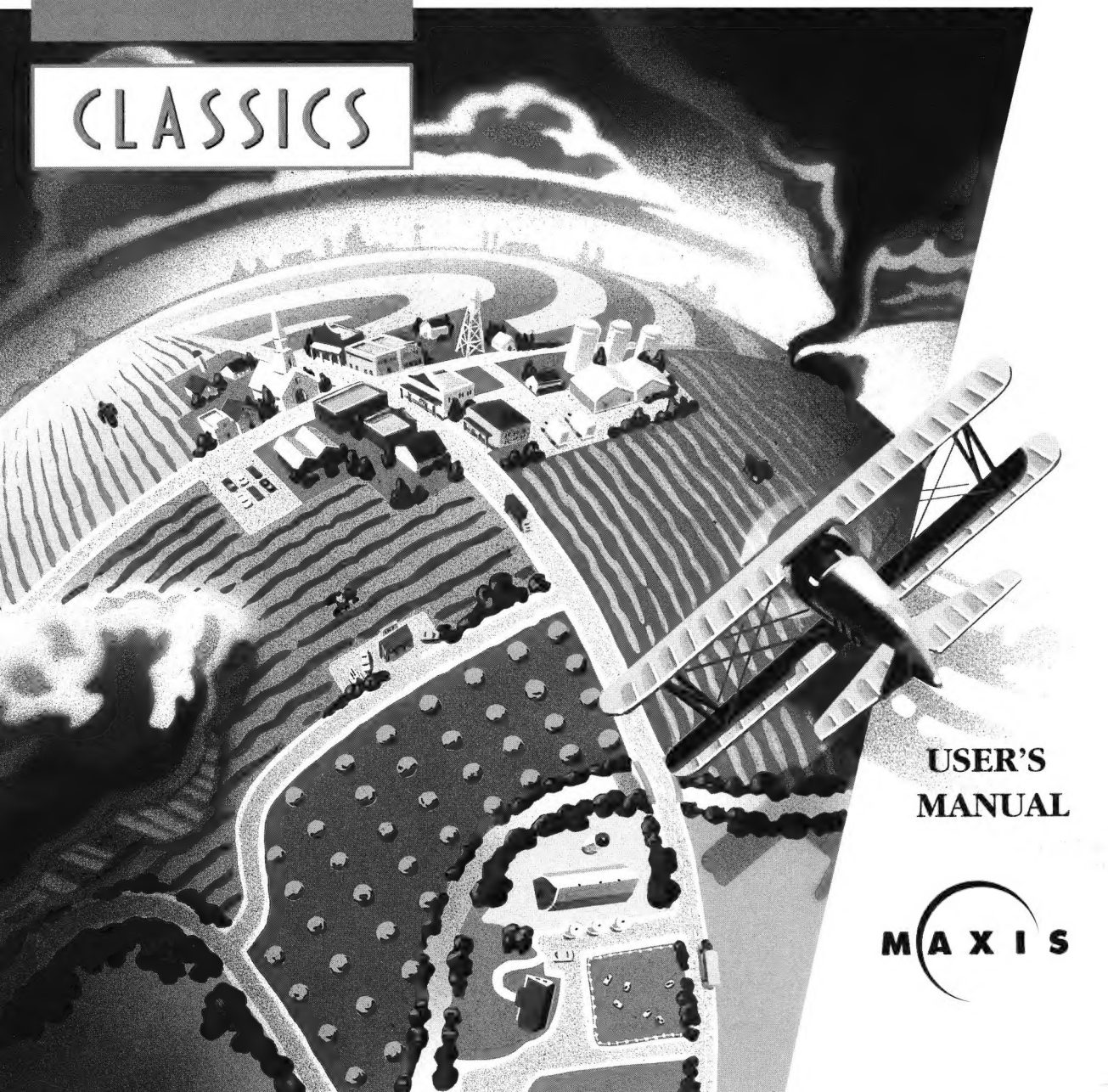
# SIM Farm®

SimCity's Country Cousin

CLASSICS



USER'S MANUAL

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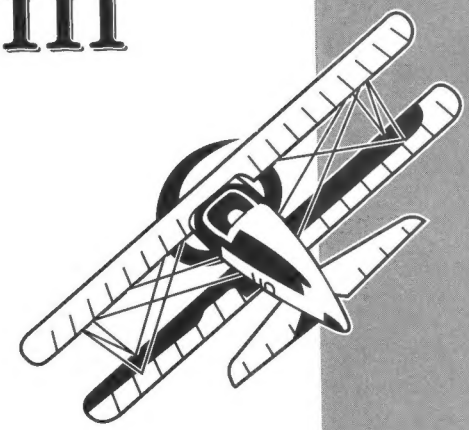
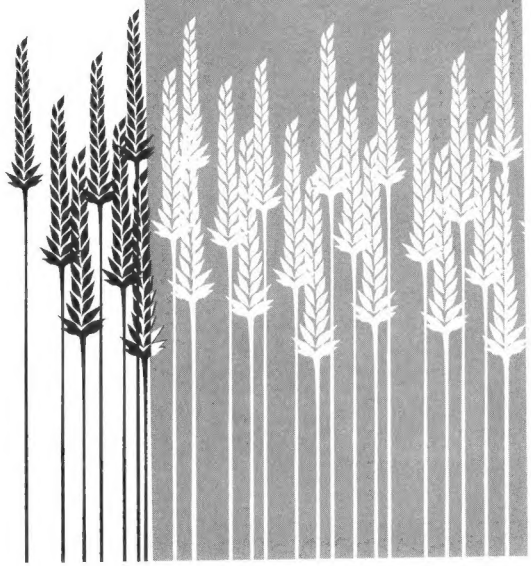
# SimFarm®



# USER MANUAL


by Tom Bentley

Real Farms Section
by Steve Perrin

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**MAXIS**
2121 N. California Blvd.
Walnut Creek, CA
94596-3572



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# CREDITS

**THE PROGRAM**
*Concept, Design and Programming:* Eric Albers
*Producer and Additional Design:* Michael Perry
*Computer Art Director:* Jenny Martin
*Computer Art:* Suzie Greene, Bonnie Borucki, Sharon Stambaugh, Donna Buttlaire, Sharon Perry, Mary Schewe, Maureen Gilhooly
*Sound:* Eric Albers, Michael Perry
*Sound Programming:* John Miles, Brian Conrad
*Music:* Sue Kasper
*Technical Director:* Brian Conrad
*Installer Programming:* Andrei Snegov
*Data Research:* Kathleen Robinson
*Something Somewhere Somewhen:* Mitzi McGilvray

**THE MANUAL**
*Written By:* Tom Bentley
*Real Farms Section Written By:* Steve Perrin
*Editing:* Michael Bremer, Debra Larson
*Design and Layout:* Vera Jaye, Kristine Brogno
*Contributions to Documentation:* Michael Perry, Kathleen Robinson

**THE PACKAGE**
*Package Design:* Jamie Davison Design, Inc.
*Package Illustration:* Laura Smith

**THE MAXIS SUPPORT TEAM**
*Lead Tester:* Don-Jah Horat
*QA:* Alan Barton, Manny Granillo, Chris Weiss, Roger Johnsen
*Tech Support:* Carter Lipscomb, Kevin O'Hare, Peter Alau, Chris Blackwell
*Product Manager:* Larry Lee
*Public Relations:* Sally Vandershaf
*Manufacturing:* Val Garcia, Kim Vincent

**THANKS TO:**
Jeff Braun, Joe Scirica, Don Walters, Jim Siefert, Brian Conrad, Andrei Snegov, Bob Derber, Mr. Green Jeans, and Maxine

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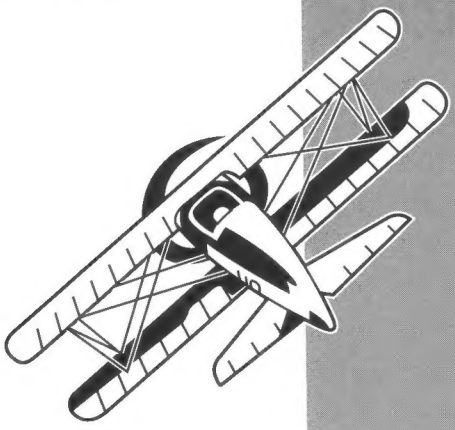
# CONTENTS

# INTRODUCTION



***When tillage begins, other arts follow. The farmers therefore are the founders of human civilization.***

— Daniel Webster,
Remarks on Agriculture,
January 13, 1840

SIM Farm

# INTRODUCTION

## WELCOME

Welcome to SimFarm, where you are rewarded for the fertility of your imagination as well as your fields. SimFarm is a dynamic, responsive farming simulation that lets you experience starting a farm from the ground up (and down). Each crop has its own planting, growing and harvesting needs, and responds to the soil quality of your fields, your farming skills, and seasonal changes. A host of prebuilt scenarios is included to offer varying degrees of challenge.

Since SimFarm, like all Maxis simulations, doesn't force you along a linear, predetermined path, the best way to succeed is to experiment. Try anything and see what happens. If your crops fail in one field, plant another crop or another field. If those skies aren't cloudy enough, hedge your bets by selling to the futures market. If your crops and machinery can't weather the weather, you can take out a loan from the bank. (But there's no free lunch in SimFarm—even if you've grown it. Those loan officers will come calling.)

Once you become an expert in your field, you can take many approaches to running your farm. You can concentrate on crop production, animal husbandry, environmental friendliness or the amassing of wealth—but remember: you reap what you sow. Of course, all of your farming knowledge might not be worth a hill of beans if disaster strikes, though you might fetch a tidy profit off the beans.

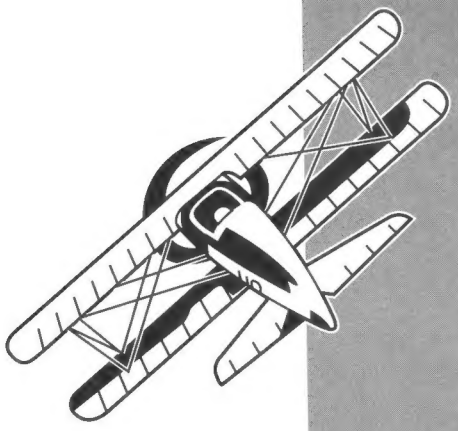
## MANUAL AND ADDENDUM

This manual contains all the information needed to play SimFarm on any computer. A separate machine-specific Addendum/Quick Start Guide gives all the details for installing and starting SimFarm on your particular computer.

## GROW FORTH

For now, step into the Tutorial, take a deep breath of that rural air and crumble some earth between your fingers—the sun's coming up and there's work to do.

# TUTORIAL



***As a work of art, I know few things more pleasing to the eye, or more capable of affording scope and gratification to a taste for the beautiful, than a well-suited, well-cultivated farm.***

— Edward Everett,
address at Buffalo, New York,
October 9, 1857

SIM Farm

# TUTORIAL

## WARMING UP THE FARM

OK farmers, here's your chance to get your nails dirty and your feet wet. We'll stroll your property, plow and plant, and bring your first harvest to table. This tutorial will ground you in all the SimFarm basics and introduce a number of the advanced features of the game. When you're ready for details on every command, window and menu item, they'll be waiting for you in the Reference section.

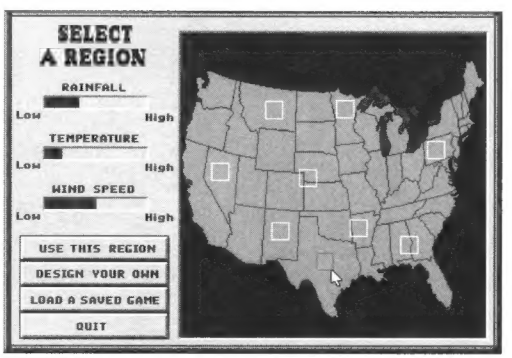
If you haven't already installed SimFarm on your hard disk, you should do so now. See your machine-specific Addendum for complete installation and starting instructions.

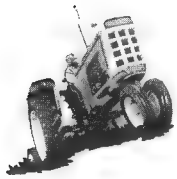
**Start SimFarm.**

Take a moment and be appreciatively dazzled by Maxine, the moovie star of the title screen.

**Click anywhere.**

You'll be ushered into the Select A Region window, which displays a fine map of our intrepid country. The map's zones will roughly correspond to weather regions in the U.S. Clicking on an area of the map will display the average Rainfall, Temperature and Wind Speed for that chosen region, measured from Low to High on the bar gauges to the map's left. The eight highlighted areas are preset scenarios, with farms in various stages and conditions. We won't concern ourselves with them now.

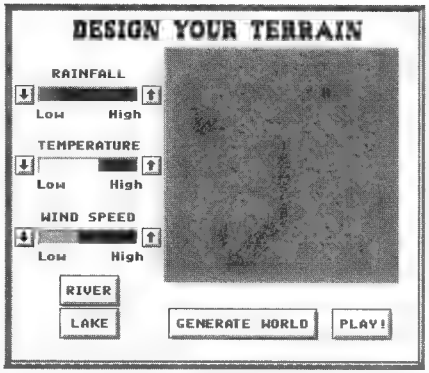




The four buttons in this window present a wealth of opportunities: You could choose USE THIS REGION after you've made your map selection, putting your (mouse) feet on that ground. DESIGN YOUR OWN grants you customization powers over your farm landscape. LOAD A SAVED GAME lets you load in previously saved SimFarm games. Clicking on QUIT wouldn't make a whole heck of a lot of sense right now, since it will end our flowering relationship.

**Click on DESIGN YOUR OWN.**

The Design Your Terrain window will open with an aerial view of your proposed game terrain, and a number of functions for altering that terrain. The terrain is different each time it is generated, so your terrain won't look exactly like the one here—but all of the other window features will be the same. Notice the **"T"** and **"H"** somewhere in the terrain. These show where the town and your homestead are located.



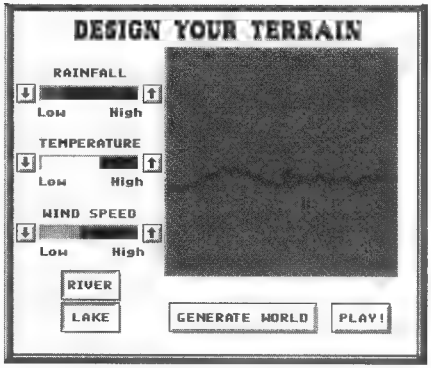

The three bar gauges to the left of the terrain control the Rainfall, Temperature, and Wind Speed. Click on the up or down buttons to change the settings.

**Go ahead now and play with the bars for a while. Stop when you feel like it.**

Below the weather bars are two buttons, RIVER and LAKE. Click on RIVER if you want a river near your farm, and LAKE if you want a lake. What the heck—let's be water hounds.

**Click on both buttons.**

Now, click on GENERATE WORLD. Your computer will build you some country. Look over the lay of the land for a second or two, until you're ready to start your new farm. If things aren't up to your exacting standards, you can click on GENERATE WORLD again and again until you're happy.




**Click on PLAY!**

## GETTING BACK TO THE LAND

Now you're treated to a couple of window views of your farmland—it may look a mite bleak at the moment. Don't click anywhere on the terrain yet—we're going to tour your screen first.

***Note: While the game is running, a number of message windows will pop up. These messages will be useful later, but for now just click on their OK buttons to make them go away.***

***Another Note: The Evaluation window will pop up every year in the first week of January. For now, just give it a quick glance then click on the CLOSE button. We'll talk more about it later.***

At the top of the screen is the menu bar. The menus let you control most of SimFarm's features and functions. Just to prove the point, let's turn off disasters to keep them from crashing this tutorial party.

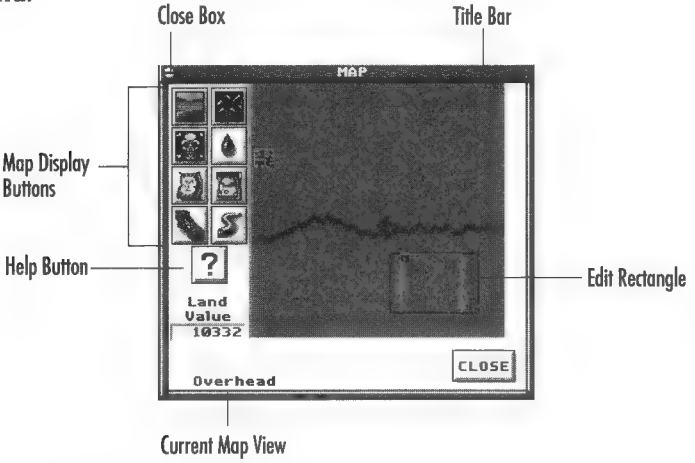
**Click and hold on the Disasters menu to open it, then select DISABLE.**


Below the menu bar is a row of buttons that let you quickly and easily open each of SimFarm's windows. To the right of the buttons are three icons that show today's weather (first icon) and the weather for the next two days. To the right of the weather icons you will see the current date (week, month and year), and your stash of cash—your available funds.

At the moment, there are two windows on the screen. In front is the little Map window, a condensed overview of the total terrain. Behind it is the larger Edit window, where you will conduct most of your farm business. Active windows in SimFarm have highlighted title bars, and their associated buttons (below the menu bar) will appear depressed. You can move most SimFarm windows around on-screen by clicking and dragging their title bars.

# UNFOLDING THE FARM

Let's get the big picture from a little window—by looking at the Map window. If it is closed, or hidden behind another window, the Map window can be activated by clicking on the button below the menu bar with the map on it, or by choosing Map in the Windows menu.




The highlighted rectangle in the Map window encloses the land seen in the Edit window. Your farm—the land that you currently own—is bound by a handsome fence.

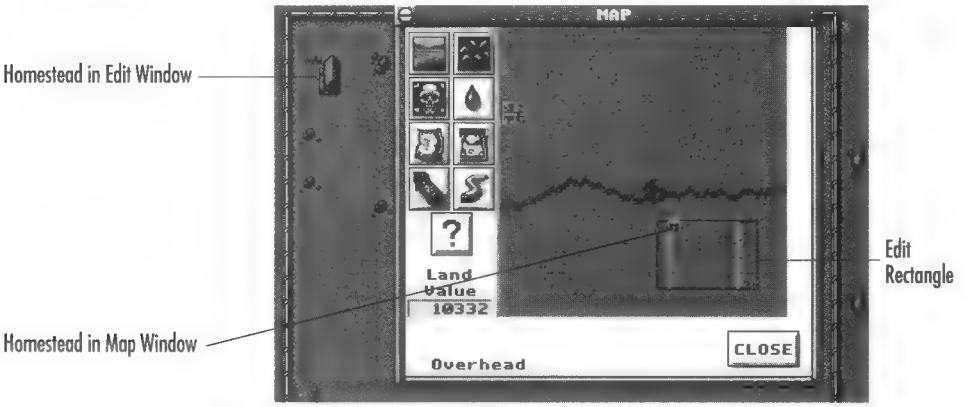
**Click anywhere on the terrain in the Map window.**

Notice that the rectangle on the map moves to the place where you clicked. The terrain in the Edit window will move to match. This is how you can quickly investigate the lay of the land. Take a minute to skip across the territory to see what you're getting into. There are tiny representations of trees, rocks, rivers and lakes in the Map window, with their big-view counterparts in the Edit window peeking out from behind. You can also move the map rectangle (and the Edit window terrain) by clicking and dragging it with the mouse. When you survey the land, you might see an active little community in the midst of some rather uneventful territory—your local town.

If onion skins are very thin, then winter's mild when coming in. But if onion skins are thick and tough, then winter's long, cold and rough.

Courtesy of Old Farmer's Almanac

**Click on your homestead in the map to return the rectangle and the Edit window to your farm.**




## BUTTON UP

A row of buttons descends along the left side of the Map window. Each of these buttons gives you a different map display with different information about your farm. If you click and hold on the Help button, which looks like a question mark, a display will appear, telling you what each button does. The name of the active map is shown at the bottom of the window. Most maps also have an associated color key (pattern key for black and white computers) to help you interpret them.

**Click and hold the Help button for a few seconds.**


**Now click on the Property button (the one with the little landscape picture).**

A grid will appear on the map, dividing the total terrain into plots. A plot is the smallest parcel of land that you can buy or sell at a time. On color monitors, the green plots are your homestead, and the blue square is the township. On black and white monitors, these areas won't be green and blue, but they will be marked.

The Property map also has a BUY/SELL button. It will toggle back and forth, depending on whether or not selected land is already yours. It allows you to buy and sell land, though you cannot sell your original homestead. (Think of the children!) The price of individual plots appears in the Land Value box after you click on them. For the moment, leave your land status as is.

**Click again on the Property button to return to the Overhead Map view.**

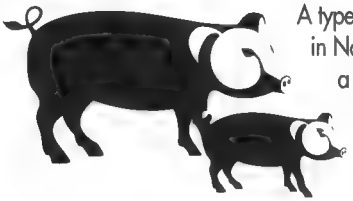
**Click on the button with the friendly skull and crossbones (Toxic Tommy).**

You now see the Soil Toxicity map, showing the general level of harmful chemicals in the soil. Use the key at the bottom of the window to interpret the colors or patterns.

Below the skull is a button that looks like a dress for Margaret Thatcher (sorry). It opens the Soil Nutrients map, and reveals the amount of good nutrients in the soil. Below that is the crop Disease button (resembling a woeful ear of corn). You can guess what that shows.

The top button on the next row displays the Weeds map; the water droplet button shows the Groundwater map, and the "ATM dollar-slot" button displays the Field Profit map. (At this point, since there are no crops growing, this map display won't tell you much.) Last, and hopefully least, the sauntering centipede button displays the Pests map.

**Click the CLOSE button in the Map window.**

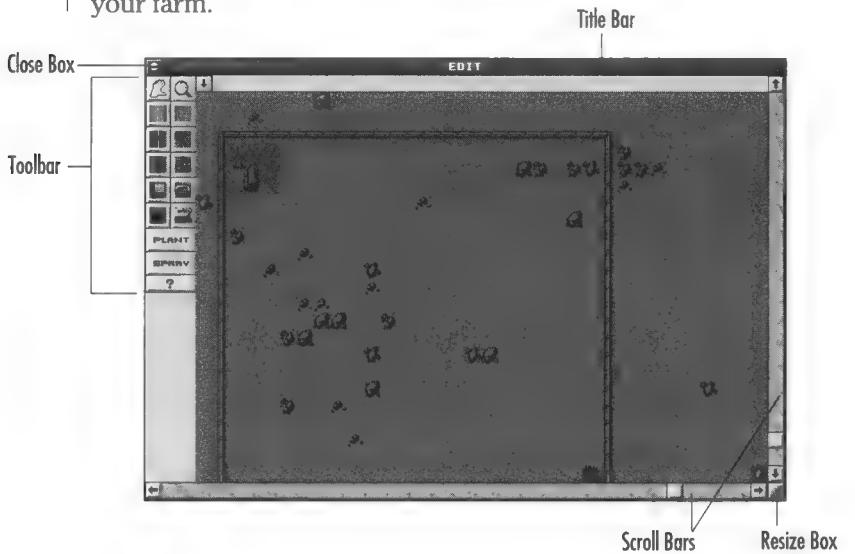


A type of seaweed called rockweed is harvested from the ocean in Nova Scotia and a type of acid extracted from it is used as a colloidal or sticking agent in jellies, packaged puddings, canned pet food, and hair-styling creams, industrial coatings, surgical dressings, and many more uses.

Courtesy of Old Farmer's Almanac

## AT HOME IN THE EDIT WINDOW

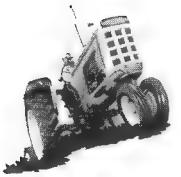
You should now be looking at the Edit window. The Edit window has a message ribbon directly below its title bar. The messages that appear here will help guide your farming decisions and will sometimes alert you to quick-changing game conditions. By clicking and holding on the downward-pointing arrow to the left of the messages, you can bring up a small window that displays the game's ten most recent messages, a little history lesson for your farm.



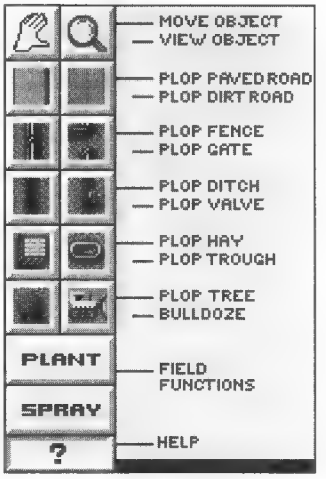

**If your property isn't visible in the Edit window, use the scroll arrows to scroll the land until it shows.**

On some computers, you can also scroll by moving the mouse pointer to any of the edges of the screen, which will cause the territory to scroll towards the chosen edge. This is called AutoScrolling. It may be a little confusing at first, but you can turn it off by going into the Options menu and selecting AutoScroll, which will toggle it off. If your computer doesn't have AutoScrolling, don't worry about it—unless you enjoy worrying.

HOME, SWEET HOME



The toolbar down the left side of the Edit window is for executing farm commands. Notice the button with a question mark on it. This Help button works just like the one in the Map window—click and hold on it to see an explanation of each of the buttons in the toolbar.




You should now be looking at your property: maybe some rocks, scattered trees, and a rather ramshackle house, all surrounded by a fence. It might look a touch shabby now, but at least you're a homeowner—and developing a prosperous farm will spruce it up. This is your land now, so get to work!

And speaking of work, your farm probably needs a good cleaning. Sometimes you have to get rid of rocks, trees, and other nuisances that clutter up your fields and get in the way. It's time to clean up your property so you can start farming.

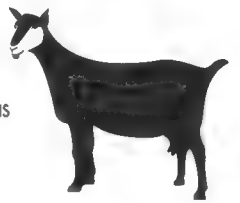
**Click on the Bulldozer button in the toolbar. Click on or click and drag over all the rocks and trees on your property.**

With the AutoDoze option in the Options menu turned on, you can place equipment, roads, buildings, etc. without having to bulldoze obstructions first—but you'll be charged for 'dozing either way.

***Note: As you play through this tutorial, you don't have to place your purchases, fields and structures exactly as shown here, but it'll be easier for you if you try to approximate the placements shown.***

The following are signs that a severe storm is approaching: Even in broad daylight, robins will get into their nests and stay there; deer and elk will come down from the mountains in great numbers, and cats will feverishly lick them selves, as if possessed.

Courtesy of Old Farmer's Almanac

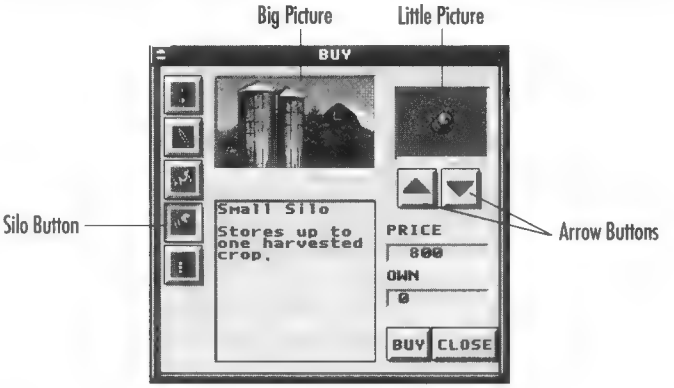


## HOW MUCH IS THAT SILO IN THE WINDOW?


Time to spend some money. When you're playing a real game, you'll want to be a touch more cautious about buying everything all at once. But for this tutorial, we'll be extravagant.

**Click on the BUY button below the menu bar to open the Buy window.**

**Click on the button that looks like a bird's-eye view of a silo.**

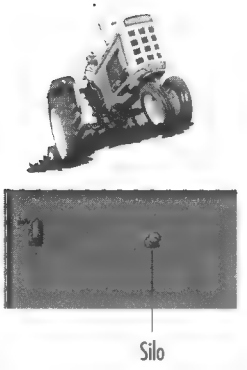



Clicking on the silo button lets you peruse for purchase various farm structures and stationary equipment. The first item is the silo. You'll see a large picture of a couple of silos, plus a small picture to show you what your purchase will look like once it's placed on your farm. You'll also see a description of the silo, its price, the number of silos you currently own, and a couple arrow buttons.

