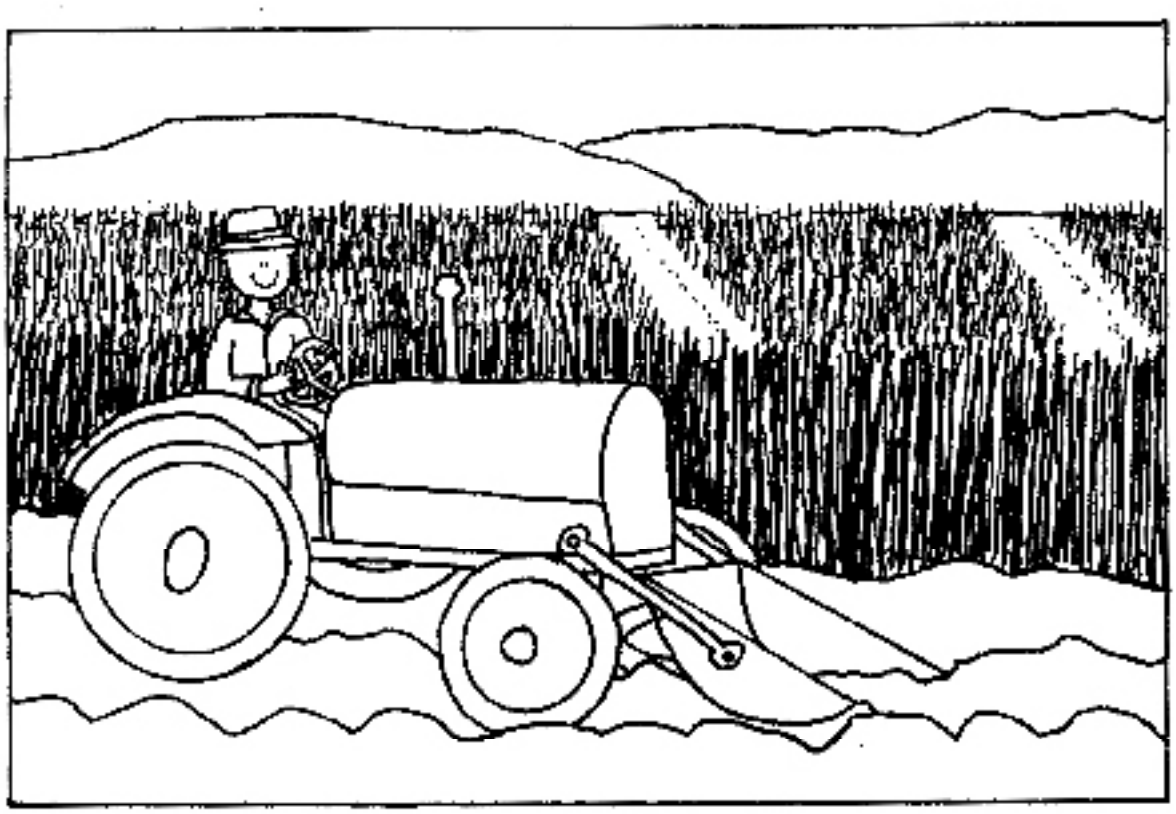
Investigating Agriculture
Science Exploration
Life Lab Garden Classroom



LIFE LAB

Investigating Agriculture
Science Exploration
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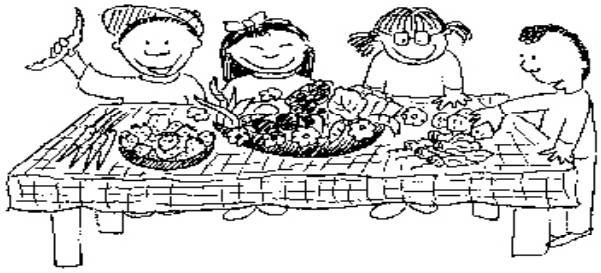


Contents

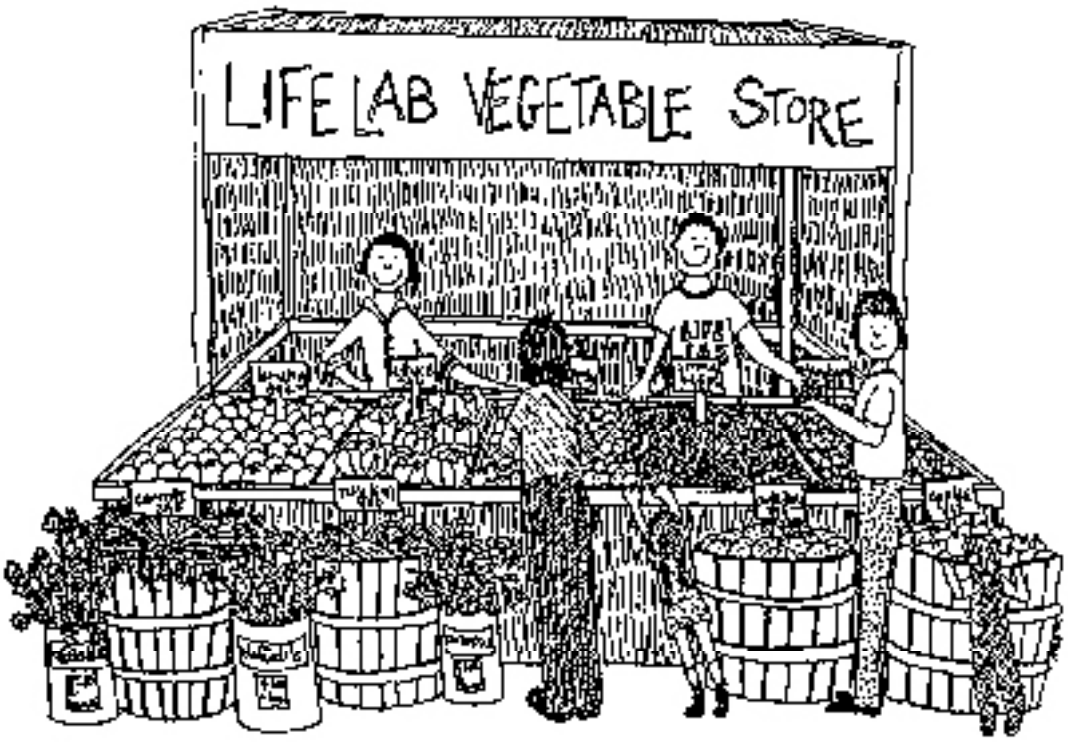
In 1900 40% of the American population described their occupation as farming. In 1990 less than 2% defined themselves as farmers.

