	1	3 gm	Spinach	1	4 gm

All seeds are non-hybrid and come from Northrup King Seed Company.
Walton's specializes in edible dry goods and has the following foods in many different packages:

Alfalfa	Amaranth	Barley
Beans (all kinds)	Broccoli	Buck wheat
Cabbage	Carrots	Celery
Cheese	Cocoa	Eggs
MREs	Flax	Flour
Fruits	Kamut	Lecithin
Milk	Millet	Mushrooms
Oats	Onions	Peanut btr pdr
Peas	Peppers	Popcorn
Potatoes	Quinoa	Rice
Sprouting seeds	Spelt	Tomato powder
Triticale	TVP	Wheat (all kinds)
Whey powder	Yeast	

Walton Feed
135 North 10th P.O. Box 307
Montpelier, ID 83254
1-800-847-0465 for catalog

Web site address:
http://waltonfeed.com/

Order number: 800-269-8563 **By Fax:** 403-756-3312 http://waltonfeed.com/