**Click on the arrow buttons to see the various items that you can buy, then return to the small silo.**

**Click on BUY.**

The Buy window will go away (actually it's hidden below the Edit window), and the cursor will change into a dollar sign. The next time you click in the Edit window, a silo will be placed where you click, and the cost of the silo will be deducted from your funds. Choose a place for your silo along the top fence, about halfway between your farmhouse and the right side of your property.




**Click to place the silo.**

Since we're going on a shopping spree, we want to keep the Buy window readily available. We'll shrink the Edit window and arrange the screen so both the Edit and Buy windows are visible.

**Click and hold the Resize box in the lower-right corner of the Edit window, then drag it to your left, so the Edit window fills the left half of the screen, then release the mouse button.**

The Buy window should be partly exposed.

**Click and drag the Buy window title bar to the right, positioning it so that you can move quickly from making your purchase to placing it on the farm.**


**Click on the topmost button in the Buy window, the picture of the little tractor.**

This reveals all the mobile farm machinery you can buy. The tractor is the first piece of equipment you'll need.

**Click the BUY button to buy a tractor, then click next to your house to place it there.**

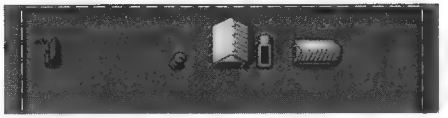
**Go back to the Buy window and use the arrow buttons to find a plow.**

**Buy it and place it near your tractor.**

**Now buy a few other little necessities: a planter, a sprayer, a harvester, a trailer, and a truck and place them near your other equipment. (Be sure to click the BUY button for each new item.)**

It would be a shame if the rain rusted all your new toys, so go back to the Buy window.

**Click on the silo button and then on the arrow buttons until you find the large shed.**



**Buy a large shed and place it to the right of your silo.**

**Buy a small shed and put it to the right of the large one.**

Stored machinery holds its value longer than that exposed to the elements, so let's put our new toys away.

**Click on the hand icon in the toolbar.**

Your cursor will become a little hand, ready to get a grip on the goods.

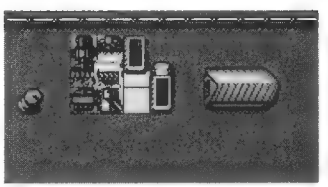
**Click on your new tractor, then click on your large shed.**

The tractor will make itself at home there. Repeat this process, putting all the machinery you just bought into the large shed.

***Note: If the game is paused, the tractor and other equipment won't put themselves away. Also, if the path to the shed is blocked, your equipment may get confused and wander around in circles.***

After you've put away all your toys, take a look inside the large shed.

**Click with the right mouse button (on the Mac, Option-click) on your shed.**

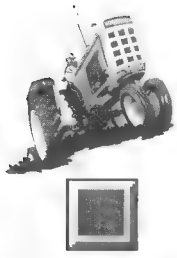


The shed's roof will open and you'll see what treasures you've stored.

**Right-click (or Option-click) again to re-secure the roof.**

You can also store things as you buy them, by clicking on the storage shed itself while placing your equipment purchase.

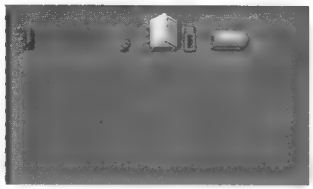
We know you'll keep your new machinery greased, but the best squeak insurance is a smooth road, and it'll keep that equipment valuable down the line.



**Click on the dirt road button on the toolbar.**

**Click and drag on your farm to run a road just under your sheds, past your house and down the left side of your property line.**

***Note: You may need to scroll the Edit window a bit while placing your dirt road.***



## SEEDY BUSINESS

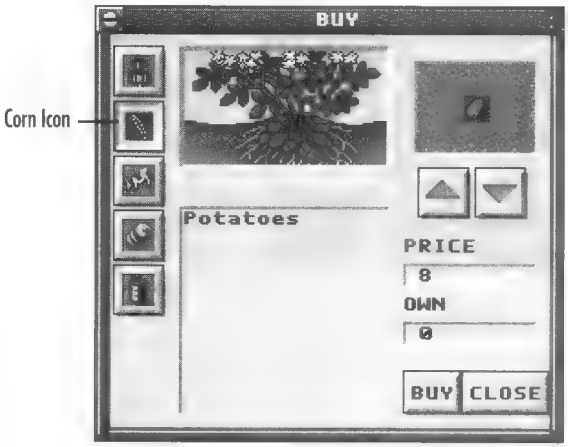
Time to grow some crops. Buying seed is the logical start. Go back to the Buy window and look at the various types of seeds that are available. Use the arrow buttons to check all your choices. We'll buy two units of Potatoes (can you spell that?) and store them in your small shed.

**Click on the Corn icon to see the available seeds.**

**Click on the arrow buttons until you see potatoes.**

**Click once on the BUY button, and twice on the small shed.**

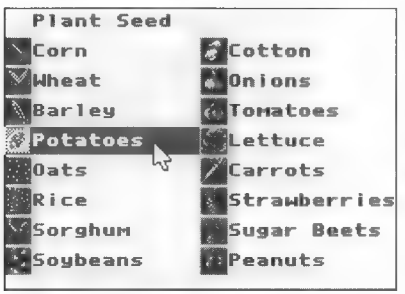
In the future, if you have many fields running and don't want to buy seeds in advance, you can allow AutoBuy (the default selection in the Options menu) to automatically purchase seeds for all fields when necessary. You'll still be charged, but you can catnap through the process.




**Close the Buy window and stretch the Edit window to fill your whole screen.**

## GROW YOUR OWN

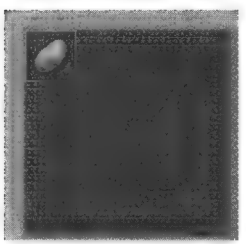
Time to plant some taters. Locate the PLANT button in the Edit window toolbar.




**Click and hold on the PLANT button, highlight Potatoes and release the mouse button.**

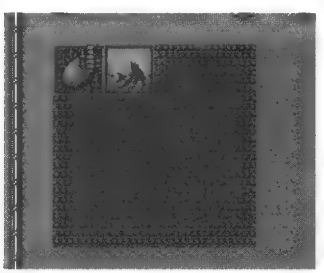
The cursor is now a large square. This square represents the potato field that will be placed and planted. Move it around your territory and settle it into the right angle created by your road placement.

**Click to place the field.**



Voilà!—you're an official farmer. Your tractor will instantly pop into action, plowing your field and then planting your seeds.

***Note: If the message bar says that the field can't be placed, make sure you aren't placing it on top of a fence, or on any trees, rocks or equipment. If you place a field, then decide you want it elsewhere, you can bulldoze it, but you'll be charged for 'dozing and new seeds.***



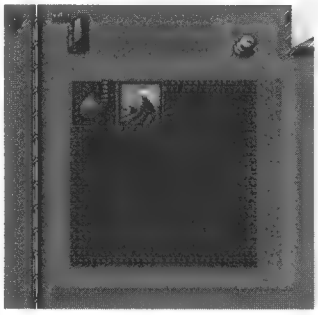
You will see a picture of the chosen crop (in this case, potatoes) in the upper-left corner of your field, telling you what's been planted. Your seed will begin to sprout, soon getting as green as your thumb (more or less, depending on the crop—and your thumb). Keep an eye on the game clock to get a sense of how long these events take and keep your other eye on the message bar to interpret if any messages require you to act. You can speed up or slow down game actions by selecting a speed under the Speed menu. (Info icons may pop up occasionally onto your land: a wave indicates the land is flooded, a steer skull that it is very dry, etc.)

# THE ROAD MORE TRAVELED

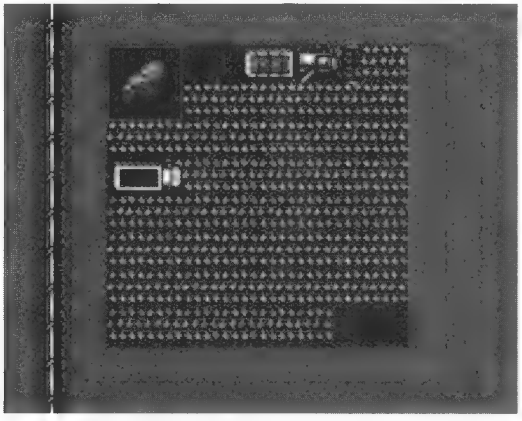
Let's make the planting and harvesting easier on your machinery by completing your roadwork. Lay the road as shown, so that three sides of the field touch the road and one side has an "open row" between it and the road. Later, we'll come back and put an irrigation ditch in this row.

**Click on the dirt road icon.**

**Click and drag to place a road around your field.**



You will see your crop going through the phases of growth, changing color as it approaches harvest time. Harvest cycles depend on the selected crop, but all of them take time. Since you've purchased a harvester and a truck, they'll appear when your crop is ready to harvest and haul away the goods. If you hadn't purchased the equipment, it would have automatically been leased from town, and you'd have been charged for its use. If you don't want a deep outlay of cash when you first begin a game, you can lease all of your equipment—but leasing is expensive. It's good for a quick start-up, but won't be cost-effective over the long run.



***Note: For future reference, you must open a space in your fence for rental equipment to enter and leave your farm.***

If the cock molts before the hen, we'll have a winter thick and thin; if the hen molts before the cock, we'll have a winter hard as rock.

Courtesy of Old Farmer's Almanac

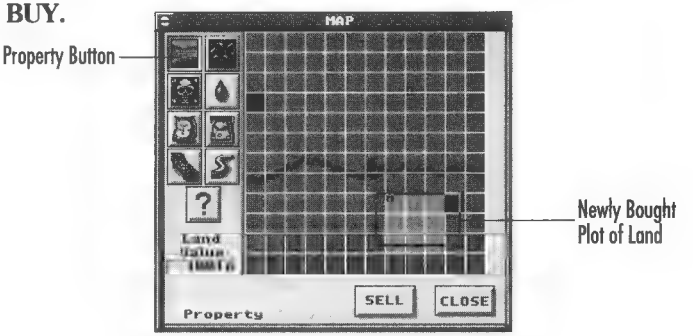
Instead of sitting around watching the grass (or potatoes) grow, let's add a little more life to this farm. First we'll buy some more land, then some cows to make sure you have enough cream for your coffee.

**Open the Windows menu and select Map to open the Map window.**

**Click on the Property button.**

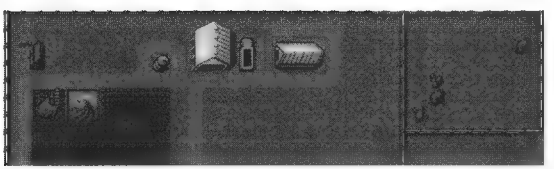
**Click on a plot of land touching your current holdings.**

**Click on BUY.**



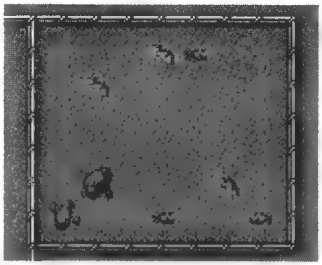

The new purchase will highlight, its cost will be subtracted from your funds, and the BUY button will change to SELL, since you now own the property.

**Close the Map window.**



Back in the Edit window, you'll see that a tidy little piece of property has been stitched onto your holdings. The fence line is good, because without it those cows you're going to buy will get into your fields and eat your crops. If you ever need to mend your fences or to partition off sections of your property to separate types of livestock, you can use the Fence button in the toolbar and draw on new sections with your mouse. Time to buy some cattle.

**Open the BUY window and click on the little cow icon to see the livestock for sale.**



**Use the arrow buttons, if necessary, to get to the cows.**

**Click on BUY.**

**Click in your fenced enclosure six or seven times.**

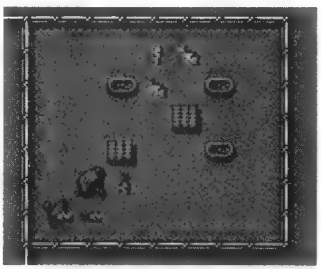
Your new cows will be scurrying about their corral, but they'll soon get plumb tuckered if you don't give 'em some food and water. The Hay icon produces generic food for all animals. The Water Trough button provides tubs of water. Make sure the food and water are in accessible spots. Hungry cows have been known to break through fences (and sometimes end up flattened by farm machinery).

**Click on the Water Trough button.**

**Click a couple times in the corral.**

**Click on the Hay button.**

**Click a couple times in the corral.**



Of course your livestock need ongoing care. The message bar will warn you when your cows need more food and water. Water troughs go gray when they dry up and hay bales shrink after being nibbled. After a while, you should notice your bossies getting a little bigger (and the food getting smaller) if you keep them fed. If you don't you should notice them getting a little invisible: they'll be dead. You'll want to sell cows and other livestock after a while, because their value drops when they get old. (It's a cruel world.)

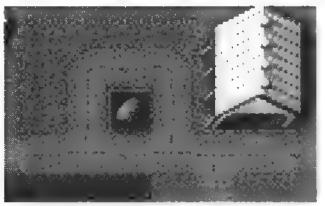
Just before a heavy rain, cows will refuse to go out to pasture, dandelions will close up tightly, and seabirds will hang around over land.

Courtesy of Old Farmer's Almanac

## YARD SALES

By now your potato crop should be harvested or just about ready. If not, relax for a while, you've earned it.

After the harvest, the trucks will transport your crop to your silo, and your land will be cleared and plowed once again. Let's take a look at what your first harvest means to your bank account.



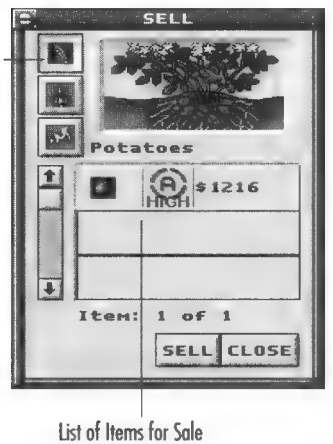
**Click on your silo with the right mouse button (Option-click on a Mac).**

The contents of the silo will be displayed. There should be a little crop icon indicating your harvest. Now we'll sell the harvest.


**Click on the SELL button below the menu bar.**

**Click on the little Corn icon in the Sell window.**

You should see a picture of your crop, and below that its icon, value rating, and current sale price. Its grade, or value, is factored according to soil conditions, weather during the harvest cycle, current market values and the amount of time the crop has been stored after harvest. If you were lucky, it was A-HIGH. If it was less than that, it's probably because your potatoes didn't get enough water.




**Click on SELL.**

The crop box picture has been replaced by sadly empty storage boxes and barrels, and NOTHING FOR SALE will appear where your crop values were; you should see that your Funds figure has increased by the stated amount. If you wish, you can click on the tractor and cow icons to get a sense of what those items are worth, but don't sell anything now. (Age, poor storage, and poor roads all deteriorate your equipment and lessen its value.)

**Close the Sell window.**

Now that you have a few more coins, let's see if there are any bargains on water pumps in the BUY window; when dry times come, they're a godsend. First, we'll buy a water pump and place

it on the farmside-edge of the nearest body of water, then run irrigation ditches to your field. Irrigation ditches can't be placed over other objects, so you may need to bulldoze any rocks, trees, or fences obstructing your path.

**Open the Buy window.**

**Click on the Silo button to see the stationary buildings and equipment for sale.**

**Click on the arrow buttons until you find the water pump.**

**Click the BUY button.**

**Place the pump next to a river or lake.**

**Click on the Irrigation Ditch button in the Edit window toolbar.**

**Click and drag to run the ditch from the pump to your field, and all along the open edge of the field.**

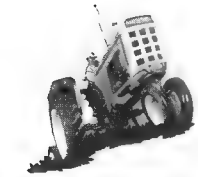
We'll want to be able to control the water flow in our ditch, so let's add an irrigation valve. You can turn valves on and off by clicking on them with your right mouse button (Option-click for Mac).

**Click on the Irrigation Valve button.**

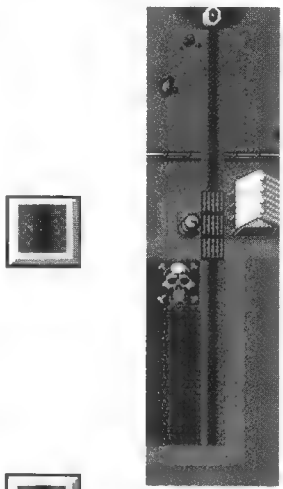
**Click to place the valve as shown in the picture.**

**Click on the valve with your right mouse button (Option-click for Mac).**

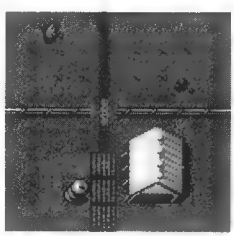
Now, even if the weather won't give you a break, you can still go with the flow. If the flood icon shows up in your field, shut off the valve. Your ditch will help disperse the overflow. If the wet weather's in your favor, you can shut down the valves for a bit. And talking about the weather, let's check out the Weather window.



PLACE THE PUMP



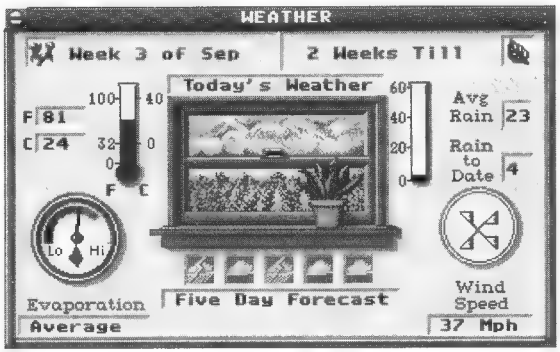
RUN THE DITCH



PLACE THE VALVE

## YOU'LL KNOW WHICH WAY THE WIND BLOWS

**Click on the Weather window button (weather vane) below the menu bar.**




When the three little icons below the menu bar don't meet your meteorological needs, check out this window. It has a dynamic readout of current conditions including the temperature, evaporation rate, average rainfall, wind speed and the five-day forecast.

**Close the Weather window.**

## RECKON ON GETTING A RECKONING

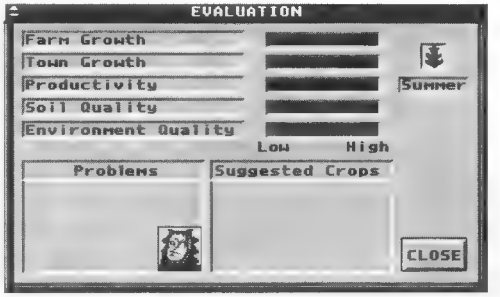
As you must have noticed, the Evaluation window appears automatically at the beginning of each year to give you an overview on your talents as a farmer. You can also access it yourself, by clicking on the thumbs-up/thumbs-down button below the menu bar or selecting it from the Windows menu. Open it, and take a look.

**Click on the Evaluation window button.**

The Tuttle family in Dover, New Hampshire has continuously worked their 245-acre farm since 1632, making it the oldest family farm in America. The land has always passed intact to the last-born son.

Courtesy of Old Farmer's Almanac

You can see a measure of your farm's growth, the town's growth, crop productivity, and other factors that let you know how your farm is doing. These are all measured in comparison to the previous year. Red bars indicate a negative change (lower than last year), green bars a positive change (higher than last year). No bar indicates that there is no significant change from the past year.




At the bottom of the Evaluation window are boxes that display icons to point out current problems, and to suggest what you should plant for a healthy crop rotation. These icons are real-time indications of present field conditions, and change quickly. You'll want to refer to this window occasionally for a push in the right direction.

**Close the Evaluation window.**

---

## SPRAY IT, DON'T SAY IT

Since you've just had a harvest, this might be a good time to return some nutrients to the field.

**Click and hold on the SPRAY button to open a submenu.**

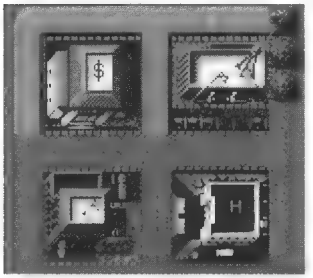

**Select FERTILIZE.**

**Click on your field.**

Your tractor, with a sprayer attached, will roll around your field. Repeat the process on your own, but this time spray some fungicide—wouldn't want any wretched fungi ruining our day, would we?

After spraying the fungicide, you might see old Toxic Tommy (the skull and crossbones) appear on your field. His presence informs you that toxins are present on the land, and reminds you that these chemical additives, while very useful, are dangerous if overused. They can be a boon to your crops if properly managed, but they can also wreak havoc on fertility and land value. Use them with caution. (SimFarm doesn't consider fertilizer to be a toxin.)

## A SENSE OF COMMUNITY

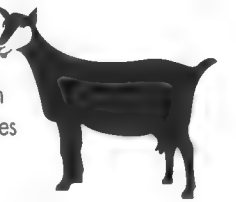


It may be a surprise to see how many of your decisions affect your community. You should periodically check the state of things over in the little town: it can be a lively place. The community will thrive as you thrive, and your successes will be reflected in expanding community growth and the upgrading of community property.

Your timely buying and selling (and increased tax payments) will cause those trailer-park and Quonset-hut homes with the black-and-white TVs to be replaced by those snappy little numbers with the pruned rows of shrubbery. Eventually, the community will purchase new plots of land to accommodate the mushrooming population. Also, you will occasionally get to vote—by means of a dialog window—on the type of town development that you're interested in, though your vote isn't always on the winning side. If you do get the chance to cast your ballot, put your two cents on the airport expansion, and you'll be able to buy your own crop duster and fly it around.


Almost all of the ginseng grown in the U.S. is grown in Wisconsin. Research suggests that properties of its roots can loosen joints stiffened by age and improve athletic performance. However, the performance *usually* associated with ginseng use is the enhancement of sexual prowess. As one saying goes, it "makes an older woman younger and a younger woman hunger."

Courtesy of Old Farmer's Almanac

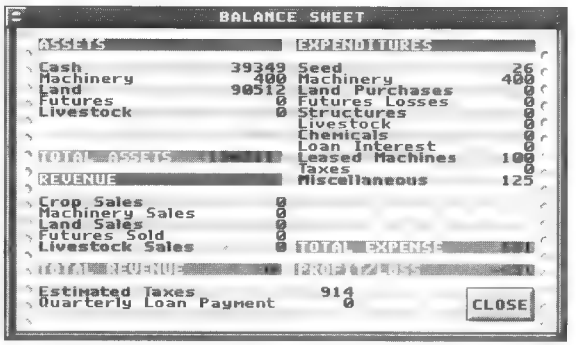


# OUT OF THE RED AND INTO THE BLACK

While the town may by mushrooming, your Funds probably aren't. Initial purchasing and leasing at the start of a game can put you in the hole, and you'll need several rounds of harvest and livestock sales to get out of the red. Let's take a look at the Balance Sheet to see how your farm finances are faring.

**Click on the Balance Sheet button below the menu bar.**

The Balance Sheet is a detailed breakdown of your profits and losses, grouped by Assets, Expenditures and Revenue. Within those headings are the present values for all your land, equipment and livestock holdings; income from the sales of any of these items; and expenditures for all purchases, including loans and taxes. Your total expenses and the profit/loss figure are at the bottom-right of the window. The bottom-left has an estimated yearly tax figure that will change according to how your farm changes. There's also a line for your quarterly loan payment.




Messages will appear to inform you if your funds are dwindling to emergency levels, and give you the opportunity to rectify things. If you don't heed their call, the simulation will rudely start selling off your assets. You'll lose the game if you go bankrupt, so stay alert. On the other hand, if your funds are doing well, you'll be visually rewarded with the antics of Cowman Mooranda. (You'll know when it happens.)

This window might put a damper on the sunshine of your situation, but hey (hay?), we didn't say it was going to be easy. Besides, you've barely got your thumbs dirty enough to see if they're really green or not.

**Close the Balance Sheet window.**

***Note: While we're touring around looking through windows, you should occasionally check in on your livestock. They're probably hungry or thirsty (or dead) by now.***

## CREDIT WHERE IT'S DUE

Time to do what Americans in financial trouble have done for generations: borrow.

**Click on the Bank window button below the menu bar.**

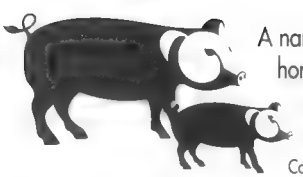

The Bank window will open, giving you a display like that on your friendly ATM machine. Your available cash, current debts, credit limit and current loan interest rate are revealed to you. Your credit limit is based upon your assets, including improvements (roads, structures, etc.) made to your property. The interest rate will shift throughout the game. Let's borrow $1,000 for starters.

**Click on the number keys to punch in 1000.**

**Click on OK.**

Your quarterly loan payment will appear under the interest rate figure. The bank will automatically deduct (every three months) your loan payments, or you can pay the loan back in full at any time by clicking on the REPAY button.

**Close the Bank window.**



A narrow shelf of land between Santa Barbara and Ventura in California is home to the U.S.' only banana plantation, where 40 different types of the tropical fruit are harvested. Some varieties taste like peaches, some like raspberries, and one, the Popoulu, is the size and shape of a baseball.

Courtesy of Old Farmer's Almanac

## I SPY

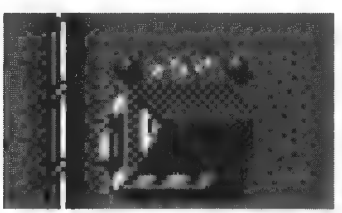
You may sometimes need to explore your farm and get instant appraisals of every item you own. You can do this in the Edit window by clicking on the Magnifying Glass (Examine) button and then clicking and holding on any item, be it equipment, machine or animal.

**Click on the Magnifying Glass button.**

**Click on an item that you own.**

A window will pop up that reveals the item's condition and age, or depending on what it is, some other variables about its status.

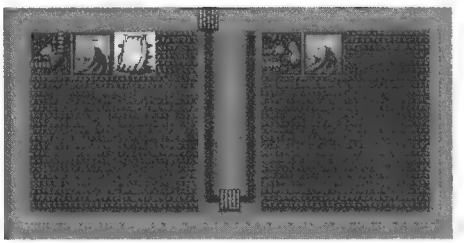

Go ahead, be nosy. Wander around the Edit window and examine everything you see. If your farm's going gangbusters, you might even see your house upgrade to the higher-priced spread.



## DOUBLE YOUR PLEASURE

So far, we've only dealt with a single field of tilled earth. Hold on to your straw hat farmer, 'cause we're going to up the ante a little bit by putting down another field and setting up the simultaneous planting and harvesting of both of your fields using the grandiose powers of the Schedule window.

Select a site for your new field close enough to your original field so you can oversee the work on both of them without having to scroll very much. After selecting your site, plant a field with the crop of your choice, then add dirt roads, both to the old field and around the circumference of the new—leave room for an irrigation ditch if possible.



**Click and hold on the PLANT button in the toolbar, select a crop and place the field. Add dirt roads, as needed.**

Every good farmer knows that too much wind will cause topsoil damage, so next, we'll place trees around the perimeters of your fields to act as windbreaks. For windbreaks to be effective, they must be no more than two tiles away from the field they protect, so place them just outside the dirt roads. While you're at it, put a few trees in the cow pen and they'll have it made in the shade.

**Click on the Trees button in the Edit window toolbar.**

**Surround your fields with trees, just outside the dirt roads.**

One can determine the outside temperature in Fahrenheit by counting the number of chirps a cricket makes in 15 seconds and adding 37.
Courtesy of Old Farmer's Almanac

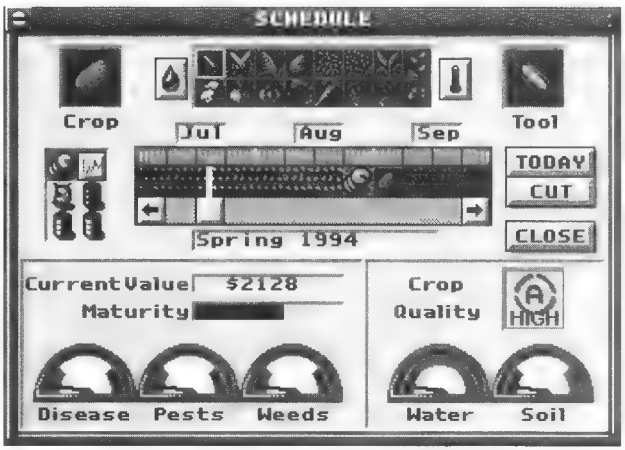
## A TIGHT SCHEDULE (WINDOW)

You now know all the basics of running SimFarm. In fact, you know enough to keep a small farm running for generations. But once your farm grows, and you have a number of different fields growing at once, things will start to happen fast and furiously. Keeping track of multiple plantings and harvests can get confusing, and lead to waste. That's where the Schedule window comes in.