Teacher Introduction

As we move away from our agrarian roots people have become less connected with the food that they eat. We take it for granted that there will always be a supermarket open with everything we desire. But that does not mean there is no value in making the connections from the soil to our stomachs. "Investigating Agriculture" has been designed to get students to start thinking about how their food is grown and to see the processes that support us all in action. Living in Santa Cruz County, one of the most productive agricultural areas in the world, provides local students with an excellent opportunity to explore our agricultural roots and future.

During your three-hour visit to the Life Lab Garden Classroom and the UCSC Farm, your students will investigate the farm and learn key principles of organic food production. While exploring the 25 acre organic farm students will be guided by their investigative journal and a field trip guide. We will provide your students with their own journals when they arrive at the Farm. After the tour and lunch students will practice being caretakers of the children's garden.

The field trip portion is just one part of your class' investigation of agriculture. Included in this packet are pre- and post- visit materials to expand student knowledge of the history and role of agriculture in our community. We encourage you to share these activities with your class before and after your visit. We are also lending you a 9 minute video entitled "Santa Cruz County Agriculture" to awaken your students minds to the diversity of our local agriculture. Please return the video when you come for your visit.



Science Standards

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content of the other three strands (life, earth & physical), students should develop their own questions and perform investigations.

Resources

One Good Apple: Growing our Food for the Sake of the Earth
Catherine Paladino; Houghton Mifflin Co., 1999
Inspired by the work and writings of Rachel Carson, this book delves into issues related to conventional agriculture, pesticide use and migrant farm workers while presenting organic farming as one solution to some of these challenging problems. The book introduces the reader to the ecological and social benefits of organic farming. Extensive bibliography.

Westlandia
Paul Fleischman, illustrated by Keven Hawkes
Fanciful picture book about an outcast boy who decides to spend his summer vacation growing his own staple crop and starting his own civilization. Illustrates the many uses of plants from food to clothing to medicine.

Once Upon a Farm
Marie Bradby, illustrated by Ted Rand; Orchard Books, 2002
A poetic picture book describing the toils and pleasure of life on a small family farm as well as the sadness of losing farm land to encroaching development.

Food Watch: Protecting out Planet
Martyn Bramwell; Dorling Kindersley, 2001
This informative text explains different food issues—from the problems of world hunger to the effect of chemical pest controls and the debate surrounding genetically modified foods. Hands-on experiments show readers how to explore the science behind the facts while suggesting ways to make a difference on a daily basis.

California Foundation for Agriculture in the Classroom
CFAITC has many free resources and lesson plans for teaching about agriculture. The annual Teacher Resource Guide is full of free resources on all topics of agriculture.
1-800-700-AITC www.cfaitc.org

Adventures in Agriculture
The Adventures in Agriculture map and activities encourage learning about people, agriculture, and our local community. Santa Cruz County agricultural poster sized map and teacher's notes are great resources to teach about the agriculture of Santa Cruz County. Contact Agri-Culture at (831) 722-6622.

http://www.gti.net/mocolib1/kid/food2a.html
An extensive list of food history, consumerism, economics, food science and nutrition, and diversity web links related to food.

www.kidsgardening.com
An all inclusive web site for the children's garden.

Master Materials List: Investigating Agriculture

Who are the Farmers?

For the Class:

- •Butcher paper
- •Marking pen

A Short History of Santa Cruz Agriculture

For Each Student

- •Copy of the story "A History of Santa Cruz County Agriculture" — Appendix A
- •Copy of vocabulary words — Appendix B

Santa Cruz County Agriculture – 9 Minute Video

•Video "Santa Cruz County Agriculture" by the Santa Cruz County Farm Bureau. (Supplied by Life Lab. (Please return when you visit the Farm for your field trip.)

This Little Lettuce Went to Market

•Seasonal list of locally grown fruits and vegetables, available from CountyAgricultural Extension or Agriculture Commissioner

•One grocery store newspaper advertisement per group of four

Hatton Makes a Decision: Town Hall Meeting

•The following Points of View for your students to read

•Group signs to label the different groups presenting at the town hall meeting

•Costumes, posters, or props to represent the different groups

Farm Ad

•Drawing paper, poster paper and/or lined paper

•Crayons, pencils, and/or markers

Who are the Farmers?

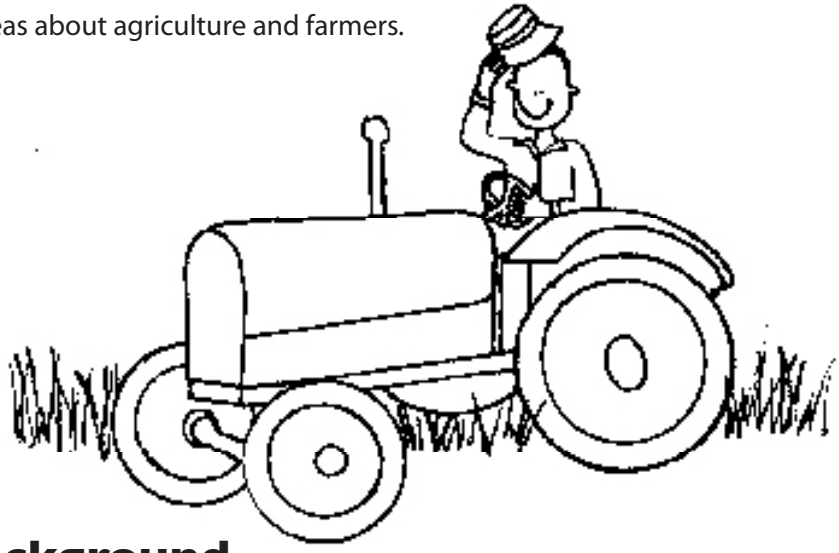
(Pre-Visit Activity)

Description

In this activity, students reveal their ideas about agriculture by writing their questions about farming and a creative writing piece "A Day in the Life of a Farmer."

Objective

To assess student's ideas about agriculture and farmers.



Teacher Background

This activity is designed to help you assess your students' ideas about agriculture and farmers. What do your students already know about farming? What do they think farmers do? What interests them about agriculture?

Although we live in an agricultural county, most kids have few opportunities to make connections between the food they eat and the farmers that work the fields throughout our county. For some students, tomatoes come from the supermarket on cellophane-wrapped trays and their images of farms come from storybooks and T.V. Other students may have parents that work in the fields as farm workers or farm managers. These kids might have a completely different perspective on agriculture and farming.

As students share their different ideas you can record them on a butcher paper poster. Then, at the end of this unit, students can look back at this poster to see how their ideas have changed.

Materials

For the Class:

- Butcher paper
- Marking pen

Part I

Class Discussion

Ask students for their ideas about agriculture and farmers. Start a poster of their ideas about agriculture on the butcher paper.What is agriculture? Why is agriculture important? What are some crops that are grown in our area? Who knows any farmers or people who work on farms? What do you think farmers do all day?

Action

1. Ask students to write a short story entitled "A Day in the Life of a Farmer" describing and illustrating their vision of what a farmer does.

2. Start an agriculture bulletin board and post the students' stories on the board along with newspaper articles on farming.

Wrap Up

Ask students to share some of the ideas they came up with in this writing exercise. Add new ideas to the class poster. What are some things you imagined your farmer doing? If you could be a farmer, what would you like about the work? What would you dislike? What do you think some of the biggest challenges are for farmers?

Part II

Class Discussion

Ask students for their ideas about organic farming and organic farmers. Start a new butcher paper poster with students' questions about their visit to the UCSC Farm. What is organic farming? How is it different from other farming? For example, what do you think organic farmers do about pests that attack their vegetables? Why do you think some farmers choose to farm organically?

Action

Have students write questions about the UCSC Farm that they will be exploring. Encourage them to ask a variety of questions, from crop and pest questions to questions about how our food is sold.

Wrap Up

Ask students to give some examples of the questions they wrote. List them on the question poster.

What do you think are some of the main challenges for organic farmers? Tell students that they will be able to add questions to this list as they learn more about agriculture and after their visit to the farm. Remember to bring the questions along on the field trip.

A Short History of Santa Cruz County Agriculture

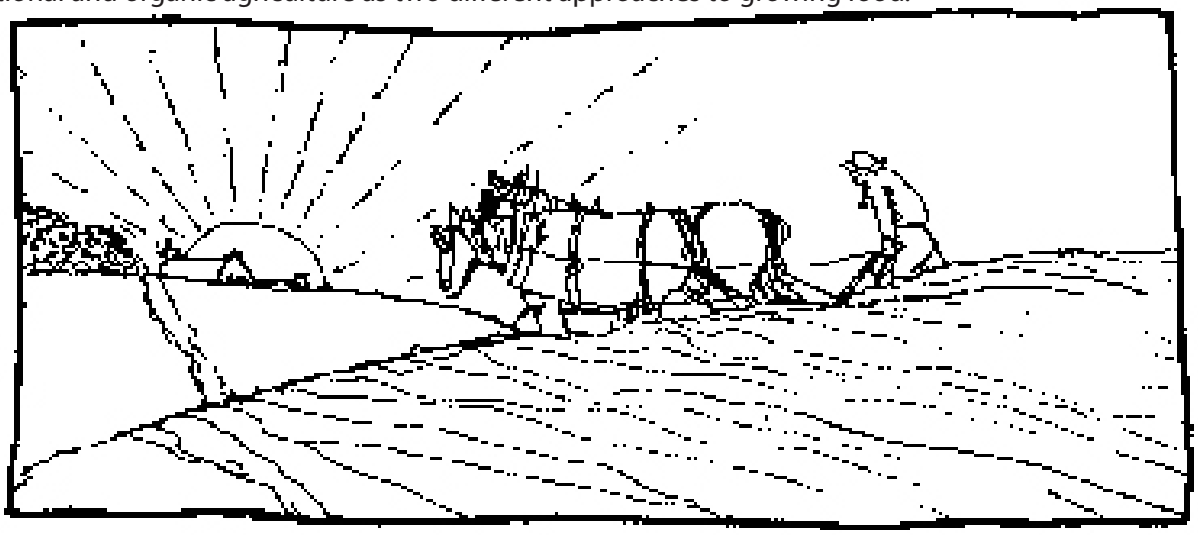
(Pre-Visit Activity)

Description

Students read about how agriculture has changed over the years in Santa Cruz County.