At this point in the tutorial, we'll just take a quick look at the Schedule window and let it go at that. When you've had some time to use your new knowledge and have built your farm up a bit, you'll be able to come back and really appreciate this window.

**Click on the Magnifying Glass button in the Edit window.**

**Click on one of your fields.**




The Schedule window grants you extraordinary powers of farm management: here you have the ability to set "timers" to plant, spray, harvest, and then begin the cycle over again, well into the future.

The Schedule window also has gauges that display readings for the presence of Crop Disease, Pests, Weeds, Water and the Soil Quality in the field. One last thing you can do in the Schedule window is to sell your crops in the futures market. You can make a lot of money in futures—and lose a lot.

When you're ready to automate your farming tasks, see the Reference section of this manual for everything you could ever want to know about the Schedule window. The Reference section also has a lot of information on every SimFarm feature, function and window, details on crops and livestock, plus strategies to make your farm more successful.

SIM Farm

## SO LONG, IT'S BEEN GOOD TO GROW YA

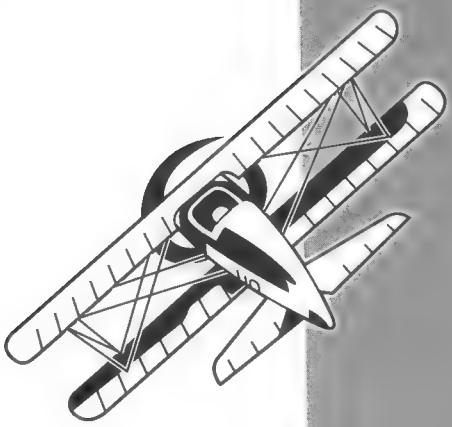
Well, you've slogged your way through this tutorial, and you can probably tell the difference between apple pies and cow pies. Time to dig the dirt and get to work—but then again, there's fun, too. There are eight scenario challenges—different farms in different lands in different levels of development—for you to take over and turn into profitable agricultural ventures. And, once the town gets big enough, and gets an airport, you can buy your own crop duster and fly it around, dusting your crops and buzzing your cattle.

Make sure you've got a spare pair of overalls and plenty of gas for the tractor—there's work to do, bub!

For an environmentally safe pesticide, prepare an infusion of cigarette or cigar butts (no filters), onion skins, and marigold blossoms. Simmer in water for an hour, strain, and spray freely on flower, fruit and vegetable plants. Will repel airborne insects as well as beetles and slugs.

Courtesy of Old Farmer's Almanac

# REFERENCE



***Worm or beetle—drought or tempest***
***on a farmer's land may fall,***
***each is loaded full of ruin,***
***but a mortgage beats 'em all.***

— William Carleton

# REFERENCE

This Reference section provides SimFarmers with a point-by-point profile of the game, broken down by its various menus, windows and commands. There is also a Strategies chapter at the end of this section.

Give yourself a head start by playing through the Tutorial to familiarize yourself with the game before you delve deeply into the nuts and bolts of this section.

## THE BASICS

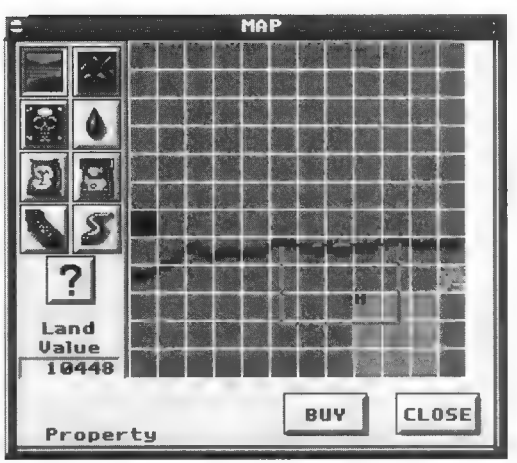
Here's a brief overview of the basic elements of SimFarm that you will be dealing with during the course of the game.

### TILES

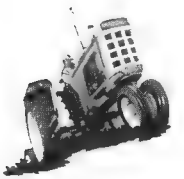
Objects in the game occupy spaces that we will call "tiles." For example, a tractor takes up one tile; fields are an 8X8-tile square. The entire SimFarm world is a 96X96 tiles square.

### LAND

The SimFarm world is divided by a grid pattern into a 12X12 square of land plots, 144 in all. The grid is visible only in the Property map in the Map window. In each scenario or game, some of the plots will be yours, some will belong to the local town and the rest will be up for grabs. You can only build or plant on your own land.

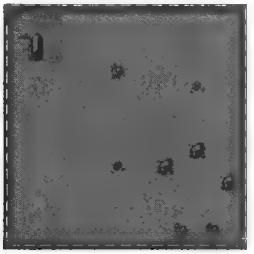



Your land is surrounded by a fence. When you buy more land, a fence will automatically be built around it. Purchase prices for land are based on soil quality (including how rocky it is), groundwater, and toxicity. Land with good soil quality and plenty of water will be quite a bit pricier. You can also sell your land, though it must be clear of all roads, fields and structures. Its price depends on the same factors as land you purchase. The plot of land that holds your homestead cannot be sold.

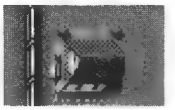


## YOUR HOMESTEAD

You are provided with a homestead at the outset of each game. The appearance of your homestead changes, reflecting your abilities as a farmer and your level of "prosperity." You'll get some lovely additions to your home if you're in the money; if not, you can always keep the shades drawn.



BASIC HOMESTEAD



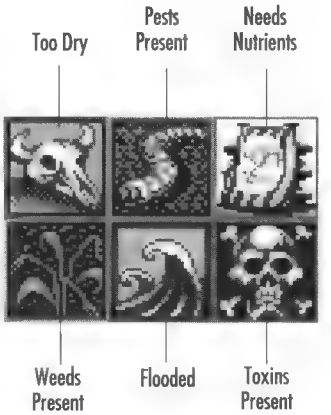
UPGRADED FARMHOUSE

## FIELDS

Fields are the lands reserved for planting crops. All fields are an 8X8-tile square. They must be placed on cleared land, somewhere within your fence line. After you place a field, its appearance reflects the current activity: you'll see rows being planted, crops will grow and change color, and harvested fields will be "emptied."

You can view overall soil conditions in the Map window and specific field readings in the Schedule window (see the Windows chapter). Fields can be bulldozed if they become overridden with toxins or pests; you'll see a snappy "flameout" animation when you send them eternity's way.

The quality of your fields and their output is affected by soil quality, the weather, harvested crops, chemical additives and disasters. Information icons will appear in your fields to notify you of soil changes.




SOIL CONDITION ICONS

## PLOWING AND PLANTING

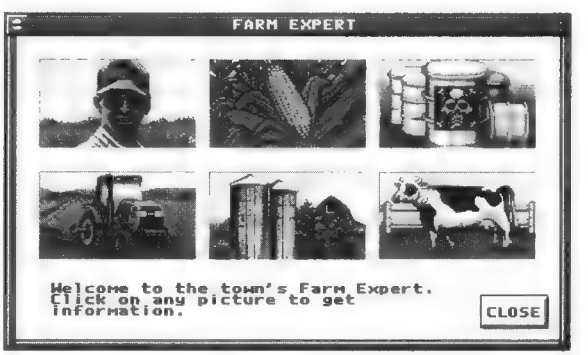
One game week after field placement, your field will be automatically plowed and planted. If you haven't purchased the tractor, plow, and planter beforehand, they will be leased to you, with the leasing charges (a pocket-draining percentage of the machine's purchase price—*per use)* subtracted from your Funds after the operations are completed.

The amount of seed required for one planting of a field is fixed, a single unit or "bag." Seed can be purchased in advance in the Buy window, or automatically purchased as necessary by selecting AutoBuy (the game default) in the Options menu and then planting a field. Seed selection after field placement (for crop rotation) can be made in the Schedule window (see the Windows chapter).

There are 24 different crops included with the game; up to 16 can be loaded into the game and grown at a time. Crop characteristics—how fast they grow, what they require in rain and temperature, etc.—are different for each crop, and are affected by weather and soil conditions, as well as disasters. Information on and advice for growing each of the crops can be viewed in the Farm Expert window.

If the goose honks high, fair weather; if the goose honks low, foul weather. Fish bite best just before it rains.

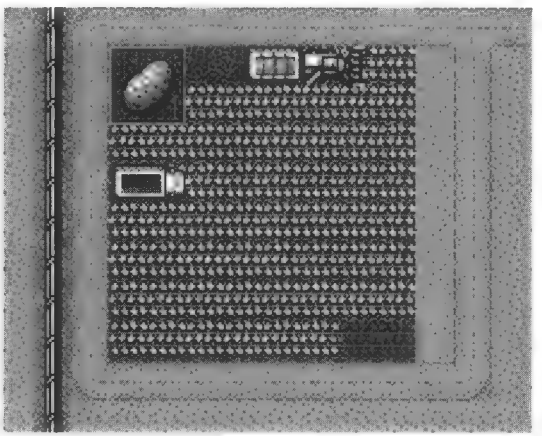
Courtesy of Old Farmer's Almanac



## HARVESTING

Harvests depend on the individual crop and game specifics. At harvest time, fields are very active with moving trucks, chopped crops, and sometimes busy workers. Required harvest machinery includes a harvester, a truck and a trailer, either leased or owned. The truck will appear "full" after harvest. The harvested crop will either be stored in silos (if you have any), or immediately sold at the current market price.

Every crop has an optimum storage temperature; for every week the crop is stored above this temperature, its value drops.

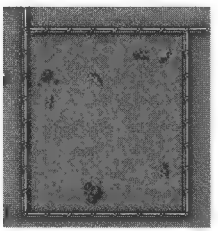


## MARKET VALUES

Market Values are the optimum price you can get for each crop—what the highest grade of a particular crop harvest would sell for at that specific time. Values fluctuate considerably over time according to weather, time of year, disasters, etc.

The actual income you receive from your harvest is a percentage of the current market value of the crop, based on your crop's quality, which in turn is based on the current weather, sunlight, water and soil conditions.

## LIVESTOCK



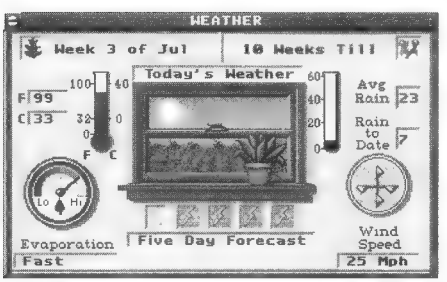
The four types of livestock in SimFarm—cows, pigs, sheep and horses—can be raised and sold like crops. If they aren't fenced in, they'll roam about, eat your planted crops, and cause general mayhem. Each type of stock has common characteristics of behavior, growth, food intake, and resistance to injury; you must monitor their needs carefully. You can breed them for increased income. With care, their sale value will steadily rise, but poor maintenance and old age will bring the beasts—and your profits—crashing down.

## WEATHER

When you select a farm site from the map of the U.S., its weather patterns will correspond with the actual patterns for that area.

Weather in SimFarm includes rain, temperature, and wind speed. There are five types of days—Sunny, Partly Cloudy, Cloudy, Raining and Snowing. Each type of day has a different rate of evaporation.

Wind speed directly affects the soil quality of fields by blowing away valuable topsoil, necessitating fertilizer applications. If high winds are not dealt with by placing windbreaks, crops and fields will lose value. (Windbreaks within two tiles of a field offer protection.) High winds also speed evaporation, and combined with high temperatures, can result in groundwater loss and threats to harvests (as well as threats to your hairdos). Groundwater in SimFarm has 12 stages of "wetness," from desert-like to extremely moist, changing according to weekly temperatures and rainfall totals.

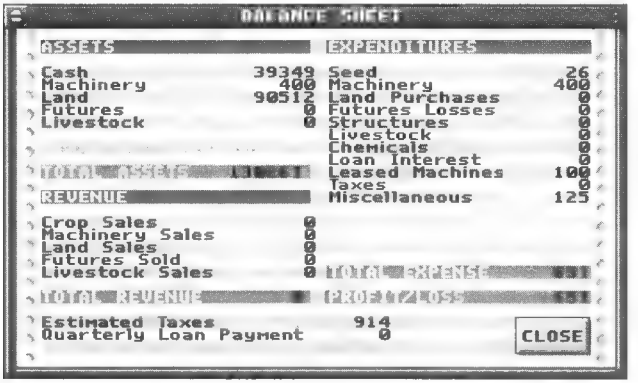



Don't look to the skies for answers, just for weather.

## MONEY

You begin each game with a specified amount of cash ($40,000 for non-scenario games). Money is automatically added or deducted after game actions. When harvests are sold, their value is credited to your funds. Charges for leased equipment are directly subtracted from your funds upon use, and loan payments are deducted quarterly. Taxes on income and assets are deducted at the end of each calendar year.

The program will inform you if you cannot pay for purchases, loans or leases, and will provide you opportunities to sell assets or borrow money—or do it automatically if you resist. All of your financial aspects and holdings can be viewed in the Balance Sheet window. If you do reach the point where it's only you and your homestead, the Tax Board or the Bank will come and confiscate your few bare, grubby acres—aren't you glad it's only a game?

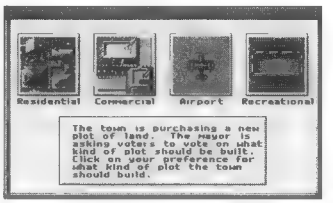



## THE TOWN

If the town is booming, so are you. Town expansion depends on your tax payments and some other farm development factors. The community will expand, a plot at a time, in any direction from its starting point. You cannot purchase town property, though the community has the option of selling its land if your growth slows or halts entirely. The town will grow and change depending on your prosperity. Those town buildings representing community

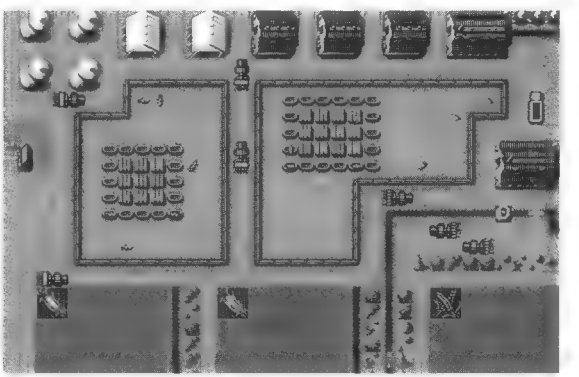
(and game) institutions, such as the local bank, can be clicked to open their respective game windows.

When the town is acquiring more land, you'll be given a message window that allows you to vote for what type of development will occur, though your vote doesn't always carry the campaign. (Not only is lunch not free, sometimes it even tastes bad.)




## SCENARIOS AND GAMES

You can begin a farm in SimFarm in three ways. You can choose any of eight preset scenarios, each of which provides a different farming challenge with a different-sized farm, town and bank account. You can click on a region of the U.S. and start a brand new farm with the land and weather conditions of that region. You can design your own terrain upon which to begin your new farm.

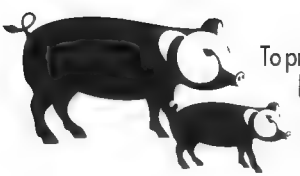


# DISASTERS

If you don't find that maintaining all of your fields, machinery, livestock and finances are challenge enough, why not throw in a disaster or two? These disasters are guaranteed to put some furrows in your brow as well as your fields.

Disasters can partially or completely destroy a field, and thus your field profits. However, the next plowing and planting will restore that good earth. Disasters can also take out portions or the entirety of the town, but it will refresh fairly quickly. You can even choose multiple disasters, if you like your problems in pairs. Disasters are sometimes brief, sometimes not, and they will not always directly affect your farm, though through their effect on the surrounding community, there could be many indirect effects.

There will be a message window on-screen to alert you of the presence of a disaster and when the disaster has passed. You can disable disasters if you prefer not to deal with them.



To prevent blisters from hand tools, wax the handles with paraffin or an old candle before using. The wax gives a solid grip and stops the turning motion of the handle, which causes the blisters.

Courtesy of Old Farmer's Almanac

## MENUS

The menu bar at the top of the screen contains pull-down menu commands for various game functions. All of the menu commands are activated by clicking and holding on the menu name with your mouse and then sliding the cursor to the item of your choice, which will highlight. Releasing the mouse button executes the command.


Below the menu bar is the Control bar with buttons to quickly open windows.

## FILE MENU

The File menu contains the system-related commands for SimFarm.

ABOUT SIMFARM reveals critical information about the creative sorcerers that produced SimFarm and also tells you the whereabouts of all of your missing socks. On the Macintosh, ABOUT SIMFARM will be under the Apple menu.

NEW GAME brings up the Select A Region window, where you can either pick a fresh farm landscape upon which to focus your fertilities, or design your own. If you choose New Game while running another farm, you'll be prompted to save your current game first.

SAVE stores your current game to disk under its current name and in the same disk location. The first time you save a game—before it has a name—a dialog box will open, letting you name the game. If you want to change an existing game's name or disk location, select SAVE AS....

SAVE AS... opens a dialog box allowing you to change an existing game's name and/or disk location. For details on saving games on your computer see your machine-specific Addendum.

LOAD GAME brings up a dialog box that lets you choose and load a game that has previously been saved to disk. For details on loading games on your computer see your machine-specific Addendum.

LOAD CROP opens the Load Crop window, which allows you to choose and change the crops that are available in the game. There are 24 total crops, 16 of which can be active at a time. You can change crops during a game, but you can't replace a crop that is currently growing or has been harvested and is stored in a silo, or if you own seeds from that crop.

QUIT closes down your farm and returns you the world of bad TV and laundry.

## OPTIONS MENU

The Options menu lets you customize a number of gameplay settings. Selected (active) options will have a check mark next to them.

MUSIC toggles the musical soundtrack (consisting of several different tunes) on and off, giving you nice melodies for enticing crop growth (you know what they said about house plants and Chopin) or only the music of your mind as you calculate profits. Sound quality varies according to your computer's sound card or lack thereof.

SOUND EFFECTS toggles on and off the sound effects of you and your farm at work. I wouldn't blame you if you planted trees just to hear 'em bulldozed, but don't tell the Sierra Club. Sound quality varies according to your computer's sound card or lack thereof. Sound effects may not play at all if you don't have a sound card.

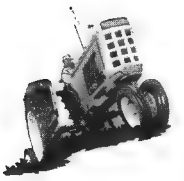
AUTOBUY (the default) automatically buys seeds for you as you plant, relieving you of doing it manually—whether you plant through the Schedule window or through the Plant button in the Edit window. You will get a message telling you that seed isn't available if you try to plant without either purchasing seed or without having AUTOBUY selected. The purchase price will vary with each type of seed. Having AUTOBUY selected also takes care of the purchase of any chemical additives. However, all purchases using AutoBuy will be more expensive than if you buy the goods on your own and store them.

AUTOSCROLL (the default when present, but not available on all computers) causes the terrain to scroll when you bring your mouse pointer to any of the screen borders. The terrain scrolls towards the edge of the pointer's contact, and stops when you move the pointer away from the edge.

AUTODOZE, if on, automatically clears terrain of obstacles when you place a field or structure, so that you don't have to labor manually. You will be charged for the bulldozed objects just as though they were manually removed.

AUTOGOTO, if selected, zips the game terrain to the site of vital game events, such as disasters, so that you can utilize all of your considerable farming know-how to deal with the emergency. Or you can deal a hand of solitaire while you watch the locusts devour your tomatoes.

MESSAGES, if selected, will display all of the message windows that warn you of impending weather perils, community events and general conditions. If deselected, only information of pressing significance to your farm's operation is displayed. You can hit Return or click on OK to remove messages from your screen.



AUTOLEASE will automatically lease equipment necessary for farm operations. The fee for leasing (a heavy percentage of the purchase price *per use* of the leased equipment) will be immediately deducted out of your funds after the operation is performed. The simulation will inform you if AutoLease is unselected (default is on) and you haven't the equipment for scheduled events. If you do choose to lease a lot of your equipment, you will be charged less for leased equipment damage if you construct a road from your farm to the town (bulldoze a section of your fence for entry), so that the machinery has smoother access.

## SPEED MENU

The Speed menu lets you decide whether your crops will grow like this country's deficit (that's *fast,* for those of you who haven't renewed your newspaper subscriptions) or else just kinda mosey along. The actual speed of game operations will vary according to your computer's clock speed.

ULTRA whips through time like a Las Vegas blackjack dealer, so that you can't see much of the growth phases of the crops; use it only when you want to bound into the future with seven-league boots.

FAST is a good setting if you need to hurry a harvest or get through a wet winter.

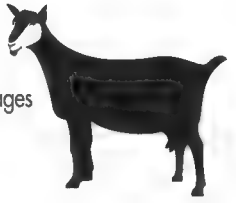
NORMAL is for those who don't want to tamper with Mother Nature.

SLOW lets that syrup drip at its own pace out of your maple trees.

PAUSE will freeze gameplay, giving you an opportunity to contemplate executive farm decisions.

When planting pepper plants, put a matchbook (without covers and staple) in the bottom of the planting hole. This encourages stonger, healthier plants.

Courtesy of Old Farmer's Almanac



## WINDOWS MENU

The Windows menu contains a list of choices that open the various windows. They are toggled on or off by selecting them with your mouse. Active windows will have a check mark to the left of their names in the menu.

BUY opens the Buy window, where you can purchase seeds, equipment and other farm necessities.

SELL opens the Sell window, where your can peddle your harvested crops, aging equipment, and fatted calves on the open market.

EVALUATION brings up the Evaluation window, presenting you with a picture of the development of your farm and the community over the past year, and giving you field assessments and suggestions.

MAP opens the Map window, where you see the SimFarm world in miniature. Make your land deals here and check on a range of soil evaluations and readings.

WEATHER displays the Weather window, where all of the pertinent climatic facts now and in days to come are yours for the viewing.

BALANCE SHEET gives you the fiscal lowdown (and we hope, the highups) on your Assets, Revenues and Expenditures, so you can see the arrival and departure of your money in detail.

BANK brings up the Bank window, where you can take out and pay loans, and see your bank records.

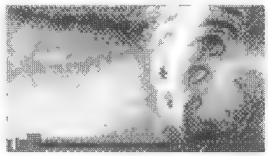
EDIT is the main view of the SimFarm universe, the big picture where you make it all happen.

MARKET VALUE is the window that displays the current prices for a perfect harvest of every available crop, and a 30-week value-trend chart.

FARM EXPERT displays the Farm Expert window, where you can obtain information and advice on machinery, buildings, crops, livestock, and sprays.

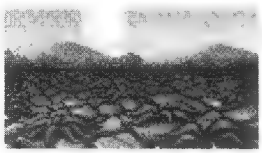
## DISASTERS MENU

The Disasters menu tips its cap to SimCity, another fine Maxis product that implements these intriguing means to really mess up your day. You can choose the Disable command if you can't weather that much weather. Disable will not stop a disaster in progress, but it will put a halt to all subsequent disasters.



TORNADO gives you a twirling twister that will sweep a path of random destruction through your fields and the community in general—or it might miss all the developed areas. You'll get a fearsome message window alerting you to its presence. You can locate the tornado by clicking in the Map window, where a "D" (for Disaster, the locator for Tornadoes and Locusts) marks its malignant presence. If it's ripping in your direction, windbreaks won't be any relief—you could try an instant harvest of all fields from the Schedule window. If it gets to your fields, you might want to go visit Aunt Mavis in Pocatello: there probably won't be much left to harvest.

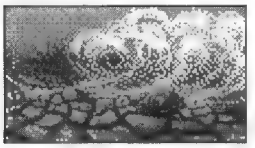
LOCUSTS can give your farm that unique Biblical aspect, though you might tire of playing Job. These creatures are here in number, and they're HUNGRY! They could gobble all of your goods, so this could be a good time to cancel any plantings, and perhaps do some field maintenance or some chemical additions if necessary. Sometimes they'll just swarm in one spot, other times they'll seek and destroy. Go figure.



DROUGHT dries up your crops, stored harvests, seeds, and eventually your cash if you aren't careful. You'll have to make strategic use of lakes and rivers and ditches and pumps to manage water sources, and make sure your plantings are for crops that aren't water-intensive. Particularly severe droughts may reduce big rivers to a trickle, so you might have to let lands lie fallow to cut your losses.

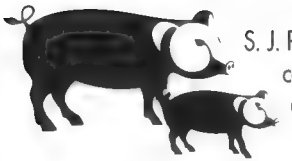
FLOOD washes the land in excess wetness, causing rivers and lakes to surge and break their banks. You might be able to drain water off your fields by surrounding them with water ditches and making sure any valves and pumps are turned off. This might be a good time to plant rice, which is a crop that likes a good soaking. Floods make any pumps you've placed in rivers or lakes stop working, and will sometimes destroy them. If the town is still small, and a flood occurs close by, it can be severely damaged. (And I'll say this in a whisper: so can your farm, so think twice about buying land *too* close to water.)

FROST sends the chilly teeth of winter biting at your neck. Harvests can be totally destroyed or of very poor quality and yield. Look for cold-weather crops, or let the fields lie fallow.



WINDSTORMS make the winds blow like an inflated politician, so put a deep line of windbreaks around your fields to protect your precious topsoil. Unprotected soil will diminish in quality (and value) over time after a number of windstorms. You can chart the decline in land value over time due to windstorms in the Map Property window.

DISABLE prevents disasters from occurring. If you choose Disable while a disaster is in progress, it will not stop it, but it will put a halt to all subsequent disasters.



S. J. Perelman called farms, "an irregular patch of nettles, bound by short-term notes, containing a fool and his wife who didn't know enough to stay in the city."

Courtesy of Old Farmer's Almanac

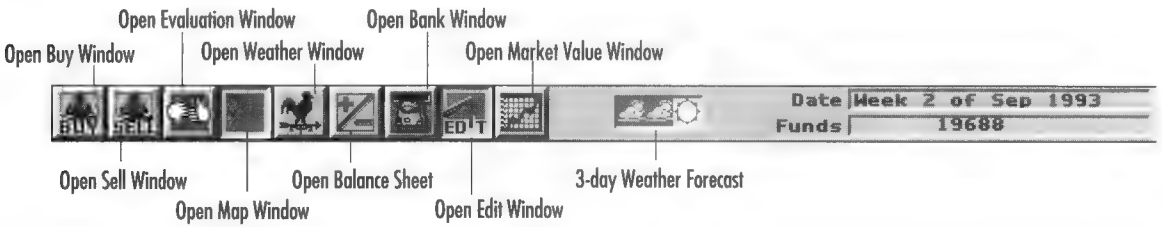
## WINDOWS

SimFarm's windows are where you'll do the dirty work—you can get your tools, put 'em in action, and see the results from a variety of angles through all of the window views of the SimFarm world.

Windows can sometimes be concealed or overlapped by other windows, but they will remain open. The window buttons below the Windows menu will be depressed when their associated windows are open. Windows can be moved around on-screen by clicking, holding and dragging with the mouse pointer on their title bars. They can be closed by clicking in their close box in the upper-left corner of the window, or by clicking on the CLOSE button.

## CONTROL BAR

Just below the menu bar is the Control bar. It has buttons to easily open most of SimFarm's windows, provides a short-term weather report, and displays the Date and your current Funds.