Objective

The reading introduces students to some of the challenges facing modern agriculture, and looks at conventional and organic agriculture as two different approaches to growing food.



Materials

For Each Student

Copy of the story "A History of Santa Cruz Agriculture" — Appendix A
Copy of Glossary of Farm Terms — Appendix B

Class Discussion

Ask students for their ideas about how agriculture has changed over the years. Have humans always been farmers? How long do you think people have been farming in Santa Cruz County? What were some of the challenges that early farmers here may have faced? How do you think agriculture has changed since the days of early farmers? How did people farm before machines and chemicals?

Action

1. Have students read the story "A History of Santa Cruz County Agriculture." As an option, ask for volunteers to act out the voices of the fictional characters in the story. Encourage students to speak the part or even dress the part. Allow time for these students to practice reading their parts. Have other students be the narrators reading the parts between the "voices". Since the reading is long, you may want to take two days to read it as a class.

2. After the reading is finished, divide the class into groups of four. Have students work together to answer the questions at the end of the story and to review the vocabulary words.

Wrap up

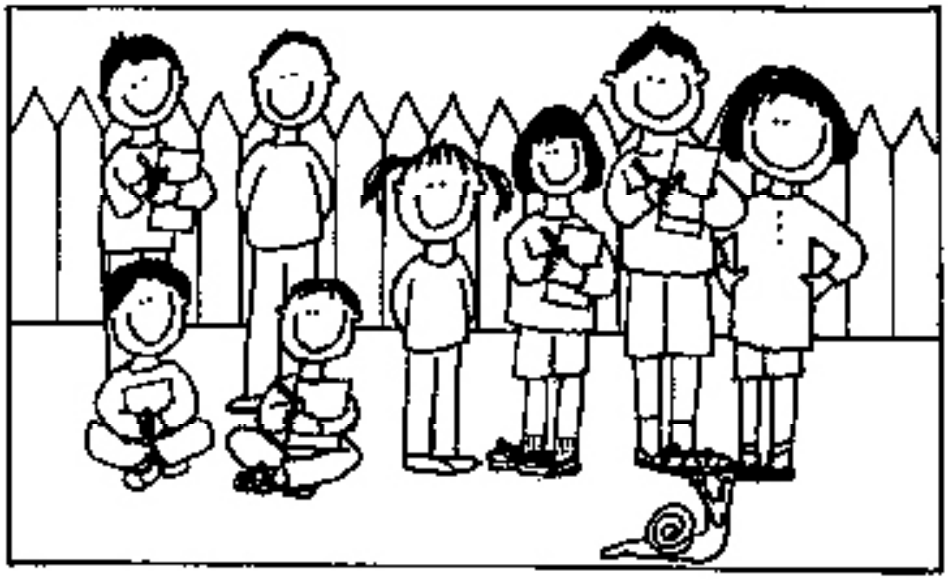
As a class, review the questions at the end of the stories and then add questions to your list for the visiting farmer. What things did you learn in this reading that changed your ideas about farming? What new questions do you have to add to our list for the farmers?

Digging Deeper

Invite a speaker from the Farm Bureau or Agriculture Extension Service.

Have students read the optional student reading "The First Farmers" about the beginning of agriculture — Appendix A.

As a homework assignment, have students conduct a survey of older family members, neighbors, or residents in a retirement home to learn about these people's perceptions of agriculture over time in Santa Cruz County.



Santa Cruz County Agriculture Video

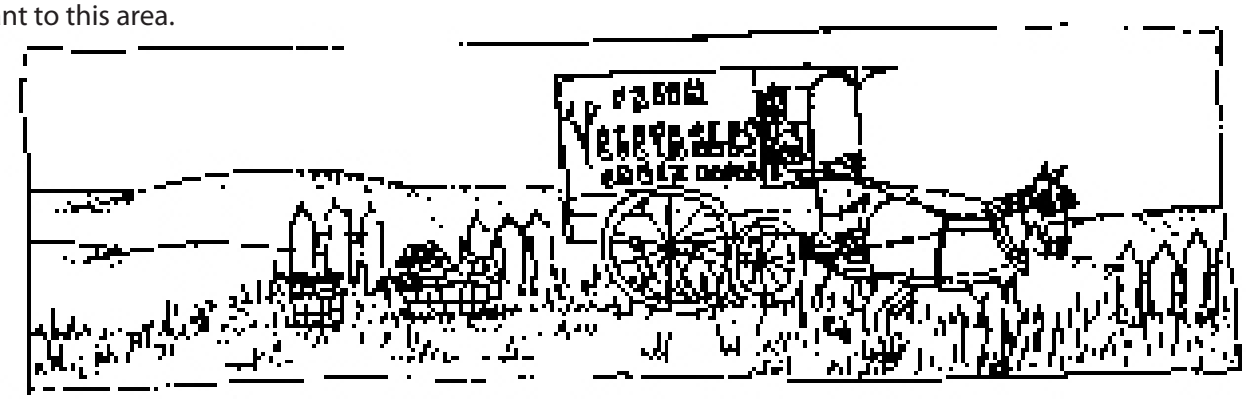
(Pre-Visit Activity)

Description

Students watch a video about Santa Cruz County agruculture.

Objective

To give students an idea about what crops are grown in Santa Cruz County and how agriculture is important to this area.



Materials

Video "Santa Cruz County Agriculture" by the Santa Cruz County Farm Bureau. (Supplied by Life Lab; please return when you visit the Farm for your visit.)