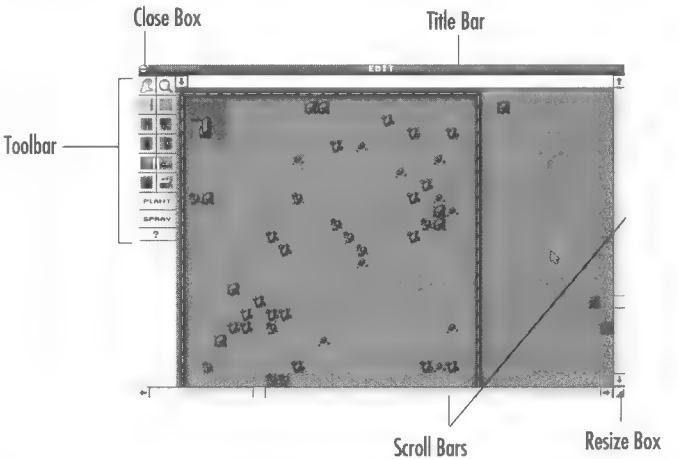



When a window is open, its corresponding Control bar button will be depressed. (Don't worry—it can get counseling.)

# SIM Farm

## EDIT WINDOW

The Edit window is your principal area of business, the level at which you implement most of your farming decisions and see their consequences. From this window, all of the game commands in the menu bar and the toolbar are accessible. Other command windows can be opened on top of the Edit window, and most of their functions will operate while your farm is active in the background.

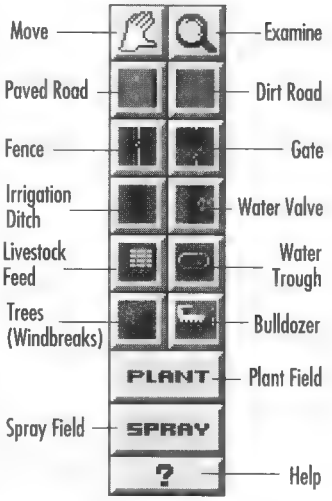




You can use the scroll bars and arrows to move around the SimFarm world. Or, if your computer supports AutoScroll, just move the cursor to any of your screen's edges and the terrain will scroll in that direction. You can also shrink the Edit window to more easily use other (possibly obscured) windows by clicking and dragging the size box at the bottom-right corner of the screen to shrink it. If you leave an exposed edge of a window underneath other windows, clicking on the bottom window will bring it up over the top-layer window. Active windows have highlighted title bars.

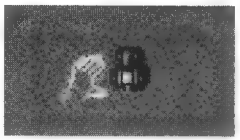
## TOOLBAR

The toolbar is the vertical row of buttons along the left side of the Edit window. When clicked, the buttons provide you with a number of construction and field functions in SimFarm. The buttons will appear depressed when active, and their functions and costs appear in the message and title bars.




**MOVE**

The button with the little hand on it is the Move button, which when clicked turns your cursor into a little set of open-handed "pinchers." You will then see a message in the message bar that says, "Choose an object to move." Clicking on any of the farm machinery in the game will close the hand and the message will read, "Choose a destination." Wherever you next click the mouse will be the destination point for your machinery. If it is a self-propelled item like a tractor or truck, it will move on its own, and if it is an item like a planter or trailer, your tractor or a leased tractor will come and move it for you. You can also move feed and water troughs if you have placed them awkwardly.



Move

This command is useful for storing machinery in sheds to protect it from deterioration when it's not being heavily used, and also to move certain pieces of equipment near fields that need them. The simulation chooses the equipment nearest a field for whatever action the field demands, so specific equipment can be moved to designated fields, hastening its implementation and saving driving wear and tear from searching for roads. Equipment exposed to the weather loses its value faster than when it's stored, so give your machines a roof if possible.

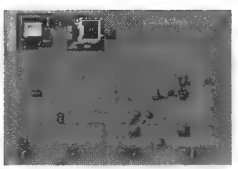
You can also use the hand cursor to "herd" your livestock—you can corner them against a fence or block their forward movement by putting the Move cursor in their path.


**MAGNIFYING GLASS (EXAMINE)**

The Magnifying Glass button changes the cursor into a magnifying glass and provides an information readout on whatever game terrain or object on that terrain you click it on. Clicking and holding the mouse on farm equipment gives you the valuation information you would find for it in the Sell window, and sometimes info about its operating status. This can be very practical data, since the value of the machinery declines with damage and age; thus, you might want to sell some equipment before you can't get any return on it at all, or you might also want to restrict the use of some equipment so that it doesn't sustain any more damage. Livestock values work much the same way, and you can also see if your livestock are pregnant. Clicking on a field opens the Schedule window for assessments of that field's soil and water quality, pests, weeds, and disease, as well as for setting the field's planting schedule.


**PAVED ROAD**

The Paved Road command will lay road tiles after selection when the mouse button is clicked, held and then dragged across the terrain surface. Roads will zig and zag with your mouse movements. Farm machinery will "seek" roads in the quest to move most efficiently across the terrain, so lay them to maximize access to your fields and structures. Roads cannot be laid over fields, structures, machinery, terrain elements or your homestead—only on bare land or on dirt roads. If you place a road over a water ditch, a bridge will be constructed automatically. It costs $30 to lay one tile of paved road.

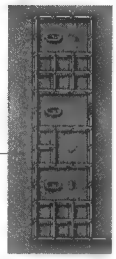


**DIRT ROAD**

Dirt roads are placed just like paved roads, but fields, structures and construction tools like windbreaks can be placed upon them—the simulation treats them like bare land. They are cheaper than paved roads, and make a good choice for travel within your property boundaries. Dirt roads damage your equipment slightly more than paved. Dirt roads cost $20 per tile.

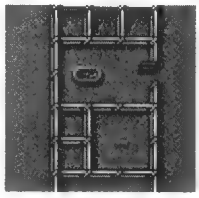
**FENCE**

Use the Fence button to enclose your livestock, preventing them from gobbling your crops and becoming roadkill. You place fences much like roads; your corrals can take on extravagant shapes if you wish: perhaps the outline of your initials, like the brand on your cattle. Hungry or peevish livestock can damage fences and escape. Fences cost $50 per tile.



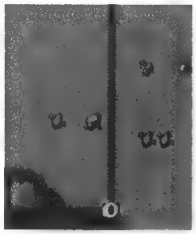

**GATE**

You can put gates in your corrals and on the fences on your property line. Gates are placed by clicking; clicking with the right mouse button (Option-click for Mac) will toggle the gate open and closed. Machinery can pass through closed gates, but animals cannot. Gates cost $75 each.



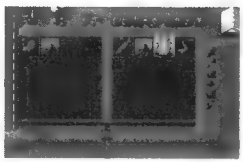
**IRRIGATION DITCH**

The Irrigation Ditch button lets you place ditches to direct water flow from your source, which can be a lake, river or windmill you have purchased. Ditches can be placed directly below or next to windmills to obtain water. Water always flows away from the source and can be greatly aided in its delivery with the purchase and placement of a water pump. A pump is mandatory to obtain water from a lake or river, and can be placed right on the river or lake's watery edge. Putting a valve on your pumped water gives you a chance also to use the ditches for drainage: when your fields flood, turn the valve off so that the ditches are dry, and they will drain water from the field. This is most effective when the ditches run the full length of the field. (Note: you cannot fill your swimming pool from a water ditch.) If you try to place a ditch over a road, or vice versa, a bridge will appear. Irrigation ditches cost $35 per tile.



**WATER VALVE**

Water valves control the flow of water through your irrigation ditches. When placed on top of or within one tile of a ditch, water movement can be started or stopped by clicking with the right mouse button (Option-click for Mac) on the valve, changing its

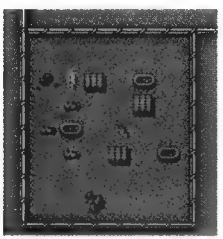


color from green (flow) to red (stop flow). You should stop water flow to fields when you see the wave (flooded) icon, which often appears after a period of rain. The cow skull indicates very dry fields. Check your crop data in the Farm Expert window for water needs of specific crops. Water valves cost $80 each.

**LIVESTOCK FEED**

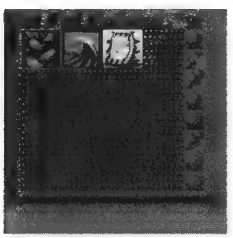
The button with the little hay bale is generic animal feed for your livestock. Feed should be placed within corrals that all of the animals can access. You will see feed diminish, and your animals grow after they nibble from it. The simulation will alert you when food levels are low or if your livestock have difficulty reaching the food. Keep a keen eye on animal maintenance; their value can decline quickly with age or if you don't keep 'em fat and sassy. They can also get a mite rambunctious if they're hungry. One unit of feed costs $100.

**WATER TROUGH**



Water is a significant farm commodity, both for crops and animals. Water troughs must be placed much like the feed units, easily accessible and vigilantly maintained (you can move feed and troughs with the Move command). When placed, you will see them as a brimming blue, but if they go gray, they (and your animals) are all dried up. The simulation will warn you of thirsty beasts, but don't let that go on too long—their health and value will be adversely affected. You can keep a water trough full for a long time by purchasing a water tower in the Buy window and placing it on your property. The tower will need a full water ditch nearby to keep the troughs full. Water troughs cost $15 each.

**TREES (WINDBREAKS)**



The Tree button gives you the chance to place trees on your farm to protect crops from the wind and to green things up a bit. You must place at least eight tiles of trees within two tiles of a field to make an effective windbreak. The trees do add a painterly touch to it all as well. Trees cost $10 each.

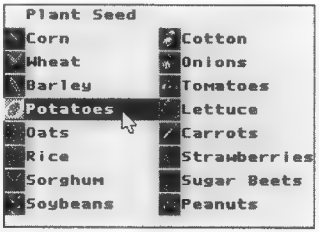
**BULLDOZER**

The bulldozer lets you clear land of rocks and debris, and remove or destroy fences, fields and equipment. (We don't call this SimCity's Country Cousin for nothin'. You'll recognize the look and function of the bulldozer as similar to that of its famous relative.) If you have AutoDoze selected in the Options menu, you can place fields and equipment over other objects without bulldozing first. Otherwise, you'll have to bulldoze and clear the land before placing anything. You'll get a dialog box from the simulation asking if you are sure you want to send significant objects to kingdom come.

Some fields may become so tainted by toxins that they can't be rescued; the only humane thing to do is 'doze them. Field bulldozing is a bit of a spectator sport, as you'll see. Bulldozing an object costs $25 per tile, whether done automatically or manually.

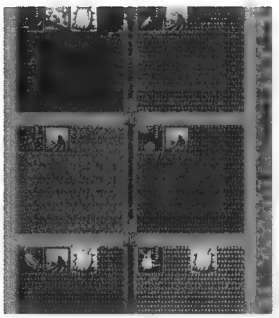
**PLANT**


The big button that says PLANT is the command to really get things rolling—and growing—on your farm. Click and hold on this button and you will see a list of all of the available seeds in the game, with pictures of their associated crops. Move the mouse pointer to highlight the crop you want, and when you release it, the pointer becomes the outline of a field, which is placed where you next click. Fields must be placed on bare land; you can clear land with the bulldozer if there are rocks or trees in the way. You'll get a "Cannot place field there" message if there's a problem. Immediately after placing, the field will be plowed and planted with the selected seed. Planting costs $120.




If you haven't previously purchased seed, you'll be charged for it out of your funds. Having AutoBuy (the game default) selected in the Options menu will automatically purchase the planted seed for future plantings, as seen in the Schedule window timeline. If AutoBuy is off, you'll get a message window suggesting a seed purchase. You can replace the available seeds at any time in the game with other choices by using the Load Crop command under the File menu.

Fields themselves can be bulldozed if they have become overwhelmed with pests, if they are too toxic, or if their placement has become unsuitable. You cannot sell land that has fields or equipment on it. You should surround your fields with access roads to ease the strain on your machinery and enable easy approach for leased machines.



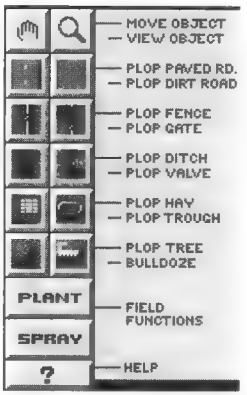
Icons indicating the presence of toxins, pests, disease and high or low moisture content (skull and crossbones, centipede, decayed corn and breaking wave and cow skull, respectively) will periodically appear in your fields and can indicate crop problems. Refer to the Map window for overviews of field quality throughout the territory; you can also get individual field specifics by clicking on the Magnifying Glass and then clicking on the field, which brings up the Schedule window's field-reading gauges. Long-term field damage will cause a decline in land value.


**SPRAY**

Clicking and holding on the SPRAY button opens a submenu with your spray choices: Fertilizer, Pesticide, Herbicide, and Fungicide. Highlight any of those with your pointer and then click in the field where you want to place the additives. Your machinery or leased machinery will then spray the field with your selection. You can also arrange sprayings through the Schedule window, using the drag-and-drop icons on the timeline. Use a subtle hand with the chemicals: there will be times when you must use them for pest infestations and nutrient loss, but heavy-handedness with them over the long haul will tax your field quality and yields, and eventually affect land values. Use the Schedule and Map windows to obtain info on chemical levels in the soil. It costs $200 to spray a field; the AutoBuy option will automatically deduct the cost from your funds.

**HELP**

Below the SPRAY button is a button with a question mark on it. If you click and hold on it, all your questions will be answered—well, at least the ones about toolbar functions. You'll see an information window that reminds you of what each of the toolbar buttons does.

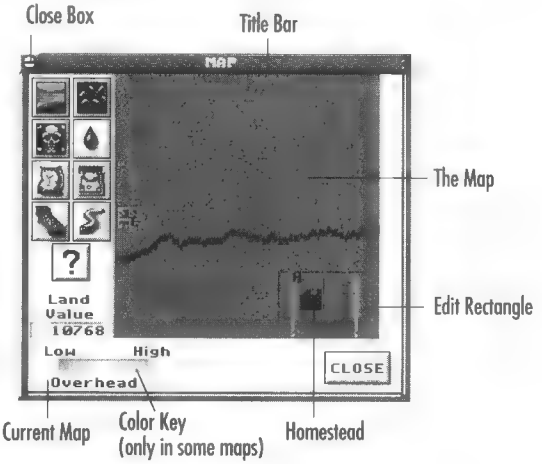




## MAP WINDOW

The Map window gives you a consolidated view of the entire SimFarm world, displaying your land, the town's land, and all of the lands available for purchase and development. The Map window opens on top of the Edit window at game startup.

The window's default Overhead view gives a rough sense of terrain and development, miniaturizing buildings, rivers, etc. The rectangle within the territory captures the land displayed in normal view in the Edit window. You can gallop swiftly across the land by clicking anywhere in the Map window, and the rectangle will follow, moving the Edit terrain along with it. You can also click and drag the rectangle for more precise alignment.




Along the left side of the Map window are two rows of buttons. Clicking on them lets you select different map displays with information critical to decision-making about your current and future properties. Clicking on the button again toggles back to the Overhead view.

The name of the active map appears at the bottom-left corner of the window. When appropriate, a color key to help you interpret each map will appear above the map's name.

You can gain a tremendous amount of information from these maps. Be sure to periodically use them to check field conditions, which can change from harvest to harvest. Besides their usefulness in land sale/purchase decisions, keeping a steady hand on when to add or not to add fertilizers and chemicals to your fields can improve your harvests and boost your Prosperity rating. You can get field-specific readings on soil quality in the Schedule window.

## PROPERTY MAP

The Property map lets you buy and sell land. Clicking on the Property button (with the picture of a nice little field with water adjacent), places a grid pattern over the entire territory, revealing (on a color computer) your plots in green, the town plots in blue, and all the others, ready for purchase. (The **"H"** and **"T"** signify the placement of your homestead and the town as well.)

Clicking on any unowned grid square will highlight it and bring up its sale price in the Land Value bar below the buttons. Land prices depend on soil and water quality. After selection, clicking on the BUY button seals the transaction and the purchase price is subtracted from your funds. Use this command when you're feeling empire-hungry. Or use its counterpart, the SELL button, to sell when you're just plain hungry. Sold land will lose its green highlight in the Property view and will lose its fence line in the Edit window. You can only build on your own property and you can only sell property that has first been cleared of buildings, structures and fields.

You can't sell your homestead plot, so don't even think about it, buster!

## SOIL TOXICITY MAP

Clicking on the Soil Toxicity button, the darling one with the skull and crossbones, will display the varying amounts of toxic substances in all the squares. Take caution when adding to fields already chockablock with chemicals—crop values will decline.

## SOIL NUTRIENTS MAP

The Soil Nutrients button reveals the presence and various levels of nutrients in all the plots. You can see what soil looks like a promising buy, and also whether it might be time to tell your cows to work overtime to produce some good fertilizer for sagging soil.

## CROP DISEASE MAP

The Crop Disease button (with the ragged ear of corn) can be clicked to display the amounts of crop diseases—like fungi and viruses—that are present in the various plots. Diseases are treatable with fungicide, though the land will object to heavy toxic assaults.

## WEEDS MAP

The Weeds button (the one on the top-right side with that scraggly old weed on it) gives you information on the severity of weed infestation in your fields. Judicious use of herbicide will counter the woeful weed and save your tender hands for typing commands.

## GROUNDWATER MAP

The Groundwater button (the water droplet) reveals levels of groundwater in your soil and the surrounding territory.

## FIELD PROFIT MAP

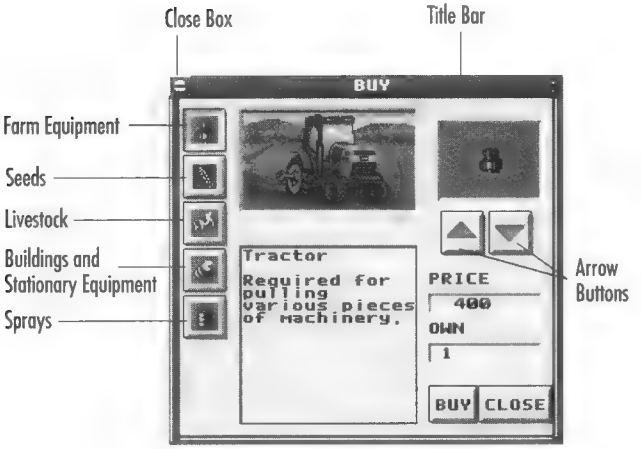
The Field Profit button, adorned with the dollar bill, displays the profitability of your various fields.

## PESTS MAP

The Pests button, with the slinky centipede, tells you everything you want to know about pests in the plots.

## BUY WINDOW

The Buy window gives you a chance to fill your farm with goodies galore. Along the left side of the window is an icon strip with five buttons that access various types of goods native to farm living. The large picture at the top middle of the window is an image of the selected item, with a description detailed below. To the right of the large picture is a picture of how the selected item will look when it's placed on your property. The scroll arrow buttons below that will, when clicked, cycle you through the articles within each button category: machinery, seed, livestock, structures and sprays.




Below the arrow buttons is a text box with the item price and below that a text box revealing how many of that item you currently own. When you find the commodity you just can't live without, click on the BUY button, and your cursor will become a dollar sign. The next place you click in the Edit window will place your purchase. Additional clicks buy you more of the same, so unless you want to open a used tractor lot, go light on the mouse-button.

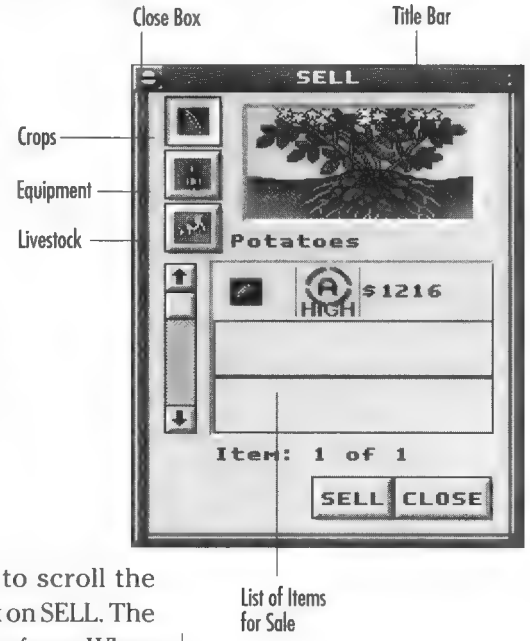
You must place your purchases within the boundaries of your property line, and if you're going to buy a bunch of critters, fence 'em in first—or your harvest is their lunch. If you buy storage buildings, you will better preserve the value and life of seeds and equipment. Barns will keep your animals a little healthier as well. See the Equipment and Supplies and the Livestock chapters for methods of use and statistical information on every item available in the Buy window.

# SELL WINDOW

The Sell window is where you can realize some of the fruits (and vegetables) of your ventures by getting some cold cash for your farming and animal husbandry efforts, as well as get a partial return on old equipment. For both harvests and livestock, the sell price is the average between the market price and the age (condition) of the item.

The three buttons at the window's top-left represent the categories of items that can be sold: crops, equipment and livestock. Clicking on one of these buttons displays the goods you have for sale.

Below the large image is a scrollable list of the items in that category that are in your possession and available for sale. Whether the item for sale is a tractor, a corn harvest or a beautiful bossie, the list displays: a small icon representing the item; the item's condition (given as a grade from High to Fair to Poor to Bad); and the current price.

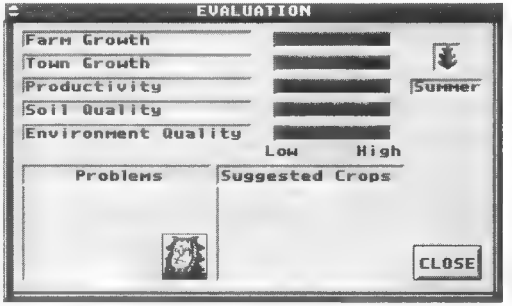



Click on the scroll arrows to the left of the list to scroll the highlight box to the item you want to sell, then click on SELL. The sold item will disappear from the list and from your farm. When you've sold off all of your harvests a "Nothing for Sale" notice will appear in the list area.

Be sure to canvass the Sell window occasionally to realize the highest prices for your goods; everything in SimFarm, like everything anywhere, is subject to time's sharp blade: the value of all goods, from crops to machinery to animals, is sliced by time, and knowing when to sell is knowledge that leads to success.

# EVALUATION WINDOW

The Evaluation window spells out just how you're doing, and—like it or not—comes up automatically at year's end, though it will quickly zip away. You can also access it by clicking on the thumbs-down/thumbs-up button under the menu bar.




The Evaluation window provides an overview of your progress for that year compared with the previous year. The thermometer-style Low/High bar graphs specifically detail: Farm and Town Growth, Farm Productivity and the Soil and Environment Quality. The Soil Quality gauge refers to the nutrient levels in your fields, while the Environment Quality registers the presence of toxins. On a color monitor, if the bar is green, it indicates a positive growth in the thing measured as compared to last year's reading; if it's red, indications are negative. On a black and white monitor, well, we have confidence that you can figure it out. No bar whatsoever tells you that you have neither progressed nor regressed in that characteristic compared to last year. The present season is indicated to the right of the bar graphs.

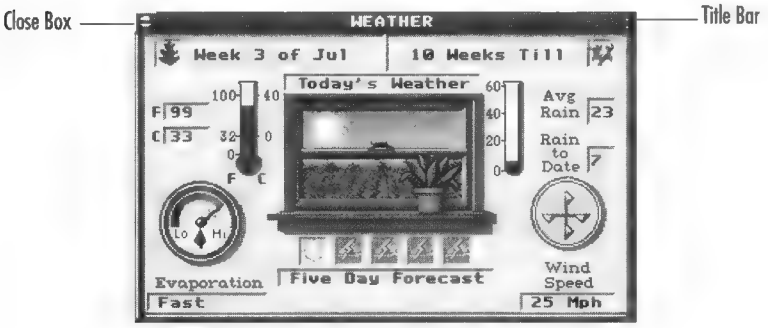
Below this information are some icons that graphically indicate any real-time problems in your fields and that suggest crops that would do well in the season to come. These indicators are generalizations for all of your fields collectively, and reflect the Map window information. You can obtain field-specific information in the Schedule window. Of course, as an independent farmer you could ignore this window and plant and spray just as you please, dadburn it, but do take its counsel under consideration.

To keep aphids away from roses, plant garlic and mint near the roses.

Courtesy of Old Farmer's Almanac

# WEATHER WINDOW

The Weather window is one of the most colorful windows in SimFarm—and it's very useful for short-range planning. It is solely an information window; there are no commands or integral game functions.



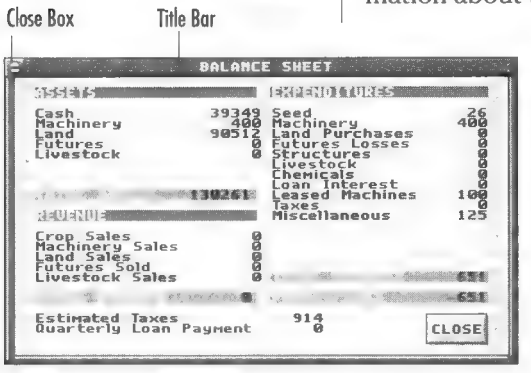

The top bar of the window provides the current week and month, with iconic representations of the current season and season to follow. Underneath is a digital readout of current Fahrenheit and Celsius temperatures, accompanied by a thermometer display of both those measures. Below that is a water evaporation rate gauge with an accompanying text box. The window's center gives a pictorial rendering of current weather conditions (note the changes in the plant over time), with a five-day forecast below. This matches and extends the three-day readout in the Control bar. Yearly rainfall totals and current wind speed measures can be found to the right.

The Weather window is a dandy place to do some cloud gazing in your SimFarm world, and it does provide useful information about whether your fields are soon to get doused with rain, and why plots are dried out or have lots of groundwater. But if you have your game Speed set to anything more than Slow, it's likely that time is passing at such a rate that five days of weather might only seem long enough to water a house plant, much less douse a field of crops. You have to admit it looks pretty, though.

# SIM Farm

## BALANCE SHEET

The Balance Sheet window (chosen from the Windows menu or by clicking on the +/– button) details the season-to-season financial aspects of your farming operation, and supplies some information about town revenues.




Under Assets you can see your cash on hand, the value of your land, machinery, livestock, what you've sold on the Futures market, and a total of all your assets.

The Revenue column is a breakdown of all your income from sales of crops, machinery, land, futures and livestock. The Futures figure here can be markedly different than that in your Assets column because you may have sold Futures deep into the future, and those speculative harvests have yet to see the bottom of a truck. Your total revenues for the game are displayed at the bottom of the Revenue column.

Below that is the estimation of your yearly tax bill, based upon your current holdings, and the amount of your loan payment.

The Expenditures column tallies the costs for seed, machinery, land, any futures losses, farm buildings, livestock and feed, and chemicals. You'll also find the records for the interest on your loans, leasing, and your taxes. Your expenses total is at the bottom of the column, along with your overall profit/loss figure.

Taxes, based on your equipment, property, and your annual income are deducted annually from your funds. Bank interest payments are deducted quarterly. Expenses for operations like bulldozing, fence placement, etc., that are deducted as your incur them are shown under Miscellaneous.


You will receive notices from the simulation when your bank account is looking a bit skinny on your tax payments towards the end of the year, and if you don't do something about it, your assets, including your land, will be automatically sold off.

Check into the Balance Sheet window every now and then to see where the money went and if any came back on the rebound. You can determine if you have placed an undue emphasis on some expenditures without much of a return, and of course, your profit/loss figure will indicate whether you should get into venetian blinds manufacture rather than farming. Don't worry if you don't seem to be making any money early on though, because it can take a stretch of time before a farm really starts putting out.

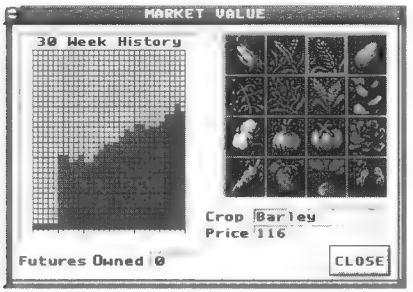
## BANK WINDOW

The Bank window (opened from the Windows menu or by clicking on the sliding dollar button) is where you can put wheels on your deals, though if you don't watch your debts, all your tires will be flats. The Bank window looks somewhat like an ATM machine window, with some obvious differences: your game funds are totaled at the top, with your debt total and credit limit below. Your credit limit is based on the value of property you own and your assets, minus any outstanding debts. The current interest rate is below that (it fluctuates between 5 and 15 percent), along with the amount of your quarterly payment. Click on the window's number keypad or on your keyboard to arrive at a loan figure and the Loan Amount text box will display the amount of your new loan. Click on OK or hit Return to seal the deal.