Action

View the 9 minute video "Santa Cruz County Agriculture"

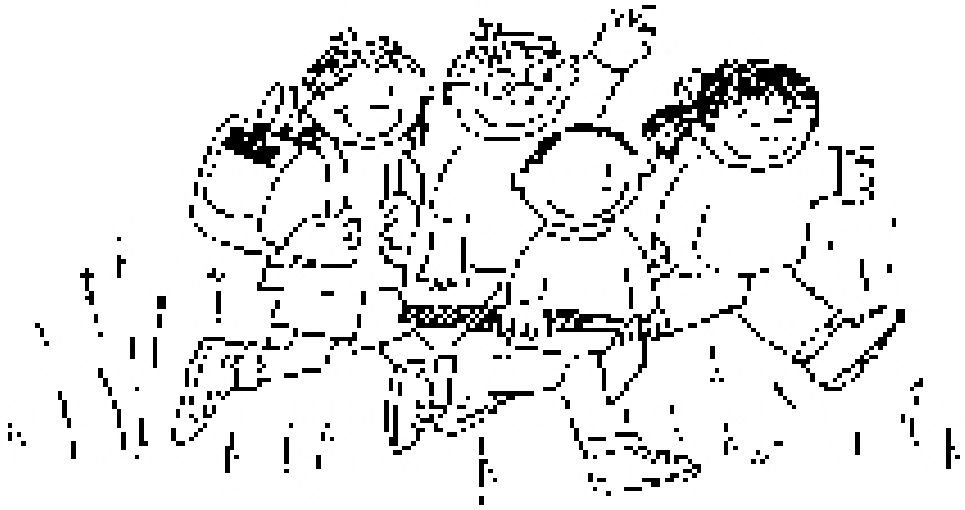
Wrap Up

After watching the video elicit students' ideas about agriculture in Santa Cruz County. What crops are grown here? Did anything surprise you? How is agriculture important to this area? What questions do you have? Record these on your Questions about Agriculture Chart.

Digging Deeper

Have students contact the Santa Cruz County Farm Bureau for additional information/resources.

Time For The Garden Classroom Field Trip



Field Logs will be provided by Life Lab

Hope you enjoy your visit!

This Little Lettuce Went to Market

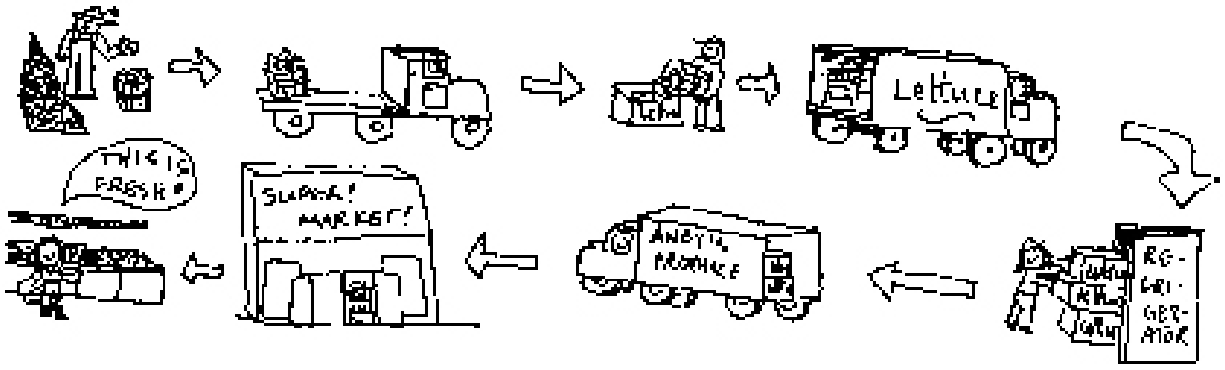
(Post-Visit Activity)

Description

Students investigate and compare the roads to market for local produce and produce grown far away. The lesson can be enhanced by inviting a farmer and a supermarket produce manager to class.

Objective

To investigate the steps from farmer to supermarket in marketing produce.



Materials

Seasonal list of locally grown fruits and vegetables, available from CountyAgricultural Extension or Agriculture Commissioner
One grocery store newspaper advertisement per group of four

Class Discussion

Review with students a list of locally grown fruits and vegetables and their season.

Action

1. Divide class into groups of four. Give each group a grocery store ad from the local newspaper.
2. Have students list fresh produce advertised and where they think it was grown.
3. Have students take one item grown locally and one transported from far away and list the

different steps each had to go through to get from harvest to the supermarket. What are the costs and energy used with each step?

4. Invite a farmer to class to explain how local farmers sell their produce. Have the farmer trace the steps from the farm to the market, and the costs along the way. How much of the produce is sold locally?
5. Invite a supermarket chain's produce manager to class. Interview the manager to find out how stores purchase produce. Can they buy direct from local farmers? How does out-of-season produce get to the store from where it is grown?

Wrap Up

Why don't stores carry only local produce? How many people handle the food between the farmer and the store?

Digging Deeper

Have students harvest some produce from the garden and determine its price at a farmers market or produce stand.

Make a seasonal stew with fresh fruits or vegetables that are in season locally.

Hatton Makes a Decision: A Town Hall Meeting

(Post-Visit Activity)

Description

In this activity your students will take the roles of community members in the fictional agricultural town of Hatton.

Objective

To recognize multiple perspectives and give students experience with community decision making.

Materials

Copies of Points of View for your students to read
Group signs to label the different groups presenting at the town hall meeting
Costumes, posters, or props to represent the different groups

Action

Explain to your students that they will be participating in a town hall meeting and that they will be grouped in four different groups representing a point of view on a city council decision. Have your student close their eyes while you describe the following scene:

Imagine you are all working adults in the town of Hatton. You might be married and have a family with kids or going to college to learn a profession. Hatton is a small town of about 20,000 people and growing. Hatton is located in a quiet green valley surrounded by farms. The nearest city is 45 minutes away. About half of the people in Hatton have jobs related to agriculture such as: truckers, farm workers, packers, and machine operators. Hatton has three elementary schools and two middle schools. Today you are attending the city council meeting to decide if Hatton should rezone some of its farmland to build houses. Currently the Hatton Creek Farm is renting 1,500 acres of farm land and if the land is rezoned for development they will go out of business and houses will be built on the farm land.

Have your students divide into four equal groups and have each group read one of the following points of view among themselves. After they have read their stories encourage them to think of ideas to present to the city council on why their point of view should be used to make the city council's decision. When the "city council meeting" begins have representatives from each group make their opening statements. Invite the mayor (teacher, principal, parent) to facilitate the discussion to keep all groups involved.

Points of View

Hatton Creek Farms

The Hatton Creek Farm (HCF) grows 1,500 acres of vegetables that are sold across the nation. The HCF company is urging the city to keep their farming lands zoned for agriculture. Every year HCF employes' close to 350 people in Hatton and sells close to two million dollars in produce. Most of that money goes to the community to pay workers and rent on the land they farm. HCF is planning to grow different crops that they can sell to local communities. They want to stay in business and be a part of the agricultural community.

The Citizens for the Preservation of Hatton

About half of the people in Hatton have jobs related to agriculture. Some of them have lived in Hatton for generations and enjoy the agricultural feel of the town. These citizens do not want to see agricultural lands rezoned for housing. They like the open space and great views of agriculture fields. The last thing that these people want to see in Hatton is more houses! They believe that if more houses come then there will be more traffic, pollution, and crime. These citizens believe that the HCF should start selling crops that can be sold to the community and not shipped around the nation so that they can be more closely connected to the community.

Developers

The AAA Construction Company from the nearby city of Metropolink is interested in building houses in the town of Hatton. AAA construction is urging the city to rezone the agricultural lands for development. They know that Hatton has a shortage of housing and that it would be easy to sell the houses they build. The only problem is that most of the land in Hatton is zoned for farming. If the city council rezones the land farmed by HCF the AAA Construction Company can build 700 houses with two community parks, a high school and a shopping mall. This housing project will bring in 400 new jobs during construction. It is estimated that the shopping mall will bring in 200 new jobs.

The Citizens for a Great Future

About half of the People in Hatton have jobs related to agriculture. The Citizens for a Great Future do not believe there is a future in agriculture and they want the city to rezone agricultural land to be developed for housing. They believe more houses mean more opportunity for new business. They are also excited about the new high school so that their kids don't have to take the 45-minute bus ride to the out of town high school. These citizens also believe that the new shopping mall will provide 200 new jobs and be a great economic boost.

Wrap Up

After your class has brought up all the points of view and debated the pros and cons on the rezoning of the farmland you can:

Tell your students that they are now the city council and they will be asked to vote on the issue. Let them know that they don't have to vote based on the point of view that they were asked to present. They can vote based on their own personal point of view.

Have your students act at the Mayor of Hatton and write down their own decision in a press release for the town newspaper that will be printed the day after the city council meeting. Remind them that they don't have to write the point of view that they presented. They can also come up with other solutions such as calling more meetings or rezoning smaller parts of the farmland for development. Have the students share their ideas written in their letters with the rest of the class.

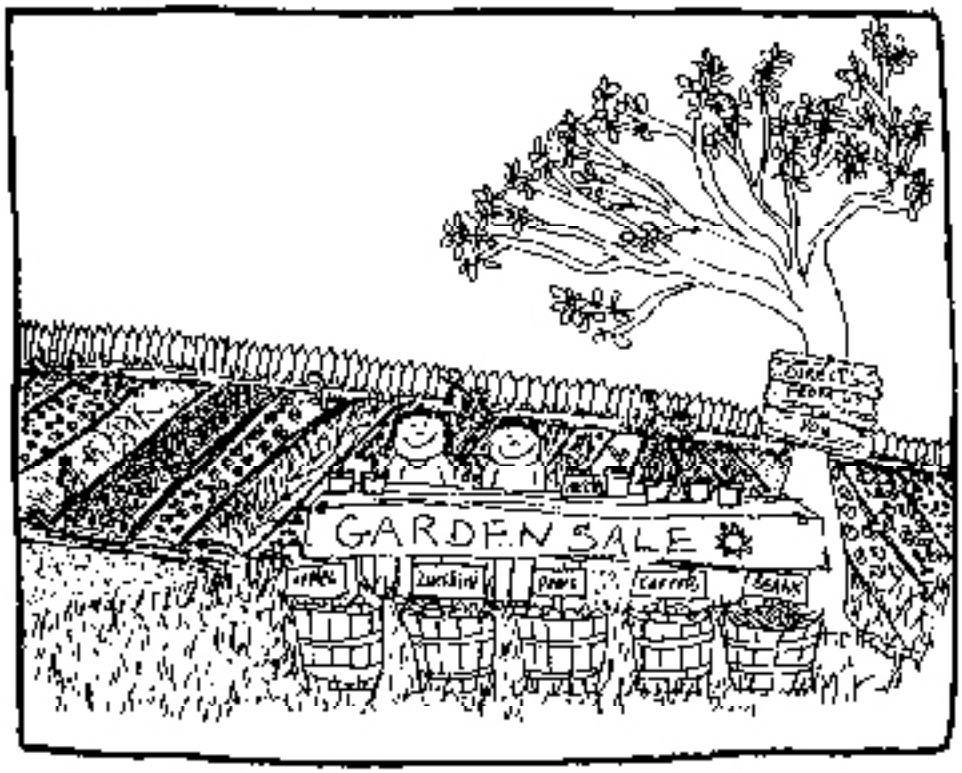
Farm Ad
(Post-Visit Activity)

Description

By creating a marketing ad for a farm, students will reveal their understanding of food production and marketing.