The fresh cash will appear in your Funds. Bank loan payments will be deducted quarterly over a five-year term, or you can choose to pay back your loan in its entirety by clicking on the REPAY button. If you don't have enough *moo*lah in your account to pay for the automatic deductions, a dialog box will appear telling you that you don't have enough money, and you'll be presented with suggestions for another loan (didn't our country get in trouble this way?), or to sell equipment or land. Evading your taxes will bring Tax Board agents who will forcibly sell your land and assets. (You'll get impolite warnings on-screen.) If none of those options can be exercised, your farming career is kaput, for this game at least. Lucky for you, there's always another game.

## MARKET VALUE WINDOW

The Market Value window, opened through the Windows menu or by clicking on the button with the positive-looking business graph, displays the information you need to make decisions about selling in the futures market. This information includes current market prices for crops, and their price history, charted over the past 30 weeks.

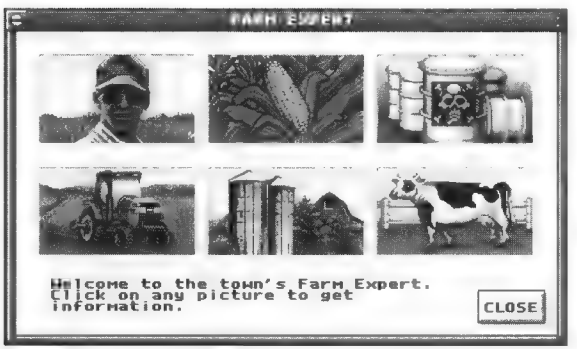



Clicking on any of the crop icons brings up its name, current futures price, chart history and trend, and the number of futures you currently own of that crop. The stated price is for the sale of a single harvest of high grade.

This window is for gathering information on crops, prices and trends. Actual futures sales are performed in the Schedule window using the Contract button.

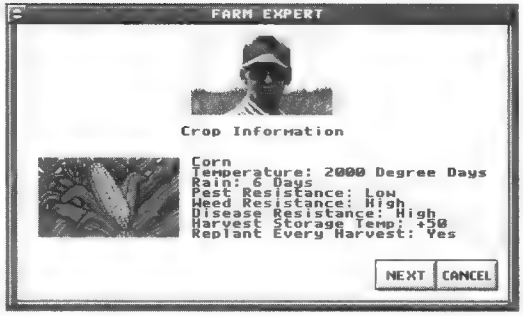
## FARM EXPERT WINDOW

The Farm Expert window is your information resource for general farming know-how. Open it from the Windows menu when you want detailed data on your crops (their growing phases, nutritional needs, values), farm dynamics, machinery, etc.




Click on any of the five icons—tractor, silo, cow, corn or pesticide—to get to specifics about machinery, structures, livestock, crops, and chemical additives. The other picture is Farmer Joe. He knows everything there is to know about farms—and owns the tavern in the local town.

The NEXT and PREVIOUS buttons cycle you through all of the items for each category, and the CANCEL button will return you to the opening Farm Expert screen.




The material found in the Farm Expert window is compiled from actual farm practices and resources, and was used as the basis for the behaviors of the crop mechanisms and other farm actions in SimFarm. It is in your best interest to consult with the Farm Expert window to separate fact from fancy.

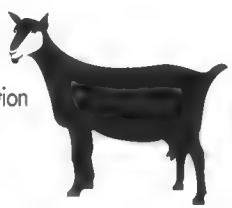
# SCHEDULE WINDOW

The Schedule window is opened for one field at a time from the Edit window, by clicking on a field after clicking the Magnifying Glass button. It is the true meat and potatoes (and sorghum and soybeans, and all that other stuff) of your farming enterprise. It gives you the power to arrange all of the crop procedures for multiple fields years into the future. It is also where you schedule your sales on the futures market. You can play SimFarm without ever using the Schedule window, but gaining a mastery over (or even a moderate competence in) this window is the primary means to farm success.

## WHY SCHEDULE?

Once you have two, three, ten or more fields, farming can become quite hectic. Between planting, harvesting, conditioning the soil, expanding your territory, and minding the livestock, there's no time for the strategic planning that successful farming requires.

The Schedule window automates the fundamental processes of plowing, planting, harvesting and marketing. It lets you manage your farm, so your can leave the actual plowing and planting to your hired Sims.

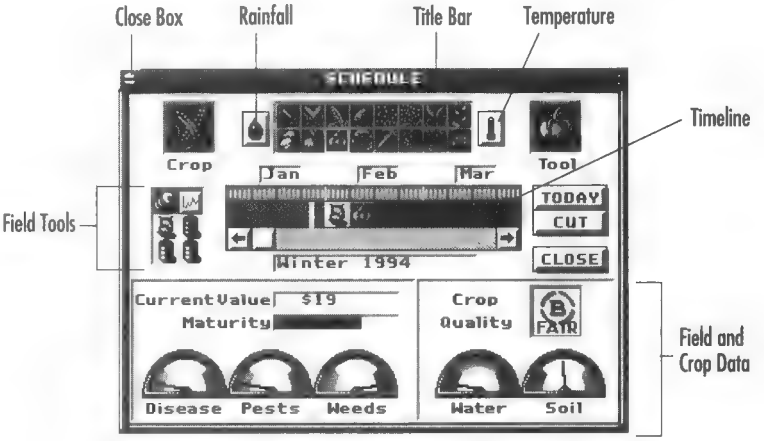


Smoke that hangs near the ground is usually an indication of falling pressure and unstable air.

Courtesy of Old Farmer's Almanac

## FIELD SCHEDULING ACTIVITIES

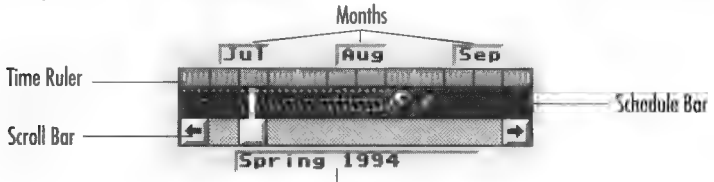
Here's a quick once-over of scheduling, planting, harvesting and general crop and soil care.




The top of the window displays icons of the crops currently loaded into the game and available for planting. To the far-left and far-right of the crop icons, respectively, are indicators of the crop currently being grown in the field and the currently active Schedule window tool.

To the immediate-left and immediate-right of the crop icons, respectively, are buttons that show valuable crop data. The Rainfall button superimposes the number of days each crop requires over the crop icons, and gives the weekly rain forecast (in number of days per week) on the schedule bar below. The Temperature button superimposes the minimum average temperature each crop requires over the crop icons, and gives the weekly average temperature forecast on the schedule bar below. This information is useful for choosing crops to plant at different times of the year.

The middle section is the timeline. The timeline displays three months at a time. You can use the scroll arrows to move the timeline forward or backward. The months appear above the timeline, the season and year below. Just below the months is the time ruler measuring off the days and weeks. On color monitors, a yellow line shows the boundaries between months. To the right of the time ruler is the TODAY button. Clicking on it returns the display to "today" in SimFarm time. Below the time ruler is the schedule bar. A bright yellow stripe marks the current stage of farming operations on the field.



THE TIMELINE

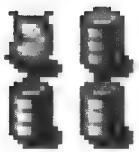
To schedule planting, click on the crop you want to plant (the icons at the top of the window), then click on the schedule bar at the time when you want planting to occur. The schedule bar will fill with the stages of the crop's growth, until it is time for harvest, where a silo icon appears. After this, the crop is automatically replanted, grown and harvested, again and again, unless you have no machinery, there is none available for leasing, the field is too fouled by toxins, or some other game activity causes the interruption of the scheduling. You can also stop the cycle by clicking on the CUT button then clicking on the schedule bar at your chosen cut-off time. You can only use the CUT button to affect the future (to the right of the yellow bar).

When crops are harvested, they are stored in a silo, if you have one, or immediately sold at market if you don't.

To the left of the timeline are six tool icons. To schedule any of these field functions, click on the chosen tool icon, then click on the schedule bar when you want it to happen. You can schedule the use of these tools while a crop is growing, or while a field is fallow.

The Harvest tool lets you plan when to harvest a crop if you want a time other than the automatically scheduled one. Of course, a half-grown crop will not get you the pretty pennies of a full harvest, but there can be times when you want to mess with Mother Nature—if a disaster is on its way, you may want to immediately harvest.

The Contract button—the one with the tiny chart on it—lets you arrange to sell your crops on the futures market, a speculative method of investment in your own harvest that can lead to bigger (or smaller) dollars. A complete explanation of the SimFarm futures market can be found below under the heading The Futures Market.



These four buttons represent additives that can be sprayed on your fields: fertilizer, herbicide, fungicide and pesticide. Placing them in the middle of the growing cycle of a crop will not stop the cycle, though it can affect crop yields, either positively or negatively. Be sure to consult the Farm Expert window for specifics on how particular crops react to chemicals. Fertilizing does not add toxins to the soil, but the others do.

## FIELD AND CROP DATA

Below the timeline are displays of important information about your field and its crop.

Current Value is the price you'd receive if you harvested the crop at that moment.

The Maturity bar gauge displays the crop's development. When the bar reaches all the way to the right, the crop is fully mature.

The Crop Quality displays the crop's current grade, the same information as you would see for an item in the Sell window. It dynamically reports the status of your crop; crops that are of low quality can be "resuscitated" before harvest if you respond to their needs, be they water, nutrients, chemicals, etc.

At the window's bottom are five gauges that advise you as to the field's environmental quality. If the needle is in the green, the reading is favorable, if yellow, it is more neutral or moderate, and if in the red, your field is screaming, at least for that attribute. The five traits that are recorded are Disease, Pests, Weeds, Water and Soil quality. The Water gauge differs in that its left red bar tells your if your field is lacking water and its right red that it is flooding. The green middle is the sweet waters of Shangri-la.

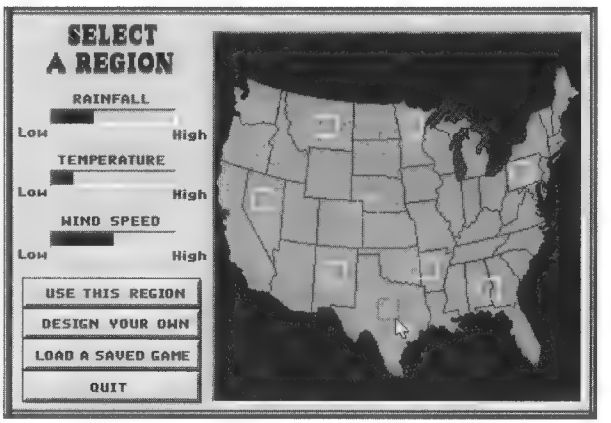

You can use these gauges in conjunction with the Map window readings and field icons in the Edit window to check the overall quality of your fields.

Your investment of careful and observant time in the Schedule window will prove rewarding. Experiment with crop rotation, fallow fields, and additives and note your results; if your are well-heeled, you could set up a carefully attended and environmentally congenial field against one you hit with every chemical on this and other planets and see what it does to the yields of a particular crop over time. See the Strategies section for elaboration and the Farm Expert window for pertinent crop facts.

## SELECT A REGION WINDOW

The Select A Region window is your diving board from which to plunge into the depths of SimFarm. It follows the (have a cow) title screen, and gives you a number of environment-altering options for your opening farm territory. The eight highlighted boxes represent preset scenarios, each with different farm terrains and conditions. Anywhere else you click within the map of our states united has its own weather conditions, which will be detailed in the bar graphs to the map's left. Those conditions will generalize the weather for similar zones in the U.S. These displayed weather factors will play a large part in the look of your game landscape:

for example, a site with low rainfall, high temperatures and high wind speeds is likely to be rocky and dry; lower readings for temperature and wind will have more trees and more fertile soil.




Below the meteorology bars are several buttons.

USE THIS REGION delivers you to the zone you chose on the map, opening a new game or starting a scenario.

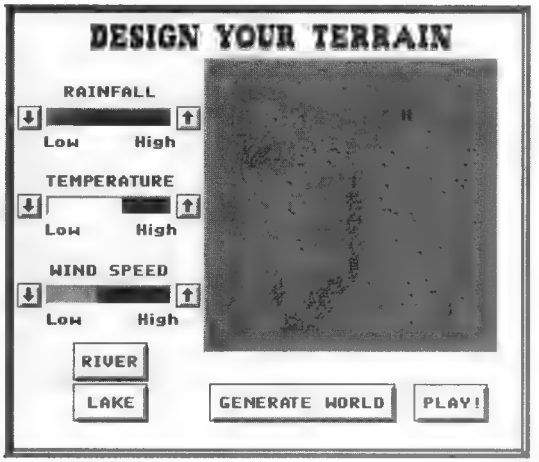
DESIGN YOUR OWN puts you in the Design Your Terrain window (see below), in which you can further refine your farmland.

LOAD A SAVED GAME opens the Load Game dialog box, from which you can select a farm whose roads you've driven down once or twice before. You have to save at least one game before this command is useful.

QUIT is just for whiners—when the going gets tough, the tough get farming. (That phrase is not trademarked, in case you want to use it at dinner parties.)

# DESIGN YOUR TERRAIN WINDOW

The Design Your Terrain window is where you'll go if you take the risk and choose DESIGN YOUR OWN in the Select A Region window.




The Rainfall, Temperature and Wind Speed settings for your new farmland can be increased or decreased by clicking on the up/down arrow buttons.

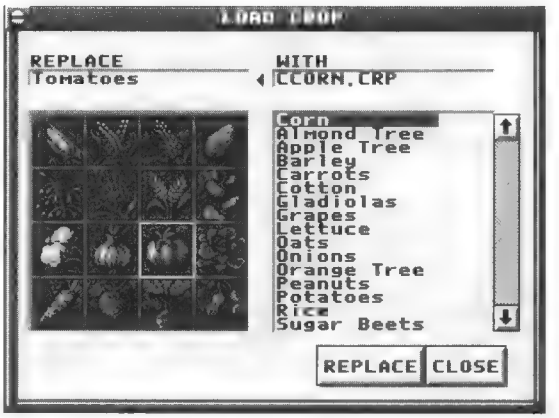
The RIVER and LAKE buttons, when clicked, place a river and/or lake in the SimFarm world. They can both be selected, or you can choose to have neither.

GENERATE WORLD generates the terrain and produces a pictorial representation of your choices in the window—if you're not satisfied, click on it again and your landscape cards will be reshuffled for a new deal. You must click here to generate the terrain after setting Rainfall, Temperature and Wind Speed. If you just set the sliders then click PLAY! it will begin the game with the terrain currently in the picture.

PLAY! begins the game with the terrain that is currently in the picture.

## LOAD CROP WINDOW

The Load Crop window lets you choose and change which crops are active in the game. There are 24 total crops, 16 of which can be active at a time.




This window lists all the available crops, and shows icons that represent currently loaded crops. Click on the scroll arrows to select the crop you want to load, click on the crop icon you want your selection to replace, and then click on REPLACE. You can change crops during a game, but you can't replace a crop that is currently growing or has been harvested and is stored in a silo, or if you own seeds from that crop.

E. B. White to chicken farmers: "Be tidy, Be brave. Walk, don't run. Never carry any strange object into the henhouse with you. Don't try to convey your enthusiasm for chickens to anyone else. Always count your chickens before they are hatched."

Courtesy of Old Farmer's Almanac

# EQUIPMENT AND SUPPLIES

Managing your machinery and your supplies is an integral part of your farming fortunes, and their mismanagement will lead to your misfortune. The following information covers the basics of buying, selling and making the most of your farm's possessions.

## MACHINERY

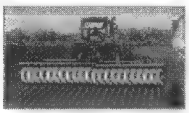
Gone are the days of the horse-drawn plow—at least here in SimFarm. Your fields are worked by machines, either purchased or leased (although a few crops are harvested by hand). Purchased equipment has to be placed on your property, either on bare land, a road, or in one of your sheds. If you see that some equipment won't be used often, store it in a shed to preserve its value.

Each piece of machinery has different characteristics, including how it ages indoors and out, and how much weather resistance it has. The results of any depreciation can be obtained by clicking with the Magnifying Glass (Examine) tool on each machine. If you haven't provided roads for any machines put into action on your farm, the machines will take the most direct route, and will sustain damage that reduces their value.

You can also view the condition and value of your equipment in the Sell window, where their current stages of High, Fair, Poor, and Bad and their accompanying sale prices are detailed. Bad machinery can't be used, nor repaired. Be alert to aging items so that you can sell them, if even for a pittance, before they break down. When they reach their maximum age, they ain't gonna work no more. Fill your farm with the following and keep our economy solvent:

### TRACTOR

Used for pulling plows, planters, sprayers and trailers
Cost New: $400
Requires: Nothing
Occupies: 1 tile




## PLOW

Used to ready a field for planting
Cost New: $200
Requires: Tractor for pulling
Occupies: 1 tile


## PLANTER

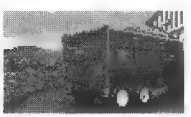
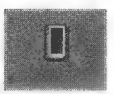
Used for planting seed in fields
Cost New: $200
Requires: Tractor, Seed
Occupies: 1 tile


## SPRAYER

Used to spray fertilizer, pesticide, herbicide, fungicide
Cost New: $200
Requires: Tractor, Choice of Fertilizer, Pesticide, Herbicide, Fungicide
Occupies: 1 tile


## HARVESTER

Used to harvest crops from fields
Cost New: $400
Requires: Trailer, Truck
Occupies: 2 tiles

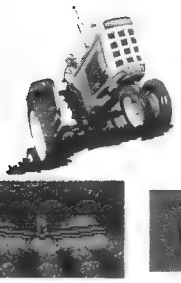



## TRAILER

Used for transport during harvest process
Cost New: $200
Requires: Harvester
Occupies: 2 tiles


## LARGE TRUCK

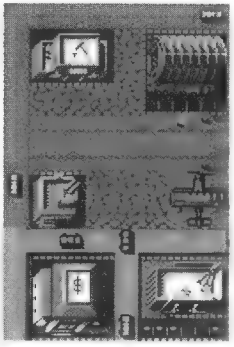
Used for transporting harvests to silos or market
Cost New: $500
Requires: Nothing
Occupies: 2 tiles



## CROP DUSTER

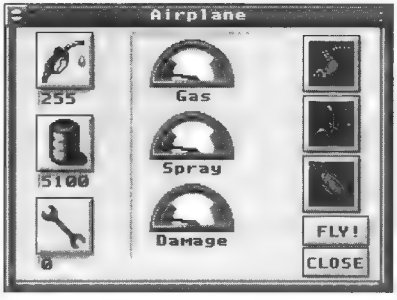
Used for spraying multiple fields
Cost New: $6,000
Requires: The town must have grown large enough to build an airport.
Occupies: Its own airport near town

For you weary, earth-bound farmers, here's your chance to get above it all.



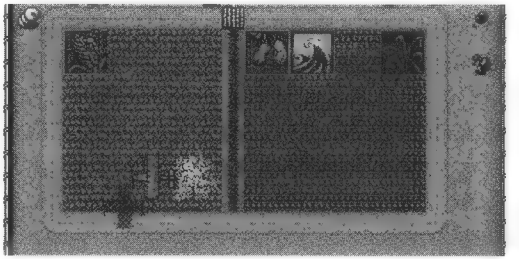
The crop duster is a pricey item, and it actually should only be used when you have many fields active that all need a dose of fertilizer or fungicide or whatever, but if it's time, choose the plane, click on BUY in the Buy window, and another window will open telling you where your plane is parked. Click OK, exit the Buy window and scroll over to the town, where you'll see a modest airstrip and your new plane.

Click on the plane and a window will open that has picture-button controls: clicking on the gas pump icon will fill your flyer with gas, clicking on either the ugly bug, weed or corn and then clicking on the ugly chemical tub will fill your spray tank with the chemical cure for the pictured condition, and later, if you've flown and incurred any damages, clicking on the wrench icon will repair them. The same type of green/yellow/red = good/neutral/bad gauges found in the Schedule window display the plane's current condition.



Just fill it with petrol and pesticide and click on FLY! Direct your flight with the keypad left and right arrow keys; the plane will travel in the arrow's direction, making quarter-turns for each click of the keys, i.e., from north to northeast, etc. PAGE UP and PAGE DOWN will raise and lower the plane's altitude. Remember that recreational flying will be very expensive.

Hit the HOME button when you want to release pesticide; hit it again when you want the spraying to stop. After you've doused your crops with a couple of applications, decrease your altitude and head back over to the airstrip. If you are low enough, hitting the END button when you're over the airstrip will settle it nicely back down. If you can do this on your first run-through without making the plane a heap of mangled metal, I don't know why you're reading this manual anyway—obviously, you're a born pilot. Keep 'em flyin' (and growin') captain.



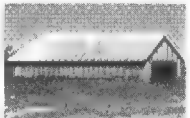
## STRUCTURES

You can buy structures just as you do machinery, but they can't be sold. You can always demolish them with your bulldozer if they're obstructing your progress or your view. They can only be placed on bare land on your property. For protection against the elements, manually store equipment in your sheds with the Move command, or click directly on the building itself after buying your equipment in the Buy window. Seed should be stored directly in the sheds for safeguarding as well. Sheds have a fixed storage capacity (see below).

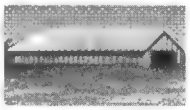
## SMALL SILO
Used to store harvests
Cost: $800
Capacity: 1 harvest

## LARGE SILO
Used to store harvests. Both small and large silos can explode if filled with certain crops and weather conditions are right. Duck and cover!
Cost: $2,400
Capacity: 4 harvests

## SMALL SHED
Used to store machinery and seed
Cost: $1,200
Capacity: 6 items



## LARGE SHED
Used to store machinery and seed
Cost: $1,440
Capacity: 9 items

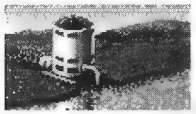


## SMALL BARN
Used to store sprays, seed, and livestock. You can store machinery in barns, but they make expensive garages.
Cost: $2,250
Capacity: 9 items

## LARGE BARN
Used to store sprays, seed, and livestock
Cost: $2,520
Capacity: 12 items

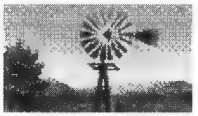
Save toilet paper tubes, cut them in half, fill with potting soil, and stand up in a tray. Use for planting seeds. When young plants are ready, plant them, tube and all. The tube helps stop cutworms.

Courtesy of Old Farmer's Almanac




## WATER PUMP

Pumps water from natural sources with the aid of irrigation ditches. Place the pump right on the water source. For increased pressure over very long distances, you can add another pump close to your water's destination. Floods will disable the pump and destroy irrigation ditches.
Cost: $1,000




## WINDMILL

Used as a water source. Its capacity depends on placement—it pumps well water. Windmill water will flow through any water ditch placed in front of or one tile below the mill; flooding could occur if no ditches are placed. They require winds of 10 mph to work.
Cost: $2,000


## WATER TOWER

Used to store water for livestock. It must be filled by a water source, such as a flowing irrigation ditch placed next to or in front of the tower; it will keep any water troughs on your land filled if the ditches flow. Water towers can burst and cause flooding.
Cost: $200

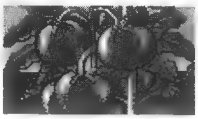

## SPRAYS

You can be the mad scientist and mix and match Fertilizer, Pesticide, Herbicide and Fungicide for your famished fields, though too much of a good thing can bruise the land. Additives can be put on fields manually with the Spray button in the Edit window or automatically in the Schedule window. Try leaving lands fallow or rotating your crops to return nutrients to the soil and reduce your use of chemicals. Cost: $200 per application.

To repel slugs and snails, spread crushed dry eggshells around plants. The slugs won't cross this barrier.
Courtesy of Old Farmer's Almanac

## CROPS

## SEEDS



Seed prices vary according to current market value of harvests: high harvest value, high seed cost. You could make a good deal on seed by buying a quantity at a low price; otherwise, seed is purchased automatically at planting with the default AutoBuy option. All seed is subject to deterioration and should be stored in sheds.

## CROP INFORMATION

There are 24 crops available for planting, 16 of which can be loaded into the game at any one time using the Load Crop window. Like real-world plants, they grow best under optimum conditions and are subject to all of the dynamics of weather and touchy soil.

***Note: All the data given for SimFarm crops are based on the data for real crops, but much simplified for the simulation, and somewhat changed for the sake of game play. Don't expect real crops to mature in the same amount of time or with the same amount of water or sun. We apologize to the real farmers and gardeners out there, but heck, after all, it IS a game.***

**Growing Weeks**—the number of weeks until the crop is ready for harvest.

**Temperature Requirements**—this is usually, but not always given in either "Degree Days" or "Chill Hours." They aren't really measures of days or hours, but those are the official agricultural-science terms.

Degree Days are the total number of average degrees that your plants are exposed to, above and beyond the baseline temperature, which in SimFarm is 50 degrees Fahrenheit. For example, take a crop that requires 1000 Degree Days during its growth cycle. This means that for the crop to properly mature, it needs quite a few days with an average temperature above 50 degrees—but not 1000 days. If, on a given day, the average temperature (day and night) is 60 degrees, that's ten degrees above the 50 degree baseline. So after this day, you can subtract ten degrees from the

remaining Degree Days. If the next day's average temperature is 90 degrees, you can subtract 40 degrees from the remaining Degree Days. If, however, a day averages 40 degrees, you must add ten degrees back to the Degree Days. Chill Hours are like Degree Days, but opposite—they are the total number of degrees below freezing (+32 degrees) that the crop needs during its growth cycle. For some crops, there are no given Degree Days or Chill Hours—just keep them from freezing.

**Water Requirements**—the minimum and maximum amount of water the crop needs during the growth cycle to fully mature. The amount is given in rainy days—but it's not that simple. These are the amount of rainy days the crop would need if there were no evaporation. In SimFarm, rainy days average 1/4 inch of rain a day. Evaporation can range from zero to 1/2 inch of water a day, depending on the temperature and wind. If your growing season for the crop is a hot, windy summer, you'll either need a lot more rainy days or a lot of irrigation. When you pick your crops and planting times, be sure to take rainy days, heat, wind and evaporation into account.

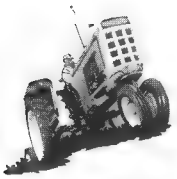
**Pest, Weed and Disease Resistance**—crops have either high or low resistance to each of these potential problems.

**Harvest Storage Temperature**—is the preferred temperature or range of temperatures for storing the crop. If one number is shown, storage is best right at that temperature. Anything above or below that temperature will cause crop deterioration and loss of value. If a range is shown, storage is best within that range. If you see ≤ before a number, then the crop needs to be stored at or below the number. If you see ≥ before a number, then the crop needs to be stored at or above the number.

**Replant Every Harvest?**—this is "No" for crops like trees and grapevines, which continue to produce for multiple harvests, and "Yes" for crops that must be replanted after every harvest.

**General Information**—hints and tips on when and where to grow the crop.

# THE CROPS



**Almonds**
*Growing Weeks:* 30
*Temperature Requirements:* 300–500 Chill Hours
*Water Requirements:* 4–7 Days
*Pest Resistance:* Low
*Weed Resistance:* High
*Disease Resistance:* Low
*Harvest Storage Temperature:* +40
*Replant Every Harvest?* No
*General Information:* Almonds grow well in Northern California and similar climates.

**Apples**
*Growing Weeks:* 17
*Temperature Requirements:* 900–1500 Chill Hours
*Water Requirements:* 5–8 Days
*Pest Resistance:* Low
*Weed Resistance:* High
*Disease Resistance:* Low
*Harvest Storage Temperature:* +32 to +42
*Replant Every Harvest?* No
*General Information:* Best planting regions for successful apple crops are from the Canadian border of Ontario to the Mississippi Valley; Virginia; and Northern California to Washington in rich fertile soil. Plant for Spring (March) and Fall (late October to early December) harvesting.

**Barley**
*Growing Weeks:* 34
*Temperature Requirements:* Avoid freezing
*Water Requirements:* 1–3 Days
*Pest Resistance:* High
*Weed Resistance:* Low
*Disease Resistance:* High
*Harvest Storage Temperature:* +50 to +60
*Replant Every Harvest?* Yes
*General Information:* Barley is a grain crop. Avoid frost. Stores very well in silos. Watch for good market values before selling.

**Carrots**
*Growing Weeks:* 17
*Temperature Requirements:* 1800 Degree Days
*Water Requirements:* 3–4 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* +34
*Replant Every Harvest?* Yes
*General Information:* Carrots prefer warm weather. If planted during hot weather, keep the fields irrigated. Try not to plant carrots during long periods of cold temperatures.

**Corn**
*Growing Weeks:* 12
*Temperature Requirements:* 2000 Degree Days
*Water Requirements:* 8–9 Days
*Pest Resistance:* Low
*Weed Resistance:* High
*Disease Resistance:* High
*Harvest Storage Temperature:* +50
*Replant Every Harvest?* Yes
*General Information:* Corn removes a lot of nutrients from the soil. Keep it well-fertilized, or plant it in rotation.

**Cotton**
*Growing Weeks:* 12
*Temperature Requirements:* 850–900 Degree Days
*Water Requirements:* 8–12 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* High
*Harvest Storage Temperature:* +40 to +120
*Replant Every Harvest?* Yes
*General Information:* Plant in mid- to late-Spring in warm climate regions when ground is warm and danger of frost is over.

**Gladiolus**
*Growing Weeks:* 12
*Temperature Requirements:* Avoid freezing
*Water Requirements:* 8–12 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* +40
*Replant Every Harvest?* Yes
*General Information:* Gladiolus need soil that is rich in nutrients. Fertilize four times during growth, with the last one right after they flower. Do not flood fields with water. Cease all irrigation two weeks before harvest.

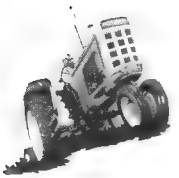
**Grapes**
*Growing Weeks:* 22
*Temperature Requirements:* 3000 Degree Days
*Water Requirements:* 3–5 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* +36 to +45
*Replant Every Harvest?* No
*General Information:* Plant in early Spring. Do not fertilize at time of planting.

**Lettuce**
*Growing Weeks:* 13
*Temperature Requirements:* 1600 Degree Days
*Water Requirements:* 4–6 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* +34
*Replant Every Harvest?* Yes
*General Information:* Lettuce matures best in cooler temperatures. Time the plantings carefully.

**Oats**
*Growing Weeks:* 34
*Temperature Requirements:* Avoid freezing
*Water Requirements:* 2–3 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* +34
*Replant Every Harvest?* Yes
*General Information:* Oats are a grain crop, and sensitive to over-watering. Avoid frost. Stores very well in silos. Watch for good market values before selling.

**Onions**
*Growing Weeks:* 22
*Temperature Requirements:* 2700 Degree Days
*Water Requirements:* 3–4 Days
*Pest Resistance:* High
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* ≥+32
*Replant Every Harvest?* Yes
*General Information:* Onions can be planted in both January and June for both a good winter and summer crop.

**Orange Trees**
*Growing Weeks:* 47
*Temperature Requirements:* Avoid freezing
*Water Requirements:* 3–5 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* +38 to +45
*Replant Every Harvest?* No
*General Information:* Do not plant orange orchards up against fences. Leave one or two tiles between orchards so that cool or cold air can flow through them to help prevent fruit damage. It is best to fertilize prior to planting and to stop all fertilizing 8 weeks prior to harvest. Pesticides, fertilizers, herbicides and fungicides should be applied in warm weather. Pesticides and fungicides can be applied right up to harvest time.



**Peanuts**
*Growing Weeks:* 22
*Temperature Requirements:* Avoid freezing
*Water Requirements:* 3–4 Days
*Pest Resistance:* High
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* +15 to +70
*Replant Every Harvest?* Yes
*General Information:* Peanuts are highly susceptible to cold weather and do much better in warm climates. Don't plant during the cold winter months.

**Potatoes**
*Growing Weeks:* 17
*Temperature Requirements:* 2400 Degree Days
*Water Requirements:* 5–8 Days
*Pest Resistance:* High
*Weed Resistance:* High
*Disease Resistance:* High
*Harvest Storage Temperature:* +34
*Replant Every Harvest?* Yes
*General Information:* Potatoes are shallow rooted and require frequent irrigation—but too much water can cause rotting. Rotate with soybeans or peanuts every two or three years to add nutrients to the soil.

**Rice**
*Growing Weeks:* 25
*Temperature Requirements:* 2400 Degree Days
*Water Requirements:* 10–13 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* +50
*Replant Every Harvest?* Yes
*General Information:* Rice prefers warm, dry weather. Fertilize the soil before every planting, or rotate with grain crops. The grains may not grow well, but they will provide nutrients for the rice.

**Sorghum**
*Growing Weeks:* 22
*Temperature Requirements:* 105–120 Degree Days
*Water Requirements:* 3–4 Days
*Pest Resistance:* High
*Weed Resistance:* High
*Disease Resistance:* High
*Harvest Storage Temperature:* ≥+32
*Replant Every Harvest?* Yes
*General Information:* Sorghum is a warm-weather crop—avoid frost. The best planting times are late May and early June.

**Soybeans**
*Growing Weeks:* 17
*Temperature Requirements:* 2400 Degree Days
*Water Requirements:* 1–2 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* High
*Harvest Storage Temperature:* +50
*Replant Every Harvest?* Yes
*General Information:* Soybeans are ideal to plant in rotation with other crops because they add nutrients to the soil. Plant soybeans twice a year—once in the first week of February and once in the first week of June.

**Strawberries**
*Growing Weeks:* 17
*Temperature Requirements:* 200–1200 Chill Hours
*Water Requirements:* 6–10 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* +34
*Replant Every Harvest?* Yes
*General Information:* Strawberries need to be chilled during growth, so frost danger is negligible. Plant when the weather is cool such as in February or March.

**Sugar Beets**
*Growing Weeks:* 47
*Temperature Requirements:* 1800 Degree Days
*Water Requirements:* 1–2 Days
*Pest Resistance:* High
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* ≤+45
*Replant Every Harvest?* Yes
*General Information:* Sugar beets are very sensitive during their early stages of growth. Try not to fertilize during these stages or you might damage the seedlings.

**Sunflowers**
*Growing Weeks:* 14
*Temperature Requirements:* Avoid freezing
*Water Requirements:* 5–7 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* ≤+50
*Replant Every Harvest?* Yes
*General Information:* Sunflowers are sensitive to fertilizers during the early stages of growth. Wait about six weeks before applying any fertilizer.

**Sweet Potatoes**
*Growing Weeks:* 17
*Temperature Requirements:* 2500 Degree Days
*Water Requirements:* 6–8 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* ≥+55
*Replant Every Harvest?* Yes
*General Information:* Favorable growing regions are New Jersey southward, Central and Southern California, Arizona, New Mexico and Texas. Harvest only on a dry, sunny day.

**Tobacco**
*Growing Weeks:* 30
*Temperature Requirements:* 2000 Degree Days
*Water Requirements:* 1–3 Days
*Pest Resistance:* High
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* ≥+60
*Replant Every Harvest?* Yes
*General Information:* Plant in fertile, moist soil when all danger of frost is over. Keep soil moist, but not wet.

**Tomatoes**
*Growing Weeks:* 13
*Temperature Requirements:* 200 Degree Days
*Water Requirements:* 6–9 Days
*Pest Resistance:* Low
*Weed Resistance:* Low
*Disease Resistance:* Low
*Harvest Storage Temperature:* +55
*Replant Every Harvest?* Yes
*General Information:* Plant when weather is warm and stable (+55 degrees Fahrenheit minimum). Keep soil well irrigated. For a longer harvest season, plant two times per year, early July and early October.

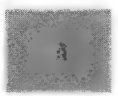
**Wheat**
*Growing Weeks:* 34
*Temperature Requirements:* Avoid freezing
*Water Requirements:* 2–3 Days
*Pest Resistance:* High
*Weed Resistance:* Low
*Disease Resistance:* High
*Harvest Storage Temperature:* +50 to +60
*Replant Every Harvest?* Yes
*General Information:* Wheat is best grown in the Great Plains region because of the intensely hot summers, the number of clear days and precipitation during summer months. Stores well in silos.

# LIVESTOCK

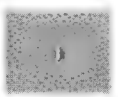
There are four types of livestock in the game, which can be raised and sold like crops. They will roam freely, so you must contain their crop-eating selves behind fences. They are all similar in growth rates, food needs and weather resistance. You must maintain a close watch on all of them to ensure that they are well-fed and healthy. If they get the chow they need, you will be able to see them grow in size and value. The females will reproduce if they're in the mood.

Livestock will wander in and out of any barns you've purchased, and the shelter will keep them somewhat healthier and more valuable. If they are ill-cared for, and their grade goes to "Bad" in the Sell window, you can—slowly—build their value back up. If they're feeling particularly hungry or ornery, they can damage your fences and flee to Malibu. If they do escape and get hit by moving farm machinery, you'll see that it broadens their perspective. You can "herd" them with the Move icon hand if you're feeling like a cowboy. They will deteriorate rapidly—and die—if not fed and watered.

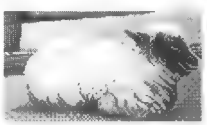
**COW**
Lives 20 years
Eats 1/4 bale of hay each month
Mates after 15–20 months
Gestates for 10 months

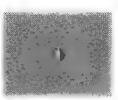


**PIG**
Lives 15 years
Eats 1/8 bale of hay each month
Mates after 8 months
Gestates for 11 months

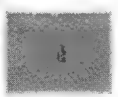


**SHEEP**
Lives 10 years
Eats 1/16 bale of hay each month
Mates after 3 months
Gestates for 6 months





**HORSE**
Lives 20 years
Eats 1/4 bale of hay each month
Mates after 4 years
Gestates for 11–12 months



# THE FUTURES MARKET

The Futures option lets you go to Las Vegas while you're still down on the farm—sort of. It can either be a way to maximize your profits or to lose the farm. (The futures market in SimFarm is much simpler than in the real world—and much safer. Don't go off investing your real money on the basis of success in SimFarm.)

The standard way to sell your crops is to harvest them when they're ready, and either sell them right away for the current market price, or put them in storage and wait for the price to go up. Of course, many crops go down in quality and lose their value if stored too long.

The futures market gives you another option, or gamble, if you prefer. It lets you sell your harvest months or years in advance—whether it's still growing or not even planted yet—at the current market value.

You don't collect the cash until you harvest and deliver the crop. When you do harvest and deliver, you will only get the full market price if your harvest is a good one and of high grade. A bad harvest will only bring in a percentage of the market price and a totally lost harvest pays nothing.

Here's the idea: if you think today's market price for a crop is good, and you think that it will be lower at the time you actually harvest, then you can sell your future harvest and lock in today's price.

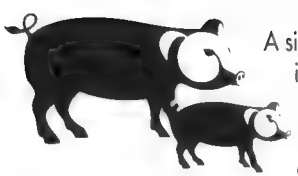
Of course, the people who buy your futures are betting that you're wrong. They make their money when the price goes up after they've bought it. A lot of factors affect market price, including the quality of other local harvests, the time of year and the weather. Do your research!

Here's how to do it:

1. Check the Market Value window frequently to see how the crop is behaving on the market. Look at the graphs, watch the trends, and try to predict the future.
2. When you think the price is at its peak, and is about to go down, it's time to sell.
3. Sell one or more future harvests by opening the Schedule window for your field, clicking on the Contract button, and clicking on the schedule bar at the time when you want to make the contract. The market price at contract time is locked in.

You will only truly make a killing if the crop's price drops and you've sold a lot of futures, implying that you are planning on planting the same crop for a number of harvests.

Remember: the Market Value window reflects the price of an ideal, perfect harvest, so in order to reap whatever futures price you sow, you must maintain the crop's quality.



A simple and harmless remedy for fire ants: be sure the ground around the nest is dry and no rain is forecast. Sprinkle nest liberally with Malt-O-Meal dry cereal. Do not otherwise disturb nest. The ants eat the cereal, which swells and kills them.

Courtesy of Old Farmer's Almanac

# STRATEGIES

Those of you who have a knack for electronic farming can skip this section, which is teeming with fascinating tips and techniques for tilling that digital earth. But if the only thing you grow well is facial hair, you might want to take a peek at these hints. They contain both broad generalizations about setting up your farms and specific uses of tools and equipment.

## GENERAL

When the town expands, you'll have an opportunity to vote for the type of development that will be built on the plot. Your vote usually counts. If you have enough dough for a crop duster, vote for an airport. Crop dusters will save you money when you need to spray multiple fields.

Sell futures. Check the Schedule window to find out the current value of your crop, and compare that to its market value. If your crop's value is high, sell a future and forget about it. You will have guaranteed a price for that crop. Just hope that its market value doesn't go up. And don't forget to maintain the crop.

If you are designing your own terrain, be sure to select a lake or river, or both. These are great water sources. Do consider that farms too close to water are subject to flood damage.

When you see a white horse, kiss your right hand and stamp it twice on your left hand. Money will follow.
Courtesy of Old Farmer's Almanac

Plan for taxes. The town will collect some of your money for maintenance and expansion. Taxes are computed from your total land value, machinery owned, structures built, and profit. If you've bought lots of expensive land, your taxes will rise considerably. You're in a heap of trouble at year's end if you don't have money for the tax man.

Don't use paved roads on your farmland unless you have a lot of land or several non-contiguous plots. Dirt roads are cheaper and don 't need to be bulldozed when you rearrange your farm layout.

Save often! The power still goes out sometimes, y'know....



Buy seed manually. Although there is a default AutoBuy option, seed prices can fluctuate. Buy seeds that can be stored for a long time when prices are low.

Consult the Farm Expert window before planting. The Farm Expert window contains useful info such as ideal crop growth temperatures, moisture requirements, harvest methods, etc.

Stagger the planting of new fields. By planting fields two weeks apart, you can reuse machinery you own. If you plant several fields simultaneously, you will need more equipment, because the fields will all demand plows and planters at the same time.

Always plant trees around every field. Trees protect your soil from wind. Trees will have no effect unless they are within two tiles of your fields. You will need at least eight tree tiles to protect your field.

Use the same ditches to irrigate AND drain your fields. Place a valve in the ditch just before it gets to the field. Turn this valve on and off to regulate water flow and drainage.

Do not "dead-end" ditches into your fields. Instead, run them all the way along one side. The more exposure your field has to the ditches, the more effect they have.

Buy a large silo if you can, rather that a few small ones. Four small silos costs $3200, whereas one large is $2400, with equivalent storage capacity.

Don't let a field whose crop quality has gone to Bad ("X" grade) go to harvest if it's deep into the growth cycle. You will incur use damage to your machinery and take up storage of a crop that has little or no value. If you notice a crop go to the X grade, use the Cut button in the schedule window to leave it fallow, or replant it with another crop.

When you see the breaking wave icon in a field, it's telling you that your field has too much water, and that may prove damaging to crops. If it is a crop that likes things a bit dry, you can use dry irrigation ditches placed the field's length to drain off excess moisture, or shut off the "on" valve from existing ditches. If the icon has appeared because it has been particularly rainy, it should soon disappear without harm.

When the skull and crossbones (old Toxic Tommy) appears in your field, then you've put a lot of chemical additives (toxins) on the land. It simply indicates the presence of these additives, and shouldn't be construed as an evidence of long-term soil damage. Constant use of chemicals will exhaust your field's ability to recover, however, and affect crop values.

The appearance of the cow skull in a field tells you that your field is mighty thirsty. The little bag of manure indicates that your soil is lacking in nutrients and needs fertilization. In SimFarm, fertilization does not increase toxin levels, so you don't have to use a dainty hand with fertilizer if you see soil nutrient levels dropping.

The scrawny old weed icon tells you that your field is full of weeds, and the chewed-up corn tells you that your field is filled with pests. Herbicide and fungicide are the most effective means of dealing with these devils, but spread 'em with care.

## MACHINERY

The absolutely necessary machinery for a single field is:

1 tractor
1 planter
1 plow
1 harvester
1 truck
1 trailer

Although some crops don't need a harvester, buy these machines when you first start your farm. After two or three plantings, you will save BIG on leasing costs.

Sell and replace your machinery before it breaks. Low-quality machinery is worth more than dead machinery. Check its quality frequently with the Magnifying Glass (Examine) tool or with the Sell window. You won't notice machinery performance problems until it breaks.

Machinery always tries to enter fields from the upper left-hand corner. Machinery tends to exit the field on the lower-left corner, but occasionally exits on the lower right. It's helpful to place roads along the left-hand side of the field to ensure they can make it in and out of the field with minimal damage.

Turn AutoLease off when you own machinery. This will prevent machinery from being leased when you mess up your schedule. You can always fix your schedule.

If you don't plan on purchasing machinery, build a paved road from the town to your farm. Try to make the road as close to a direct path from the upper left-hand corner of the initial town plot to your fields. This will reduce damage to the leased machinery and lower your leasing costs. (Machinery always leaves town from the upper left-hand corner of the first town plot, no matter how many town plots there are.) Expect the road to be partially destroyed due to the occasional flood and town expansion. Check it every four months (game time).

Use paved roads when you have several non-contiguous plots of land. This will help machinery get to your other plots with minimal damage.

Buy a shed for machinery. It will keep your equipment's value and functionality high.

Machinery will exit sheds from the side closest to the destination field. Try to lay roads from that side of the shed to the field.

For the best-tasting tomatoes you ever ate, pour a cup of beer around the roots of each plant after they blossom. Repeat once a week until tomatoes are ripe.

Courtesy of Old Farmer's Almanac

## LIVESTOCK

Take care of livestock. You make more money through breeding than raising.

1) Buy new livestock.
2) Take care of them.
3) Sell them when they're older and after they have produced offspring.
4) Repeat Step 2.
5) Bask in riches and glory.

You don 't need a thousand water troughs to water livestock. Just a couple can water an entire pen if you have a water tower.

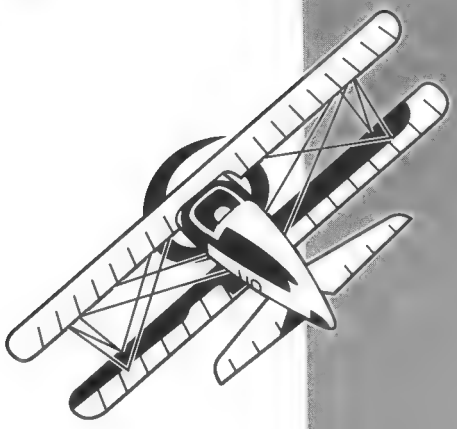
Water towers should be placed next to an irrigation ditch that you always keep full (if possible). Floods will occasionally destroy ditches from rivers and lakes, droughts will sometimes make rivers and lakes recede from water pumps, and low winds will prevent a windmill from functioning at all. Water towers will store water for a couple of weeks until you can repair or restart your water sources. If you have lots of livestock and water troughs, you may need more than one water tower.

Place water troughs and feed strategically if you have multiple livestock pens. Livestock are DUMB. If feed in a neighboring pen is closer to the livestock than the feed in their own pen, they will try to go to the neighboring pen. This can cause starvation of animals and destruction of fences, and perhaps make you feel as dim as your beasts.

If you can afford it, buy a barn for livestock. Livestock won't drink or eat as much if they have a barn to enter. It will also raise their value by protecting them from the elements.

Grow enough food to feed the hungry. (I know this isn't a strategy, but I thought I'd give you an incentive.)

# REAL FARMS



***It brings up happy old days when I was only a farmer and not an agriculturist.***

— O. Henry (William Sydney Porter),
The Gentle Grafter, Modern Rural Sports

# REAL FARMS

## HISTORY OF AGRICULTURE

### BEFORE AGRICULTURE

This section of the manual contains information about real farms, from their beginnings around 9000 B.C. to modern times.

Before agriculture, people lived by hunting wild animals and gathering edible plants. When the herds were plentiful and the plants flourishing, life was good. But, when the herds migrated elsewhere, people had to follow them and often discover a whole new set of plants to supplement their diet.

Hunters eventually realized that their prey was much easier to kill if it were walled up in a box canyon. Better yet, they could capture the prey and keep it in a cave for future use. Archaeological finds show that early humans imprisoned giant ground sloths in this way. Entrapment, however, was a temporary measure. Not thinking of the future, hungry humans gorged themselves, then, when the sloths had all been eaten, they sought out more sloths. Maintaining a herd—by breeding and nurturing—wasn't yet practiced.

This "feast or famine" lifestyle had its definite drawbacks—including starvation. Fortunately, several geniuses throughout the world eventually discovered how to preserve meat by drying it, smoking it over a fire, or cooking it. Some others realized that if they took the seeds of the plants they had been eating and scattered them about, they grew into new plants.

Eventually, people decided that life would be a lot easier if they always had the animals with them and if edible plants or their produce were always available. Settling down seemed like a good idea.

## THE ORIGINS OF AGRICULTURE

Recent archaeological finds place the beginning of agriculture before 7000 B.C. and animal domestication (mostly dogs used as hunting aids) thousands of years before that. There is some evidence that the people of Shanidar, in Kurdistan, were domesticating sheep and planting wheat as long ago as 9800 B.C.

Intensive food-gathering, in which the local inhabitants of a region set up permanent residences and made extensive use of already-present plants, seems to have started in the Near East around 9000–7000 B.C.

Barring the use of time machines, there is no way to know for sure how planting really got started. But archaeologists have lots of theories. One theory suggests that some seeds were spilled in a memorable manner during a migration. When the tribe next passed the same place, they might have correlated the spill of seeds with the sudden abundance of the plant. They could then have realized that they could store seeds and plant them, and be assured of having a food supply. Later they began selecting and planting the seeds from plants with the highest yield. In this way, plants were domesticated—changed and controlled to benefit man rather than just exist in the wild.

At about the same time as the agricultural advances described above, people started to domesticate the wild ox and gather sheep into herds. Remains of a hunting dog, dated back to 8500 B.C., have been found in North America.

## TOWNS AND CITIES DEVELOP FROM FARMING

The abundance of the harvest from domesticated plants allowed major increases in population. Having all of one's plants and animals in one place allowed the agriculturist to move from random caves and makeshift huts into permanent or semi-permanent villages with homes made from stones, wood, or wattle. An early example is the Biblical city of Jericho. It started as such a village around 9000 B.C., and has been a settlement of one sort or another ever since.

One of the earliest recorded towns is Catal Huyuk (Catalhuyuk), established on the Konya Plain in Turkey—a vast, fertile expanse ideal for primitive agriculture. The earliest buildings date from 6500 B.C. and are similar to those found in the oldest Jericho settlements—mud brick buildings entered from the top. Catal Huyuk is notable for the number of shrines used for a variety of purposes, including burial and possible propitiation of deities of the hunt and the harvest. This implies an early religious organization and a way of life that left enough time for some members of the society to concentrate on religious duties. There was also time for crafts. Some of the earliest known pottery was found in Catal Huyuk. There is also evidence of copper smithing and rope-making, and some ovens were big enough to imply that some residents were full-time bakers.

By 5000 B.C., the Euphrates Valley was full of villages and townships. The townships provided central services of storage, religious observance and administration that the villages could not handle. These townships developed into the Sumerian civilization.

At about the same time, similar villages were beginning in the Nile Valley and the river valleys of China and India.

## EARLY FARMING TECHNIQUES

The initial approach to farming was to remove some of the seeds from food plants before eating them, then scatter the seeds back into the same area they came from.

Later, the planters realized that other (non-food) plants were competing with their plants for the field, so they took to weeding the fields to make sure that only *their* plants were growing there. Everything else was left to nature.

Eventually it became obvious that this constant replanting resulted in stunted crops and low yields. The first response was simply to find a new field. After all, the land was vast and people were few. After awhile, though, the obvious fields were used up. Then, potential farmers looked to the forests.



## SLASH AND BURN

Most agricultural societies discovered the slash and burn technique. First, all the foliage in a section of a forest was cut down, creating a field. The remains were left on the ground. Then the field was set on fire, and the ash from the cut foliage enriched the soil. After many uses even this enriched soil became barren, and farmers were forced to find new fields.

As the population of the world grew and more fields were slashed and burned, the walk to a newly burned field became longer and longer—and other cultures could claim these unattended fields. The tribe would then have to move to new sections of forest. In some areas, such as Madagascar, slash and burn agriculture is still practiced and the land is becoming less and less fertile.

## FALLOW FIELDS

A fallow field is one that is not planted for a period in hopes that it will regain its fertility. It is believed that the practice of leaving fields fallow originated because some cultures were forced to return to their old fields, and found that the infertile fields they left behind had become more productive.

This led to the establishment of a rotation system where each growing season certain fields would be left alone (or perhaps tilled but not planted), extending the useful production life of a set number of fields. Sometimes the fallow fields were used for pasturage for animals, which had the incidental benefit of fertilizing the soil.

It was later found that certain plants, thought useless except perhaps for animal fodder, were beneficial to a field's productivity, and seeds for these plants were planted in fallow fields.

## IRRIGATION

As populations grew and competed for the best growing lands, some cultures were forced to try to farm normally arid areas. Some of these cultures died trying; others discovered the prin-

ciples of irrigation. There were some early massive engineering projects to dam water for later use, including the digging of canals to distribute water to normally dry fields. The first known examples of this irrigation process were built by farmers who colonized the Euphrates River Valley around 4000 B.C.

In most cases, irrigation involves trapping and storing water that appears for a short period (such as the spring flooding of the Euphrates and Nile, or the winter rainstorms of the American desert), so that it can be used later in normally dry periods. In almost all cases, early irrigation made the desert flower for a couple of centuries, then the water dried up in some climatic change or the fields grew barren because the irrigation had washed away all the good soil—and the culture died. Both the Pueblo dwellers of the American desert and the inhabitants of Petra in the Middle East flourished and then died with their irrigation systems.

Other areas, such as the very fertile Nile Valley and the Tigris-Euphrates Fertile Crescent, were big enough and had a sufficiently dependable source of water so that they remained productive until the present day, though even these areas have undergone a decline in fertility and might be barren if not for modern agricultural techniques.

## PLANTING TECHNIQUES

Initially, primitive agriculturists practiced broadcast sowing, simply taking their gathered seeds and casting them over a field. This was, at best, a chancy method of planting. A strong wind or incursion of seed-eating birds could destroy a crop before it got into the ground.

After a while, farmers started to use sticks to break up the ground, and then invented early hoes and mattocks. Eventually, some agricultural prodigies made the connection between domesticated animals and ground-breaking sticks and they invented the plow: a sturdy stick that can be pulled behind a draft animal such as an ox or horse or donkey. This made life much easier for the farmer, though not for the draft animal.

A plow's primary purpose is to cut into the soil in long ruts, performing two tasks. The ruts loosen the soil so the roots from the seed can take hold and they open up the ground so that the seed can be planted inside the earth rather than left on top. Even in ancient times, some technical wizards had come up with the idea of fastening a funnel to the back of a plow to let seeds drop through, ensuring that they fall into the rut carved by the plow. People without this innovation had to lay the seeds by hand, or broadcast them and hope they fell into the ruts.

Early plows just cut the earth; they didn't ensure that the earth wouldn't close up after them. In an essay on farm procedures written in Roman times, the plower was said to be followed by someone with a mattock, who would break up clods of earth and make sure the ruts stayed clear. Around the year 1000 A.D., wheeled plows were invented in Europe. They had a rudimentary moldboard and coulter to invert the soil and leave a clean furrow, improving the seedbed.

About this time the horse collar (apparently originating in China) arrived in Europe. Earlier all-leather harnesses put the load on a leather strap across a horse's windpipe, cutting its efficiency drastically. The horse collar puts the load on the horse's shoulders, where it belongs (though the horse might have something to say about this). After the horse collar, horses became more common as plow pullers, though poorer farmers preferred oxen because they were less expensive to maintain.