Objective

Students will communicate what they have learned about frams.



Materials

Drawing paper, poster paper and/or lined paper
Crayons, pencils, and/or markers

Class Discussion

If you were to make an ad for the produce of the farm we visited, what would you include in the ad? List some ideas. Why would you include these things in the advertisement? What would you be trying to convince people to do?

Action

1. In small groups have students create an ad marketing the produce from their farm visit. Tell them they can create this ad using any format and for any media: it can be a T.V. or radio ad, a poster to hang around town, an ad in a newspaper, or a rap song to sing at the market. Encourage them to be as creative as possible and to include as many of the different things they have learned about organic produce and marketing.

2. Allow students time to create their advertisements and to get feedback from other students as they work.

3. Choose a day for the presentation of the advertisements.

4. Have groups present their ads to the class. Make a bulletin board for the ones that are in poster form. As an option, arrange to have them displayed at the local Farmer's Market or grocery store.

Wrap up

What did you think were the important things to tell people about buying fresh produce? What do you think farmers would think of these ads? How would these advertisements influence the general public?

Digging Deeper

Write thank you letters to the guides who hosted you during your visit and include any written advertisements or "scripts" for T.V. ads, etc.

Appendix item A

A History of Santa Cruz County Agriculture: Changing with the Times

Drive through the countryside in Santa Cruz County, and what do you see? Strawberry fields on the left, artichoke fields on the right, rows of lettuce and broccoli here and there, and an apple orchard just up the hill. Farm fields cover hillsides, fill valleys, and stick right out to the edge of ocean bluffs. The farmers and farmworkers who work these fields are our neighbors and they grow food for us. Yet how much do we know about the agriculture that is going on all around us? And how much do we know about the history that made Santa Cruz agriculture what it is today?

Imagine that you could go back in time and check out what the Santa Cruz area was like hundreds of years ago. Instead of farm fields and towns you would see only meadows and forests. For hundreds of years, the Ohlone Indians lived here by gathering wild foods and hunting. In the 1790's the first Europeans came to the area and started the Santa Cruz Mission. All around the Mission the land that is now downtown Santa Cruz became farm land. Many Ohlone Indians were brought to the Mission and worked in the farm fields. If we could have talked to an Ohlone Indian at the Mission, here is what we might have heard . . .

Ohlone Woman, 1769 - 1821, Mission Santa Cruz

1818: When I was a young girl I would go with the women to gather acorns and wild plants on the hills. My brothers would go with the men to hunt and fish. We moved around as we looked for food. The life was hard, but we had enough to eat and every day was our own.

Now life is so different for the Ohlone people here. We must live in the Mission and work in the farm fields to grow food. The Europeans have so many strange foods they grow! All around the mission, we have cleared the trees and brush and meadow grass to make fields. Every year we use the big animals called oxen to plow the fields and grow the wheat, corn, and vegetables. Now we have planted pear trees, olives trees, and grapes. More settlers come here every year. I see the land changing to farm fields and cattle ranches all around me. Our world is changing, our old ways are changing too.

The Santa Cruz countryside went through many changes in the 1800's. Cattle ranchers took over the meadows and loggers took down a lot of the redwoods and other big trees. More farmers moved to Santa Cruz County to take advantage of its rich soil and mild climate. Potato fields popped up everywhere. In the early 1850's the Santa Cruz farmers grew more than 8 million pounds of potatoes to feed miners in the California gold rush country. By the late 1800's, Santa Cruz County farmers were growing much more than potatoes. If we could have interviewed a farmer who lived in those days, here's what we might have learned…

Earl Johnson, 1857-1915, Farmer of sugar beets, apples, hops, Watsonville

1890: This is the best place in the world to be a farmer! Great weather, great soil, and now more. Two things have made life better for farmers here. The first is that the railroad has finally been built all the way across the country to Santa Cruz County. We can send our crops to faraway places now. The second is the Chinese immigrants. They've come here by the ship-full looking for work. With a good team of horses and a good crew of Chinese farm workers, a farmer can grow good money-making crops like apples, sugar beets, strawberries, and hops.

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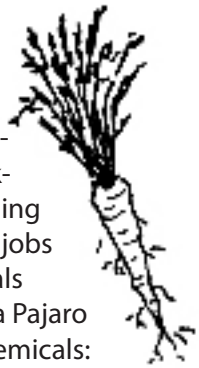


As Santa Cruz moved into the 1900's agriculture began to change faster. Over the years more immigrants came — Irish, Yugoslavs, Portuguese, Italians, Japanese, Filipinos, and Mexicans — looking for jobs and willing to work for cheap in the farm fields. But, meanwhile, farmers were changing the way they farmed. By the 1930's tractors and other machines were starting to do more of the jobs in the fields. By the 1940's and 50's there were chemicals called pesticides to kill insects, chemicals called herbicides to kill weeds, and other chemicals to fertilize crops. If we could have talked to a Pajaro Valley farmer at that time, here's what he might have had to say about these new agricultural chemicals:

Jack Monroe, 1901-1978, farmer of strawberries and lettuce, Pajaro Valley

I've been farming now for 35 years, and I can't imagine now how we used to farm without chemicals! My job is so much easier and I can grow so much more food. Why, I used to lose a lot of my apple crop and strawberry crop to pests. Now we just spray the crops with some of these "miracle bug-killer" pesticides, and I can sell almost all of it without an insect bite or a spot. And weeds! I used to have to hire twice as many workers to weed the lettuce and strawberry fields. Now we use the herbicides and the fields are instantly almost weed-free.