In the first half of the 18th century, the Rotherham plow (supposedly invented in Holland) came into use in England, Scotland and the Low Countries. Its design is essentially identical to plows in use today, though the materials have been updated. The original Rotherham plows were made of both iron and wood.

The first factory that made plows was established in England in 1783. Previously, plows had been made-to-order by blacksmiths.

While the use of plows and domesticated animals spread throughout Europe, Asia and Africa, in Meso-America, where the domesticated animals needed to pull plows were not available, the plow was never invented. Instead, planting involved a laborious process of drilling holes in the ground and dropping the seeds in. Some anthropologists argue that this time-hungry process decreased the time the American Indians might have otherwise spent devising other technologies that may have helped them meet the threat of the European invasion.

## DEVELOPMENTS IN FARM MECHANIZATION

Of course, sowing seeds and plowing the ground are just part of the farming process. The resulting plants must be protected from insects and weeds, harvested, in some cases threshed (the food element separated from the rest of the plant by beating the plants) and carried to the market for sale or prepared for consumption on the farm. All of these were backbreaking labors that, when done by hand, took a lot of time and energy.

By 1800, a few threshing machines were in operation, and an English gentleman named Jethro Tull invented the horse-drawn hoe for keeping the ground between rows of wheat weed-free, and a seed drill, which was a more elaborate version of the old seed funnels.

After the 1830s, farm mechanization began to take off. Patrick Bell in Scotland and Cyrus McCormick in the United States devised reapers for harvesting grain, British inventors devised threshing machines that had farm laborers rioting because of lack of work, and John Deere of Illinois invented the all-steel plow that would be the foundation of a farm tool and mechanism empire that is still powerful today.

The advent of steam power in the mid-1800s set farmer-inventors to work on steam plows, steam-powered milking machines and other steam-powered devices. The internal-combustion engine of the 20th century made it possible to create a tractor that could haul various mechanisms about the farm. After the Second World

War, the trend went to self-powered devices, though the tractor is still an essential farm workhorse.

## THE BIRTH OF AGRICULTURAL SCIENCE

Initially, farming information went from father to son, from uncle to nephew, and from farmer to farmer in the same community. Philosophers and other theorists had little time for such a mundane activity, though some ancient farming advice has come down to us as part of religious doctrine.

To a degree, this method worked. Farmers got better and better at what they did, but there was no research into why certain practices were effective and others less so. A normally unproductive practice that didn't actually harm the crops might happen to work one year and be continued for generations until someone else figured out that it was actually ineffectual. And, of course, tricks and aids found by one collection of farmers would not be passed on to others, leading to uneven farm production, even among the farmers of one country or province.

While the Roman essayist Pliny and other classical and medieval writers wrote on farming, agriculture was never considered part of the academic structure. Even the natural philosophers of the 18th century thought that a general education was all that was necessary for a farmer—there was little concern with the study of farming as a concept. It was just there. You learned what your father knew and got on with it.

However, as more and more people grew away from the land to become part of an industrialized society, some of them began to study farming as a science. Now, every industrialized nation and most nations whose economies are based on agriculture have regular colleges in which agriculture is taught as a science.

The first established agricultural colleges were started at the turn of the 19th century in Hungary and later in Germany. They were very empirical: the attending farmers learned from the experiences of other farmers. This was simply an extension of the

practice of passing on agricultural knowledge from farmer to farmer. Now, the farmers of an entire country could learn the techniques used by all the other farmers of his country.

In 1840, Justus von Liebeg of Darmstadt wrote the first book on scientific farming. Von Liebeg's concept that the principles of experimental science could be applied to agriculture revolutionized European and American thinking on the subject. Agricultural academies sprang up all over Europe; the first agricultural colleges in America appeared in the 1850s. The Agricultural College of the State of Michigan, which opened its doors in 1857, still exists today as Michigan State University.

The development of these colleges has resulted in a program for academic farm training that is the same all over: a combination of classroom training and practical experience on college-owned farms. Most governments with an agricultural policy maintain learn-at-home courses for farmers who can't take the time to attend school.

Today, the science of farming is split up into five areas of study: soil science, plant production, animal production, economics and management science, and agricultural engineering.

# MODERN FARMING

## SOIL SCIENCE

If soil is not fertile, crops don't grow. The more fertile the soil, the better crops grow. Soil Science deals with all factors relevant to soil fertility, including the uses of water. Soil Science began with the theory of humus, formulated in 1809. This theory formalized the long-known but poorly understood principle that decayed vegetable matter, called humus, added fertility to soil. In 1840, Justus von Liebeg introduced scientific experimentation with soils, including a theory of the necessity for soil to have mineral nutrients.

Now, the general theory of soil fertility embraces soil cultivation, soil enrichment with humus, soil enrichment with nutrients and soil preparation in accordance with crop demands (which includes water regulation, especially drainage).

Soil Cultivation deals with physically improving and preparing land for crops. This includes breaking up the land with plows, eradicating weeds, preparing seedbeds and aerating the ground to allow oxygen to reach the seeds.

Soil Enrichment deals with adding nutrients to the soil. Nutrients include both naturally decayed vegetable matter, humus and chemical fertilizers. It also encompasses crop rotation schemes that call for planting special crops—usually legumes or grasses used for forage—to fix nitrogen in the soil, which replenishes the soil's fertility.

Soil Preparation deals with irrigation techniques and drainage schemes to keep the water on the crops where it does the most good, rather than running off, being wasted and causing erosion problems. Water regulation deals both with piped-in water and the use of water from rain, flooding and snowfall. Drainage techniques include methods to keep the irrigation-water salts from building up around plant roots and stealing water from them.

# PLANT PRODUCTION

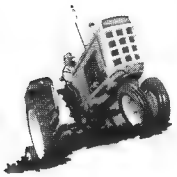
Plant production deals with the actual plants, rather than the soil they are grown in. Instruction in sowing dates was recorded in Egypt as far back as 2000 B.C. Greek and Roman classics, medieval herbals and 18th century Rationalist treatises gave instructions on how to achieve higher yields.

In the early 1800s, English researchers started field experiments. About this time, the re-discovery of Mendel's laws of heredity gave growers guidelines for developing new plants and led to modern plant breeding. The modern approach to plant breeding is to find or make varieties that are hardier, more pest-resistant and capable of flourishing in areas where they have not been grown before. Because many nations are attempting to make more use of their deserts, there has been much research into crops with a high tolerance for salinity.

In the 1900s, the world suffered several agricultural disasters, mostly caused by the introduction of plant diseases into areas without immunity against them. These disasters stimulated research into plant diseases and their causes.

Pest control needs led initially to chemical poisons effective against bacteria and insects. The poisons often caused as many problems as they solved, opening the ecosystem to different pests and otherwise harming the environment—traces of the poisons were found in many untargeted animals, including humans. Much research is geared to adjusting the biological balance of the environment to reduce the losses from diseases and pests.

There has also been research into making the fruits of the harvest more palatable to the product-buying consumer, including methods of preservation, to allow the foods to travel further and still be fresh and edible.



## ANIMAL PRODUCTION

This aspect of agricultural science concerns the genetics and breeding, nutrition and husbandry of animals.

The first animal used for crossbreeding was the horse. Hittite records from 1600 B.C. from the Tigris-Euphrates area detail breeding programs for chariot horses. In medieval Europe, draft horses were subject to carefully controlled breeding programs. The same methods were used in breeding 18th-century English racehorses.

The science of crossbreeding, bolstered by genetics research, has created a leaner, faster-growing pig, small turkeys to fit into small ovens and several sheep species meant to live in different environments. Methods used for crossbreeding range from simply bringing members of different breeds together to assorted schemes of artificial insemination.

Animal production studies also investigate the feed given to animals in an effort to produce the best animal without putting unfortunate byproducts into its meat or milk.

In the efforts to breed and maintain animals that are not prey to the hazards of open range living, a lot of research has been done in confinement management of animals, in which they are kept in a stall or pen for their entire lives. Some investigations show that confined animals are more prone to disease because of their stressed condition, although, of course, some types of disease prevention are easier with the animal confined into one small space.

## ECONOMICS AND MANAGEMENT SCIENCE

This aspect of agricultural science concerns behavioral science, agricultural policy, market research and rural sociology. The concept of a farm being an enterprise, affected by location, production techniques and market factors originated in the 19th century. And in the 20th century the idea became popular that like a business, a farm should concentrate on optimal production

lines (crops) to match the production factors (growing environment, market needs, highest profits) of the region. In other words, farmers used these techniques to specialize in crops that would bring in the most money.

Behavioral Science has been used to examine the psychological causes of problems in farm managers' decision making.

Agricultural Policy has been applied to the problems of increased production in the face of decreased rural population. It usually involves governmental policy toward loans to farmers, price supports for farmers and governmental sponsorship of research into machinery and improved crops.

Market Research is used mostly to study past statistical market trends in order to forecast production needs.

Rural Sociology is a relatively young discipline, originally fostered in the United States, but now present in virtually every country. Data from these rural studies is used in determining agricultural policy.

## AGRICULTURAL ENGINEERING

This aspect of agricultural science includes various areas of mechanical engineering, construction, hydraulics and soil mechanics. Its roots lie with the ancient canal makers and irrigation ditch diggers, but it has become a scientific discipline in the last century. This discipline has four areas of concentration: farm power and machinery, farm structures, soil and water control, and electric power and processing.

Farm Power and Machinery deals with the design and construction of power systems and specialized farm machinery such as harvesters, electric brooders and other equipment that is now part of any modern farm.

Farm Structures deals with the design and construction of farm buildings, barns and specialized buildings, as well as fencing.

Soil and Water Control deals with the problems of drainage, irrigation, soil conservation, hydrology and, to some extent, flood control. This is the nuts and bolts aspect of the water-control problems studied under Soil Science, as discussed above.

Electric Power and Processing deals with the distribution and application of electric power on a farm.

# MODERN PROGRESS IN FARMING

Where it had taken centuries to devise such improvements as the horse collar and the metal plow, scientific developments in agriculture multiplied on a yearly basis as agriculture caught up to the scientific method. Some developments were rushed into the field without adequate long-term testing and others have brought up intense philosophical debate, but there is no doubt that the face of farming has changed immensely in just the last century.

## CROP ROTATION

Reviving a failing field by leaving it fallow was discovered long ago, as described earlier. However, shortly before the end of the 17th century, the Norfolk four-course system was invented. First put into practice in Norfolk County, England, on the newly enclosed farms; by the early 19th century it had spread throughout much of Europe and the United States. Variations of this system are still in use today.

The four-course system calls for wheat (or some other major crop) to be planted the first year, turnips (used for feeding cows or sheep) the second year, then barley with clover and ryegrass undersown in the third. The clover or ryegrass was either used for grazing the fourth year, or cut for feed. This process has a cumulative effect, because the feed crops produce better animal manure, which enriches the field. Besides the benefit to the crops, the animals are better fed and healthier.

## PEST CONTROL

Unfortunately, agricultural products are prey to many hazards, especially insects. Insects are a common menace to the farm throughout the growing process. It seems that there is at least one insect that preys upon every crop developed to provide for our needs.

Insect plagues are documented in the Bible. Pliny's works on farming include descriptions of removing insects from plants by hand. A scientific study of insect pests was finally undertaken in the 17th and 18th centuries.

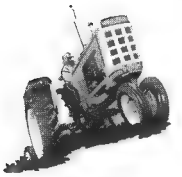
### FIRST STEPS

The first large-scale conquest of a pest by chemical means took place in 1840 when first lime sulfur, then sulfur dusting was used in Europe to control vine powdery mildew, a disease brought over from the New World.

John Curtis was the first writer to call attention to their serious economic impact of insect pests in his book, *Farm Insects*, published in 1860. In the 1870s, various experimenters found ways of using sprayed chemicals such as calcium and lead arsenates, nicotine, pyrethrum, derris, quasia and tar oils. One mixture, called the Bordeaux mixture (copper sulfate and lime), was accidentally discovered in 1882 and is still used against vine downy mildew. Also in the 1880s, there were a number of experiments in importing natural predators against insects that crossed the seas and became major pests in a predator-free environment.

### THE MAJOR PESTICIDES

In 1942, Dr. Paul Muller of Switzerland discovered the insecticidal properties of a substance first synthesized in 1874. Called dichlorodiphenyltrichloroethane, it is better known now as DDT. Dr. Muller won the Nobel Prize for this discovery, which was far more persistent and effective than any other known insecticide. During World War Two, DDT was used for killing body lice and fleas. It stopped a typhus epidemic threatening Naples. Between 1945 and 1951, several similar pesticides were discovered, includ-



ing aldrin, chlordane, dieldrin, endrin, heptachlor, methoxychlor and toxaphene.

German poison gas research led to the discovery of the organophosphorus chemicals, some of which have systemic properties: plants can absorb them without harm and then become poisonous to the pests. Some of these chemicals were extremely toxic to people and warm-blooded animals. Sprayers had to wear heavy protective clothing and breathing devices. Others seemed to harm only the pests.

Initial tests of these chemicals seemed to indicate they were the answer to all of a farmer's pest problems. Their use became the instant solution; many farmers felt that if one application was good, then two or three was better. The answer to any pest problem was found in a bag or bottle of poison.

But in the 1950s, problems started to arise from these wonder chemicals. The insects who survived the first applications bred resistant descendants. Double and triple applications were necessary where single applications had been sufficient before. Moreover, many of the pesticides were not very specific. Useful insects and pest predators were killed as easily as the intended targets.

Finally, as documented by author Rachel Carson in her seminal book, *Silent Spring*, the plants and animals protected by the pesticides proved to have a heavy pesticide buildup within them. Worse, this buildup went right up the food chain, so that small birds that ate DDT-laden grasshoppers passed the DDT up to the predators that ate them. Cows that grazed over DDT-laden fields concentrated the toxin in their meat, which was then eaten by humans. The residual effects of those years of poisoning the soil and the food chain are still around and will probably be around for decades to come.

Experts investigated the various abuses and reappraised pest control. The result has been an "integrated" approach that uses chemicals as only one part of pest-control practices.

### INTEGRATED CONTROL

The United States and many other countries have now banned the use of DDT, though it is still manufactured and shipped to Third World countries that have no such laws. Milder, less human-toxic chemicals, such as malathion, are still used for crop dusting and other anti-pest operations.

Other methods of pest control include using radiation to sterilize male members of the pest species, thus causing the female members of the species to lay non-fertilized eggs. Another method induces lethal genes that mutate the insects' offspring so much they die. Some scientists are studying the use of chemical attractants that only attract the pests, which are then trapped.

A systemic fungicide has been developed that is absorbed by plants, making them fungus-resistant.

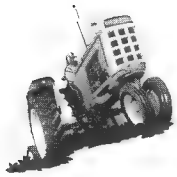
## FARM MECHANIZATION

### MECHANIZATION OF PLOWING AND PLANTING

The four-stroke-cycle gasoline engine was invented in the 1860s. Initially used in Germany as a stationary engine, it was later put on a wheeled cart for mobility, then by the end of the century geared and connected to the wheels to make it self-propelled. The tractor was born.

The number of tractors went from about 600 in the United States in 1907 to more than 3 million in the mid-1950s. Tractors now exceeded the number of horses and mules.

Other modern farm devices include grain combines that both cut ripe grain and separate the kernels from the straw (developed in 1938), all-purpose corn combines that plow, plant and harvest corn (developed after the Second World War), cotton pickers that separate the bolls from the seeds and bale the cotton (invented in 1927), tomato harvesters that can pick tomatoes and grade them by size (in use since 1987), and a variety of spraying machines for applying pesticides. At first, tractors were used to haul these other mechanisms, but many of them have become self-powered.



As well as equipment made directly for farm use, automobiles and trucks are used to haul farm produce, and animal trailers and airplanes are used for dusting crops, scouting land, distributing fertilizer, seeding forest terrain and controlling forest fires. Rice growers use airplanes for seeding, dropping fertilizer and spraying insecticides. Ranchers use planes to drop hay for starving cattle in times of blizzard or drought.

Airplanes are used to transport valuable livestock and perishable farm products everywhere in the world. They are particularly useful in areas like Australia and western Canada, regions extensively farmed but otherwise underpopulated.

**POWER SYSTEMS**

One of the most significant technological advances for farming in the 20th century was the electrification of the farmyard. It is believed that the first farm cooperative to bring electricity to farmland was organized in Japan in 1900, followed by similar groups in Germany in 1901. By the 1920s, bringing electricity to farmers had become a national interest in many countries. Now, more than 90 percent of the advanced nations have adequate electrical supplies for their farming populations.

Electricity is used for conditioning and storing grain and grass, preparing and rationing animal feed, controlling the environment in pig-rearing pens and chicken coops, and horticultural endeavors in greenhouses.

On dairy farms, electricity is used to automatically control feed rationing, cow milking and milk cooling. It is also used to operate fans and heaters for proper produce and feed storage.

## CONFINEMENT MANAGEMENT

One aspect of modern animal farming that has taken efficiency perhaps a bit too far is the practice of enclosing—restricting animals to single stalls that limit all of their movement. This is called "Confinement Management."

Various animals, from cattle to chickens are kept nearly motionless and fed hormone-laced food to promote their growth until they are big enough to market. The farms themselves often look more like industrial parks full of blank-walled buildings, except that the overpowering smell of animal waste is not common in your usual office park.

By keeping the animals enclosed in one place, the farmer is ensuring that the animal is not endangered by any of the hazards of loose wire, chuckholes, toxic vegetation, or outdoor pests that could cut down the farmer's profit margin. But the price is that an animal whose ancestors ranged widely for millennia is now kept in a stall for its entire life, until the butcher's automated knife descends. This quandary of ethics versus profit is causing much debate among cattle ranchers and animal rights groups.

Confinement management saves both land and manpower, but there are many hidden costs. Cramming animals into tight spaces encourages the spread of disease. To offset this problem the animals are fed costly medicines with their feed and given regular injections. Moreover, the stressful nature of this confinement weakens the animals' systems, making them all the more susceptible to opportunistic diseases and more inclined to die early. Of course, many industrial farmers just raise animals for one or two seasons of milk or eggs, and then consider them expendable. However, the cost of replacing confined animals is far greater than on farms with pastured animals.

Most of the cattle and sheep of the world, even in advanced countries, are still kept in pastures. The cost of a fully automated enclosure system is more than many ranchers can afford; modern animal feed systems and veterinary medicine can keep animals in the field quite healthy without sealing them off from the outside world. But as the cost of enclosure mechanisms comes down and the opportunity to get rid of pasture land by selling it to land developers increases, the alternative of enclosing one's herds and automating their feeding and care, which gets you more animal from less space, becomes all the more tempting. Confinement is a "solution" with its own set of problems.

# WHAT FARMS GROW

A farm's main purpose is to raise food for people to eat. This includes both crops (plants), and livestock (animals). In the 1920s and before, farmers grew a variety of crops and animals on each farm. Since then, farmers have become more and more specialized. Very few farms today raise both crops and livestock, and most raise only one crop or one animal. This trend is evident in most American and European countries, and becoming more common in Third World countries as the influence of American and European methods becomes more prominent.

## NEW CROPS

For thousands of years, the three main crops of farmers in America, Europe and Asia have been corn or maize (which originated in the Americas), wheat and barley (which originated in the Near East and Europe) and rice (which originated in Asia). However, the last couple of centuries have introduced some other significant crops that are not really new, but whose value is only now being appreciated.

### SOYBEANS

Soybean meal and oil have been sources of nutrition for centuries in the Orient. Imported to America around 1804, it was considered a "rare garden plant" until the early 20th century. At that point, farmers began growing it for hay, pasturage and green manure.

In the early 1930s a method was found to extract the oil without the disagreeable odor that usually attended its processing. During the Second World War soybeans became an alternate source of protein for meatless meals.

Soybeans are now used as the basis for mayonnaise, margarine, shortening, salad oil and other food products. Their non-food uses include paints, inks, oils and varnishes.

### SORGHUM

Sorghum originated in Africa; it is thought to have been domesticated in Ethiopia by 3000 B.C. It spread from there throughout the Near East and all the way to India by 1000 B.C., and was carried to

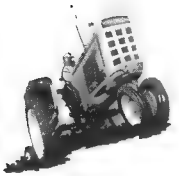
China and other East Asian countries. It is known as Guinea corn, mtama and kafir corn in various parts of Africa, juar in India, kaoliang in China and sorgo in the United States.

It first came to the United States in slave ships as a grain to feed to the slaves, and by the 1930s was used as a grain, forage plant and silage for livestock. Sorghum grain is consumed by people and animals throughout the world, usually as goods baked from sorghum flour. In Africa, it is also brewed for beer.

## SUGAR BEETS

The method of obtaining sugar crystals from a beet was discovered in 1747. Before then, this European vegetable had been mostly used for animal food. Development of the beet as a source for sugar was explored during the Napoleonic wars, when sugarcane from the Caribbean was no longer available in mainland Europe. Napoleon hopped on the sugar beet bandwagon and by 1814 many small factories were in operation throughout the steadily disintegrating Napoleonic Empire. After his defeat and the lifting of the blockade, the market for beet sugar declined, but it bounced back because the process had become cheap enough to compete with sugarcane. By the end of the 19th century, a third of the sugar consumed came from beets.

During and immediately after the Second World War, several developments in beet harvesting machinery made beet-raising even easier and more profitable. The hours of labor cost have been reduced to a fifth of what they were 75 years ago.



# GENERAL CROPS

There are many different ways to divide up types of crops. Below, we have divided them into 11 categories, some of them edible by either people or animals, some useful as medicines or as cash crops for other purposes besides consumption. In some instances, entries fall under multiple categories.

## CEREALS AND GRAINS

Cereals and grains are essentially the bread crops. They provide starch, carbohydrates and some protein and are the mainstays for much of the world's diet. Until the 1920s and 1930s, they were the mainstay of the American diet. Now, many of these grains are used as livestock feed. Cereals and grains include:

| | | | |
|---|---|---|---|
| Amaranthus | Barley | Buckwheat | Corn |
| Emmer | Job's Tears | Millet | Oats |
| Rice | Rye | Sorghum | Wheat |

## PULSES

Pulses include legumes, peas and beans. They are typically very nutritional, many having high protein value. Vegetarians use pulses instead of meat as a protein source. Pulses include:

| | | | |
|---|---|---|---|
| Beans | Chayote | Cowpeas | Groundnuts |
| Lentils | Lupine | Peanuts | Soybeans |

## ROOTS AND TUBERS

Root and tuber plants are just as their name implies, edible roots. A tuber is a root that acts as a seed pod as well as a root. Such plants are high in starch and frequently have a good concentration of protein. Roots and tubers include:

| | | | |
|---|---|---|---|
| Arrowroot | Beets | Carrots | Cassava |
| Elephant's Foot | Jicama | Lotus | Mustard |
| Potatoes | Radishes | Sweet Potatoes | Taro |
| Turnips | Yams | | |

## OIL CROPS

Oil crops are those that are grown more for their oil than for their eating value. The oils can be used as food additives, cooking oils, and sometimes as medicines. Some oils are high in protein and are used as meat and dairy substitutes. Many oil plants actually fall under some of the other categories listed here and are harvested both for oil and their other functions. They include:

| | | |
|---|---|---|
| Butternut Trees | Castor Bean (Castor Oil) | |
| Coconut | Flax | Mustard Seed (Mustard Oil) |
| Olive Trees | Palm Trees | Peanuts |
| Poppy Seeds | Rapeseed | Safflower |
| Sesame | Soybeans | Sunflowers |
| Tung Seeds (Tung Oil) | | |

## FRUITS AND NUTS

Fruits and nuts are categorized as consumable seeds that grow on trees or bushes. This is their only shared characteristic. Otherwise they come in amazing varieties of size, shape, taste, nutrition and care needs. Many fruits are a good source of vitamin C. Fruits include:

| | | |
|---|---|---|
| Akee | Apples | Apricots |
| Avocados | Bananas | Baobab |
| Brazil Nuts | Breadfruit | Cactuses |
| Cashew Trees | Citron | Durian Trees |
| Feijoa | Ginkgo | Grapefruit |
| Grapes | Guava | Jackfruit |
| Lemons | Limes | Litchi |
| Longan | Loquat | Mangoes |
| Mangosteens | Oranges | Papayas |
| Peaches | Pears | Pineapples |
| Prickly Pears | Rambutant Trees | Sapodilla |
| Shaddock | Tangerines | Walnuts |
| Water Chestnuts | Watermelons | |

## VEGETABLES AND SPICES

This category covers everything from salad lettuce to exotic spices used in Oriental cooking. In general, these plants are grown on the ground. Vegetables are good sources of many necessary vitamins and roughage. Some have respectable amounts of protein. They include:

| | | |
|---|---|---|
| Anise | Artichokes | Black Pepper |
| Bottle Gourd | Broccoli | Brussels Sprouts |
| Cabbage | Caraway | Cardamon |
| Chili | Chinese Cabbage | Clove |
| Coriander | Cucumbers | Cumin |
| Dill | Eggplant | Fennel |
| Fenugreek | Garlic | Ginger |
| Leeks | Lettuce | Nutmeg |
| Okra | Onions | Parsley |
| Purslane | Saffron | Squashes |
| Tomatoes | Turmeric | Vanilla |
| Wild Rice | | |

## FIBER PLANTS

Fiber plants are not usually consumed—they are used to make things such as clothes and rope. Many fiber plants are also sources of oil and medicine. In many cases one part of plant may be used for fiber and another used for a consumable product. They include:

| | | |
|---|---|---|
| Baobab Bark | Cotton | Flax |
| Hemp | Jute | Kenaf |
| Mague | Palm Trees | Ramie |
| Sisal | | |

## STARCH AND SUGAR FOODS

These are the sweeteners. Diets all over the globe use sweeteners—one common trait for all humanity seems to be a sweet tooth. The following sugar foods can all be appreciated in one form or another in their natural state. They include:

| | | |
|---|---|---|
| Carob Trees | Palm Trees | Sorgo |
| Sugar Beets | Sugarcane | |

## FORAGE

Forage crops are used almost exclusively to feed animals. They include:

| | | |
|---|---|---|
| Alfalfa | Bent Grasses | Bermuda Grass |
| Betel Leaf | Croton Oil | Grass |
| Timothy (Herd's-grass) | | Vetches |

## DRUGS, NARCOTICS, FATIGUE PLANTS

Since people started gathering plants they have tried to find ones that were magic: plants that would heal ills, raise consciousness, aid sleep or help work magic on a foe. In many cases, there was success. Modern medical researchers are still finding "folk" remedies that can help cure illness. Researchers with less altruistic agendas are still finding plants that can cause euphoria and addiction. They include:

| | | | |
|---|---|---|---|
| Agave | Belladonna | Camphor | Coca |
| Cocoa | Coffee | Cola | Foxglove |
| Ginseng | Guarana | Henbane | Jimsonweed |
| Licorice Roots | Maté | Opium Poppies | Peyote |
| Rhubarb | Senna | Tea | Tobacco |

## UTILITY CROPS

Some plants are useful for more than eating or otherwise consuming. Some grow into useful shapes or can be used for practical purposes with a minimum of processing. They include:

| | | |
|---|---|---|
| Bamboo | Bottle Gourd | Rubber |

# ANIMALS

What would the traditional farm be without its small herd of dairy cows, the pigs in their pen, the chickens and geese running around underfoot and the plow horses whickering from their corral? Well, most farms today have very few of these elements. If they have animals, they are likely to be concentrated in one species. Most farms that raise animals produce few if any crops.

**Cattle** are raised for milk and, in America, South America and Europe, for meat. Other nations and cultures, such as India's, value cattle too highly as work animals and sources of milk to eat

them. Beef is a favorite meat for many people around the world, but it is seen to be a very inefficient source of protein when you compare the acreage of feed needed to raise a beef cow against the acreage needed to feed a person with grain products.

Confinement management has been used with some success (according to confinement managers) with both dairy cows and meat cows.

**Sheep** are mostly raised for their wool coats and for meat. However, sheep milk is becoming more and more popular in some European countries and in Australia. Some farms in these countries are now specializing in milking sheep.

Sheep are a very rugged animal that can graze where other animals would starve. The ease of raising sheep in comparison to crops and cattle caused the sociological phenomenon known as the Clearances in the early 1800s in Scotland. Scottish landlords turned all their tenant farmers out of their villages and burned the villages to the ground in order to have space for raising sheep. This is one reason why there are so many people of Scottish descent living in the United States, Australia, and Canada.

Sheep are so cheap to care for that confinement management has not really touched the sheep flocks yet. Some wool-bearing sheep are kept confined, however, as are lambs meant to be slaughtered for meat.

**Swine,** or pigs, are raised for meat. They are sometimes preferred for breeding because they can eat many different substances and can be kept in a relatively small area instead of the vast fields needed for cattle and sheep. Even so, pigs are frequently the victims of confinement management.

**Poultry** usually refers to chickens, though geese and ducks are often raised for meat. Chickens are also raised for eggs. The traditional farm generally has a hen house with a fenced-in yard where the chickens wander and peck their feed, just as their ancestors did in the wild.

Confinement management for chickens packs them into suspended cages, with padding for eggs to drop onto. Their beaks are clipped to keep them from pecking each other. Meat chickens are generally slaughtered after a couple years of life.

**Horses,** in some countries, notably France, are raised for meat, but in general horses are too valuable as a cash crop to eat. Farmers used to raise horses as work animals, but their major market these days is as riding animals. Unless a farmer raises horses for the purpose of riding around his fields, horses are generally raised by specialty ranchers and are not part of the usual farming mix (assuming the farm has any mix at all).

## PERILS OF THE LAND

Along with insect pests, birds and rodents are menaces at two times in the growing process—when the seed is being put into the ground and during harvest time.

## WEEDS

The common definition of a weed is a plant that is not valued for use (to eat or sell) or beauty, and that either encumbers the ground or hinders the growth of valuable vegetation. Weeds actively fight the growth of crops. There are many plants that can be removed from a field and never re-enter it. These are not weeds. A weed is a plant that attempts to take over or keep possession of a field where someone wants to plant something else. Some ecologists feel that every plant has value and has a place in the ecosystem, but from a farmer's viewpoint, weeds have no place on the farm.

Weeds can be plants native to an area that try to grow where they have always grown, such as the sunflower in Kansas, or they can be immigrants, brought along with some more useful plants, such as the Russian thistle in Kansas. They can even be a plant that was formerly useful, such as crabgrass, once grown as a cereal in Central Europe, now the bane of lawn growers and farmers everywhere.

This is not to say that weeds cannot be useful. There was a massive multi-car accident on Interstate Highway 5 in California in 1992 that was caused by dust storms. The dust arose from field edges that had been cultivated but not planted. If weeds had been present on those field edges, they would have held down the dust and stopped the dust storm from blinding the motorists on the freeway.

## SALT CONCENTRATION

One of the biggest ongoing pollutants threatening crops all over the world is high soil salinity—a high concentration of salt in the soil. This salt is actually a collection of various mineral salts, including sodium chloride (table salt), Epsom salts, sodium bicarbonate and gypsum. Insoluble salts, such as lime and gypsum, are not real hazards to plants, but soluble salts fight with the plant seeds and roots for water. The higher the salt content, the fewer nutrients a seed can take from the soil and the fewer nutrients a root system can draw from the soil.

Salt comes from two sources: the soil itself and the water the soil is irrigated with. Most desert and semi-desert soils have a lot of salt, the result of past generations of water evaporating. Water in the same vicinity as desert soil is also likely to have high concentrations of various salts. Removing the salts from the water (desalinization) is very expensive. Also, this process essentially creates drinking water, and it seems like a waste to use drinking water on irrigation. Instead, growers and agricultural scientists are trying to find the most salt-resistant varieties of various food crops and breed them to be even more resistant to the effects of salty soil.

## INDUSTRIAL POLLUTION

These are pollutants from nearby (and not so nearby) non-farming industries that affect farmland and crops. Industrial pollution takes two main forms: pollution of rivers and water tables, and air pollution causing acid rain.

Over the last thirty years, more and more factories have fled the cities for more rural areas where land and labor are cheaper. This trend started after the Second World War, and many rural factories are more than thirty years old. Moreover, mines have always been in rural areas, in many cases in mountain areas near water sources that feed the rivers that many farming areas use for their water.

Rural factories frequently disposed of the waste by dumping it in the nearest river. It's an ancient, virtually traditional, practice. When the waste was the effluvia of an 18th-century metal-working shop, this was reprehensible but not catastrophic. Modern industrial practices that use a great many toxic substances as part of the job can cause catastrophic effects on nearby water sources used as waste-disposal units. Near Cleveland, Ohio, the infamous Love Canal caught fire. Lake Erie was stripped of all its life except for a green scum.

In urban areas, citizen groups gathered and, in many cases, made their legislators pass laws that required the industries to both clean up their acts and clean up the local waterway. Lake Erie has fish in it again and the Love Canal, while not a waterway you might want to drink from, is unlikely to catch fire again.

But rural districts that had no way of controlling runoff from plowed fields getting into the nearby rivers had no procedures in place to handle industrial and mine dumping of waste products into the same rivers. Agricultural water sources are getting more and more polluted with stranger and stranger chemicals. The Environmental Protection Agency, a chronically under-staffed and under-respected agency, is trying to get some relief from this situation, but most of the activity seems to be finger-pointing with little real action.

Of course, the lack of action can be attributed to the very real industrial problems of where to put these wastes and the farmers' own lack of control of their waste products.

The other byproduct of industrial waste, acid rain, has a much more widespread effect. Acidic substances are blown out of the smokestacks of American (and many other nations') industries every day. These substances rise to the top of the atmosphere and come back down again, often mixed with other substances from other factories. The result can be a highly acidic rain that strips trees of leaves, etches the paint off of houses and settles in agricultural fields, killing the crops therein. No area is safe from acid rain. Forests unvisited by man in Canada have been attacked by pollutants from factories in New York; pollutants seem to have traveled to Florida and the Caribbean first before making the trek to Canada.

## EROSION

One of the great hazards facing modern American farmers is erosion. Wind and water are eroding arable land faster than natural processes can put it back. Water erosion happens because irrigation water carries some of the soil away with it when it drains. In the earlier decades of this century, farmers were trained to create small fields with banks of soil around them that would hold in the soil. They also used contour plowing, a method that kept the plowed rows parallel with the land's depressions, so that water and soil would not drain off into the nearby riverbeds.

However, as machinery got bigger and bigger, it was more efficient to plow and harvest in long straight lines, without bothering about the contours of the land. Most modern, large farms use this bigger machinery and these newer methods, allowing for constant erosion as irrigation water carries away the soil.

This reliance on large machinery has also reduced the number of windbreaks found on modern farms. Farmers pulled up the trees and hedges that formed the windbreaks so they could have longer, straighter rows to plow and harvest. Wind that had been broken up by the windbreaks now has a clean shot at picking up the soil in a field and scattering it over the next five counties.

Worse, many farmers no longer plant ground cover on unused fields over the winter. If there is no ground cover, they can start planting faster. However, this means that winter winds have a field day picking up the unbound soil and tossing it around.

## FARM FINANCE

### THE EXPENSE OF RUNNING A FARM

In the late 1800s and early 1900s, land in America was free. Acts of Congress called the Homestead Acts allowed a potential farmer to claim up to 160 otherwise unused acres as a homestead. With some hard work and some weather luck, the new farmer could become self-sufficient almost immediately. With the burgeoning population in the cities, there were more and more customers for the food grown on the farms, providing an income for farmers who were close to a grain elevator and a railhead. And, in those days, more and more railheads were appearing throughout the formerly unsettled lands of the West.

The free land is gone now. Land everywhere in the country is at a premium, and the farmer has to compete with ruralizing industries and suburban housing for the land.

Moreover, the days when a farm could be run with a plow, a plowhorse and a bag of seed are also long gone. Farm machinery is becoming more complex and expensive, and seeds, fertilizer and irrigation are keeping pace with the machinery. A new farmer is looking at a mega-thousand-dollar outlay before he can start to plant a crop.

### SOURCES OF INVESTMENT

Beginning farmers have great difficulty getting loans because they either don't have enough collateral or equity in other property to guarantee the loan or enough experience to justify a bank taking the risk. Farming is a very expensive proposition. In the last decade many farms have failed because a bad crop or a bad market destroyed cash flow, and the farmer could not make payments on his loans.

In the 1970s, when savings-and-loans and banks were more regulated, potential borrowers had to have co-signers for loans. In the

de-regulated 1980s, this requirement was often ignored, or else unreliable co-signers were accepted. When a farm failed, there was no one to repay the loan to the financial institution, which meant that the institution had no money, could not maintain its services to its other customers, and thereby failed. In the mid-1980s, the national farm debt was over $200 billion.

## FARM SUPPORTS

Between the years 1910 and 1914, the American farming establishment was at a joyous equilibrium. Just enough farmers were producing just enough food to feed the American public and a few foreign markets, and demand was just sufficient that the farmers were receiving a good return on their investment of time and money.

In 1933, in the depths of the Depression, the Roosevelt administration pushed the Agricultural Adjustment Act through Congress. It introduced the concept of parity. The stated goal of parity is to restore the purchasing power that agricultural commodities had in the time period between 1910 and 1914.

To this end, Congress started paying farmers for their crops and, in later years, paying farmers not to grow crops. The main theory is that the government buys the crops at a parity price, then holds the crops until the world market price is high enough that the government can get its money back.

The problem with this scheme is that when the market prices are down, the government cannot sell the crops at a decent price, so it holds on to them. This is called the farm surplus. When the prices are up, the government can sell its surplus, but only by competing with the farmers' new crops. The parity arrangement can also include the farmers being paid in credits toward the stored crops, so they can sell the stored crops on their own. The exact scheme changes from year-to-year as the Department of Agriculture and the Congress try to work out the farm surplus problem. Farmers are left in the middle, wondering just what

support, if any, they will get from the government for the current year.

These supports are not unique to the United States. Other countries have similar schemes, though most involve more direct government intervention in the planting and sale of crops. Many set up tariffs on foreign crops so that they must be sold at the same price as the domestic farmers wish to sell them. Some nations deliberately sell crops at a low price just to gain a market share and drive off the higher-priced competitors, such as the United States.

The United States and the European community just underwent protracted wrangling over the issue of farm supports for European oilseeds that, according to the United States, provide an unfair advantage to European farmers in the international markets.

## TYPES OF MODERN FARMS

Throughout history, as a culture increases in size and power, the size of individual farms has grown and the number of farms has fallen. In Sumer, individual planters became subservient tenants to the great temples. The independent Roman farmer of the Republic either became a massive landholder or retreated to the cities. Most of the countries of Europe have duplicated this process in their own histories. In France the process was reversed through revolution—the smaller individual farm became institutionalized by law, but France has proven to be the exception. Despite the American tradition of the rugged farmer being the backbone of the country, the United States has not proved immune to this agricultural evolution.

Between 1920 and 1985, the total number of farms (based on a Department of Agriculture criterion of a farm being any agricultural property that provides more than $1,000 in income in a year) in the United States declined from 6.5 million to under 2.2 million. At the same time, the average size of a farm has risen from under 150 acres to over 450 acres. If you ignore all of the marginal farms

that really do not support their owners, the average size of an American farm is closer to 1,000 acres. Look at the changes in the number of farms and farm sizes, as well as some other revealing factors, between the farms of 1967 and the farms of 1992.

**AVERAGE FARM SIZE**

| | 1967 | 1977 | 1987 | 1992 (est.) |
|---|---|---|---|---|
| **Total Acres** | 1.12 bil. | 105 bil. | 0.99 bil. | 0.97 bil. |
| **Avg. Farm Size** | 355 acres | 427 acres | 451 acres | 485 acres |
| **Avg. Land Value (incl. bldgs.)** | $168/acre | $474/acre | $547/acre | $690/acre |
| **Total Debt** | $43 bil. | $103 bil. | $154 bil. | 135 bil. |
| **Agricultural Exports** | $6 bil. | $24 bil. | $29 bil. | $40 bil. |
| **Farm Subsidies** | $3 bil. | $2 bil. | $17 bil. | $10 bil. |



In the United States, most farms are family-owned. At the same time, very few are individually-owned. This seeming contradiction is a result of families incorporating themselves for tax reasons, so that their farms are owned by a corporation in which all the stockholders are family members.

As a part of this incorporating of American farms, the number of farms has been shrinking at the same time the average size of farms has been increasing. Since 1978, the process has only accelerated. In the late 1970s and early 1980s, farmers bought up all the land they could to feed the markets of the world, only to overproduce and have the markets collapse on them.

# THE DYING INSTITUTION OF THE AMERICAN FAMILY FARM

In most of the world, the family farm is still the mainstay of agriculture. The main exception is in communist and formerly-communist countries, where farms were collectivized and private ownership of farms was forbidden. However, even in ostensibly communist countries, such as China, this trend is changing back to private ownership of at least some of the farmlands worked by the farmers.

But while much of the world shifts towards democracy and looks to private ownership of farms, a different form of collectivization is happening in America. In the United States, there are no state-owned farms (except for some correctional and experimental facilities), but there are many corporate-owned farms. The people who work them have no ownership of the actual farm (unless they happen to be shareholders in the owning corporation)—they are just hired hands.

The popular American conception of the large farm family that works the land—and through the sweat on their brow and the muscle of their backs leads a healthy apple-cheeked rural existence—is now largely mythical. Big business is taking over and the farmers have had to become businesslike themselves to meet the threat of corporate absorption.

The only types of farms to increase in number since the 1960s are the largest farms (over 1,000 acres) and the smallest farms (under 50 acres). The interesting aspect of this is that in the same time the total farm acreage has actually shrunk. The large farms are essentially the result of smaller farms being purchased and combined. The small-farm increase is discussed under Subsistence Farming below.

These larger farms are owned either by major corporations that have diversified into the agricultural business, or by families who have incorporated. These family farms are now businesses, though many proprietors still try to maintain their old-style farm life.

But in most of these farm families, the draw of living in the city or the suburbs—with all the modern conveniences and a job that pays for them—is too strong an attraction for the younger members. More than half of the family farmers currently working their farms are over 60. Their children have gone on to different lives, and the chores are done by hired hands with no vested interest in the farm. The rest of the family just shows up for holidays. There are certainly exceptions to this tendency, but the trend has continued for the last thirty years.

# SUBSISTENCE

Subsistence farming is simply farming to grow enough food to feed yourself and your immediate family. This is what many people around the world do every day because they have no choice. There is a bit more choice in the United States, though many small farmers are caught in a cycle where they must subsistence farm, even though they would rather be making a profit.

## LIVING OFF THE LAND

Many people in the United States of America have chosen to try subsistence farming as a lifestyle choice. It is an outgrowth of the New Age and Back to Nature movements of the 1960s and 1970s. The basic premise is that the farmer only grows enough to feed himself and his family and perhaps enough other food to barter with others for cloth for clothes, mechanical work the farmer cannot do for himself, and food and other supplies (such as gasoline) that the farmer cannot grow or manufacture.

Usually, the farmer diversifies greatly, with a little grain crop and lots of different vegetables and fruits, depending on what the land and weather permit. He might keep goats and some poultry and a few pigs. Cattle are usually too expensive and time-consuming. Depending on how determined to get back to nature the farmer is, he might even invest in a plow horse instead of a tractor.

Of course, a subsistence farm is small, probably under 100 acres. Unless the farm is actually a commune or cooperative of several healthy adults, there is no reason to have more acreage.

This back-to-nature lifestyle often sounds attractive, but there are a number of pitfalls for eager farmers-to-be. For one, unless they inherit some appropriate land, they have a hard time finding good land for a farmstead. The civilized world is pretty well filled up with people. All the good farmland is owned by someone, usually someone trying to grow crops for profit. The land can be bought (often from banks who have foreclosed on a farmer-for-profit who went bust) but only for a very high price. The subsistence farmer is virtually forced to be part of the money-making rat race he is trying to avoid by becoming a farmer in order to afford the money to become a farmer.

Once the would-be farmer has his farmstead, he has put his life up as a hostage to fortune. For-profit farmers have disasters all the time: pest infestations, lack of water, toxic water, animal diseases and crop diseases are all waiting for the opportunity to strike. Many for-profit farmers have had to fold up their tents and go to the city to try to find a job because of these calamities. But a for-profit farmer, if he has been at all successful, has a bank account and credit. He can rebuild from a disaster.

The marginal subsistence farmer who wants to avoid commercial ties also avoids the financial cushion that can save him from disaster. The loss of a crop is not just a blow to the bank account; it can mean starvation for his family. It can definitely mean the loss of the farm.

## PART-TIME FARMERS

Farming includes the activities both of planting, nurturing and harvesting plants and of breeding, raising and exploiting animals for the benefit of the farmer and his society. Many farmers do not raise animals except for personal use and others, such as dairy farmers, concentrate solely on animal husbandry, but both activities are essentially farming.

More than 50% of farmers "moonlight" by holding down other jobs while still working their farms. Many farmers work a regular 9-to-5 day in the nearby town as anything from a car (or farm implement) salesman to a computer programmer; they do their farming chores before and after work and on weekends.

Some farmers take these outside jobs because they need additional money to support their farms, either in lean seasons or in lean years. Other farms are actually the hobbies of people who have other incomes. "Weekend farmers" work on their farms over the weekend and hire labor to handle other daily chores, or they dump the jobs on their spouses and children. We might call such farmers "half-subsistence" farmers, since they do have a financial cushion and actually support the farm with another income. This practice is also popular with some people who work at home or as part-time consultants in anything from farming practices to computer game design.

A "gentleman farmer"is a person who farms as a hobby because he has another source of income, or delegates the actual operation of his farm to others and just reaps the rewards.

## TENANT FARMING

A tenant farmer is a person who rents farmland to grow crops. In some cases the rent is paid in crops or a combination of money and crops; in other cases the contract is strictly a money rental. Many family and corporate farmers are part-time tenant farmers; they rent land from others to expand their own crops when they think it will be financially useful to do so.

Tenant farming can become a variety of slavery when the rents are so high that they can barely be paid. The tenant farmer must continue to rent and work the land while his debt to the landholder grows. This can result in the doomed cycle of the farmer unable to go anywhere else, never making enough money off the crop after paying his rent to save enough money to buy his own land.

In the American south and in colonial countries around the world this was a way of life for more than a century. It still is in many places where big landowners just collect their rents, and frequently monopolize every other aspect of their tenants' lives by owning the only local stores, and perhaps owning the machinery that the tenants must rent to cultivate their crops.

## INDUSTRIAL FARMING

This term can be used to describe the cultivation techniques of some family farms (usually ones that have been incorporated into family-held corporations) and farms owned and run by outside (non-family owned) corporations. Such farms can be found all over the world, from massive corn farms in the American Midwest to rubber plantations in Malaya. The characteristics of industrial farming for the purposes of this discussion are twofold—specialized crop cultivation and cultivation of many hundreds of acres. A "factory farmer" (also called an industrial farmer) is a farmer who applies the efficiency—and callousness—of industrial production lines to farming.

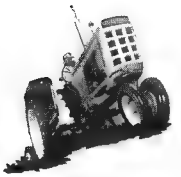
### SPECIALIZED CROP CULTIVATION

Most industrial farms specialize in one or two crops, such as wheat, corn, rice or certain vegetables. These are meant to be cash crops. Nothing is being grown for the use of the farmers; everything is to be sold for profit.

### INTENSIFIED ANIMAL PRODUCTION—CONFINEMENT MANAGEMENT

As discussed earlier, the animal husbandry version of industrial farming calls for keeping animals in close-fitting pens or stalls at all times. Their food is automatically put into their feeding bins at the appropriate times; eggs, milk and other byproducts are taken out as needed.

The rationale behind this treatment of animals is to obtain consistent-quality meat and dairy products. This result is obtained at the expense of treating animals like machines and thwarting their every instinct. Cattle are force-fed and kept in



restrictive stalls to prevent them from bruising their meat or harming their milk flow. Calves are raised in boxes and slaughtered for veal without ever seeing the sky or even being allowed to stand up. Chickens are kept in close-fitting cages and de-beaked to keep them from harming each other. Other animals, such as swine, are also raised in confinement.

Of the major meat animals, only sheep are rarely raised in confinement, because sheep can live on land that can't be used for anything else. It's just not cost-effective to confine sheep. However, some experiments have shown that with certain hybrid breeds of confined sheep, more lambs are born per year and the sheep don't die from various range diseases and toxic plants, so some confinement management is likely.

## THE ECONOMIES OF SCALE

To make the most profit, the industrial farmer has to farm as many acres as possible with the same crop so that he can economize on hiring transient help and cheaply rent the needed farm equipment and train cars or truck containers for shipping. The more diversified the crops are, the more different pieces of machinery are needed, the more shippers must be used to ship different products with different ripening dates and the more extra help must be hired to assist with different harvesting times. Moreover, with bigger harvests, the farm proprietor can get discounts on the per-item shipping and handling costs of the crops.

## EFFECT ON OTHER FORMS OF FARMING

Industrial farming tends to have a missionary effect on other farms. An industrial farm is so efficient at producing its product that other farmers who wish to join in the lucrative market must adopt the same principles of specialization and expansion. This tends to turn an entire region into a collection of cash-crop farmers; other crops that are perceived as unprofitable can disappear. The lack of these other crops creates the need to import them from other areas, thus raising the prices to the consumers, including the industrial farmers and their workers.

There are places in the world where people have starved because most of the arable land was devoted to a cash crop and no one was growing basic foods for the people who grew the cash crop.

Moreover, dependence on this cash crop can be an economic disaster if the market for the cash crop goes away. Such a disaster happened in Brazil after the turn of the century when rubber, which had been a Brazilian monopoly, was transplanted to Malaya, where it could be produced by the rubber companies who would otherwise have had to buy it from the Brazilian state monopoly.

# CONCLUSION

Today's farming world presents a spectrum of conditions: from food preserved by irradiation now appearing on shelves all the way to slash and burn methods still performed much the way they were thousands of years ago. Science has revolutionized food processing; refrigeration, for example, has made possible the large meat-packing plants and shipment and packaging of perishable goods. Urbanization has fostered the specialties of market gardening and truck farming. Harvesting operations have been mechanized for almost every plant product known. Breeding programs have developed highly specialized animal, plant, and poultry varieties, thus increasing production efficiency. Yet much of the world still goes hungry.

And not all of these advances are thought to be purely progressive. There have been a number of backlashes to the factory farming techniques, demonstrated by a vocal consumer market insisting on "free range" animals, organic foodstuffs, and "green" legislation to inhibit use of chemicals, pesticides, and animal hormones and antibiotics.

Some areas in the United States have tried to restrict the size of huge agribusinesses to set acreage, but many loopholes have been found to escape the restriction. In California, a succession of drought years brought about a clamoring for reform of water allotments to big farms, with many environmentalists and urban dwellers claiming that big business farms are polluting the rivers and wasting precious water. Subsidies to maintain prices, once introduced, have proved extremely difficult to end, despite many voices of opposition. Representatives of the farm-states have fought for their continuation despite the high prices for commodities.

However much the laboratory and the legal process touches our tables in the future, it's safe to say that the prime movers in the farming process for some time to come will be the land, the skies and the farmers. When the moment arrives when apple pie is brought to the table in pill form, that's the time to start a diet.

# GLOSSARY

**Acid Rain**—Polluted rain created by industrial toxins. It has harmful long-term effects on vegetation, house paint and people.

**Agricultural Science**—The study of agriculture and farming as a science. Includes Agricultural Engineering, Soil Science, Plant Production, Animal Production, Economics and Management.

**Agriculture**—The art and science of cultivating the ground.

**Animal Husbandry**—The science of breeding, raising and nurturing animals.

**Arable**—Land that crops can be grown on.

**Broadcast Sowing**—Casting seeds around a plowed field in hopes that they will find a proper place, germinate and grow.

**Confinement Management**—The modern technique of raising animals by confining them in one stall or pen for their entire lives.

**Contour Plowing**—A system of plowing along the contours of a field so that the soil is not eroded away.

**Cover Crop**—Crops planted for the purpose of keeping fields fertile or increasing their fertility during the winter. Many cover crops can be used as fodder crops for livestock.

**Crop Rotation**—The process of rotating crops in a field so that a good-selling crop is rotated with crops that re-enrich the field so that the next planting of the good-selling crop will be productive.

**Crops**—What are grown on a farm. Usually refers just to the plants grown, though animals could be thought of as a crop, too.

**Cultivation**—The act of preparing ground for farming and nurturing the crops planted in that ground.

**DDT** (Dichlorodiphenyltrichloroethane)—The first major pesticide. Originally hailed as the answer to all of a farmer's pest control needs, it is now banned in many countries because of its harmfulness to useful insects and other animals.

**Domesticated Animals**—Once-wild animals that have been tamed and made useful, including dogs, cats, horses, cattle, etc.

**Drill Planting**—A method of planting where seeds or groups of seeds are placed into a hole that is drilled in the ground.

**Ecosystem**—The overall balance of plants, animals and geology in an area, which can be as small as a farmyard or as large as the entire world, depending on what you are talking about.

**Erosion**—In a farming context, this is the loss of topsoil and nutrients to the effects of wind and water.

**Fallow Fields**—Fields that have not been planted for a period in hopes that they will become more fertile the next year.

**Farm**—A place where crops are grown and/or animals produced for consumption.

**Fertilizer**—A substance used to replace needed nutrients in a planting area that have been leached away by previous use.

**Field Fertility**—A measure of the ability of a field to grow crops.

**Fodder**—Prepared food for livestock.

**Forage**—Growing plants that livestock eat in the field.

**Herbicide**—Poison used to kill weeds.

**Humus**—Vegetable mold. Humus can provide excellent fertilizer.

**Industrial Pollution**—The toxic byproducts of industry.

**Insecticide**—A poison used to kill insects.

**Integrated Pest Management**—A current method of handling infestations of pests, combining low-level insecticides, natural predators and farming practices that discourage the pests from staying. It tends to be more work, but has less potential for eventually killing the world.

**Irrigation**—The act of bringing water to fields to nurture plants.

**Livestock**—An overall term for animals raised on a farm.

**Neolithic Age**—The New Stone Age. A period starting about 10,000 B.C. and marked by a new form of stoneworking to make more efficient tools and the domestication of animals and plants.

**Orchard**—A field of trees used to grow fruit or nuts.

**Paleolithic Age**—The Old Stone Age. The time period from when man first began using stone tools until the New Stone Age. During this period man was a hunter and gatherer, not a farmer.

**Pest**—In the context of farms, a pest is any living thing that makes agriculture more difficult. It includes weeds, animals and insects.

**Pest Control**—Keeping animal and vegetable pests from ruining your crops.

**Pesticide**—A poison used to kill pests.

**Plow**—A device used to break up a field before planting. Probably the greatest invention of the Mesopotamian world.

**Pollution**—Toxic substances that get into the water, soil and air and make it difficult to grow plants. Now, mostly a byproduct of the industrial age, but animal byproduct pollution has been a problem since people first gathered in towns and cities.

**Salinity**—The presence of mineral salts in the soil.

**SimFarm**—Not merely a game, not just an educational experience—it's a way of life!

**Slash and Burn**—An early form of agriculture (still practiced in parts of the world) in which a patch of jungle or forest is cut down, then burned, theoretically to give the field more fertility.

**Soil Science**—The science of treating soil to be more fertile and the identification of fertility factors in soil.

**Subsistence Farming**—Farming for the sole purpose of feeding the farmer and his family.

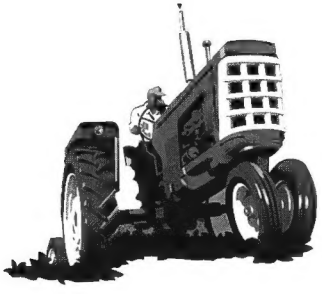
**Tenant Farming**—Farming in which the farmer rents the land from the landholder, often paying the landholder with a portion of the crops grown. Also called sharecropping.

**Toxins**—In a farming context, any substance that poisons the soil and the plants that live in it.

**Weed**—A plant that grows and thrives where you don't want it to.

**Windbreaks**—Walls of trees or shrubs grown purposely to keep the wind from blowing soil from a farm's fields.

# INDEX



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