They say that with these new chemicals and with our modern farm machinery, our farmers could feed the world and stop hunger everywhere. In this country already, fewer farmers are feeding more people than ever, and food prices are still cheap! It's truly revolutionary.

Through the 1950's, 60's, and 70's farms continued to get bigger and more dependent on new machinery and new chemicals. Chemical companies worked to develop more pesticides and herbicides to help farmers battle the bugs and weeds. New farm machinery like the giant sprinklers-on-wheels, airplanes called "crop dusters" to spray pesticides, and harvesting machines made it easier for one farmer to grow more crops on more land with fewer workers.

While many people believed that this progress in agriculture was all for the better, some people started pointing out the problems and the payment for this progress. If we could have talked to a Pajaro Valley farmworker in the 1970's, here is what she might have said:

Maria Ruiz, 1940 - present, farmworker

My family came to Santa Cruz County because there are many jobs for farm laborers here. We lost our jobs on the tomato farm in central California because now they have big machines that pick tomatoes! Here in Santa Cruz County, many of the crops—the apples, the strawberries, the artichokes, the lettuce—must be picked by hand, so this means lots of jobs. Its very hard work though, and many days my back hurts from always bending over and carrying things.

They say that Santa Cruz County farmers pay some of the best wages for farmworkers, but the pay is still low compared to what other jobs pay. I see so many families struggling to just get by. Some live in their cars or in the woods because they can't find cheap enough housing.

Another thing that worries me is the pesticides. The farmers make sure we do not come into the fields while they spray pesticides on the fields from airplanes or tractors, but sometimes the spray drifts to nearby houses. I have seen people get sick from the pesticides, and I wonder what will happen if we keep working near these chemicals.

By the 1970's, people around the country were starting to learn more about some of the problems of modern agriculture. People were especially worried about pesticides and their effect on humans and the environment. Some pesticides like DDT had already been banned by the government. It turned out that these chemicals, designed to poison insects, were harmful to other animals, including humans. Some herbicides, designed to kill weeds, were also found to be harmful to humans and were banned. However,

some of these banned chemicals continue to be made in this country and shipped to other countries where they are still legal.

Today many people know about the challenging problems facing modern agriculture around the world and in our county. Almost everyday, newspapers tell us something about agriculture's problems and hopes for solutions. Topsoil is eroding from farm fields where special care isn't taken to protect the soil. Groundwater is being used up for irrigation. Pesticides and other agricultural chemicals continue to be made from scarce non-renewable resources. But many people's biggest concern continues to be about pesticides and other agricultural chemicals, and the impact they can have on the environment and on people's health.

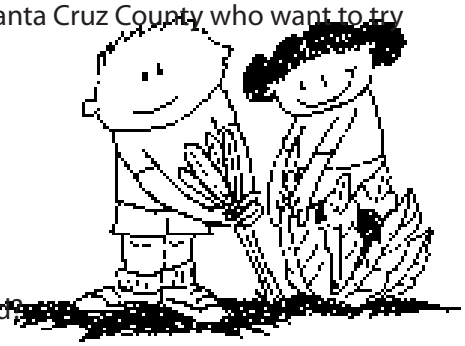
In 1993, many farmers, many scientists, and even the Federal Government agreed about some of the new problems facing farming. Speaking for the US Food and Drug Administration, Dr. David A. Kessler reported the following: "The Administration is committed to reducing pesticides . . . We've got a lot of pesticides out there and we ought to be doing something to reduce them."

In Santa Cruz, there are farmers who are already doing something about it. Some farmers are using fewer chemical pesticides by practicing IPM, Integrated Pest Management. IPM farmers may still use some chemical pesticides, but they also make use of beneficial insects like ladybugs and other natural controls to help fight pests and diseases. Organic farmers don't use any chemical pesticides, chemical fertilizers, or herbicides. Over the last 20 years, organic farmers have been growing crops successfully in Santa Cruz County. Organic farmers have done so well that a few conventional farmers are now starting to grow part or all of their crops using organic methods. If you dropped by a farm with both organic and conventional crops, here's what you might hear from the farmer:

Fred Smith, 1940 - present, Apple farmer, Watsonville

I wanted to use conventional farming and organic farming and see for myself how they compare. The University's Agroecology Program helped me set up an experiment to test how the two types of farming compared.

First we divided my apple farm in half. On one half we continued to farm conventionally, or with the usual amounts of chemical fertilizers, herbicides, and pesticides. On the other half, we used organic methods instead of chemicals. There's a lot more to organic farming than just not using chemicals! To fertilize the soil we used natural fertilizers like compost and manures. Weeds were controlled by mulches and by hand weeding. To keep the pest insects under control, we used organic methods such as releasing "beneficial insects" that are the natural enemies of the pest insects.
After three years of comparing conventional and organic farming, I've been very pleased with the results in the organic plot. It costs me a little more to farm organically, but I can make more money selling the organic apples than the conventional apples. We're going to continue this study for a few more years so that we can learn more. Now this farm is a model for other farms in Santa Cruz County who want to try switching to organic methods.



Class Discussion

How has farming changed over 200 years in Santa Cruz County?
What were some of the biggest changes?
What are chemical pesticides and herbicides why were they developed?
What are some of the problems facing modern agriculture?
What is IPM farming? What is organic farming?

Appendix item B

Glossary of Farm Terms

Acre -n. A measure of land, equal to 43,560 square feet. The U.C.S.C. Farm is a beautiful 25 acre organic garden.

Beneficial insect -n. The natural enemy of a pest insect. The ladybug is considered a beneficial insect because it eats aphids.

Chemical fertilizer -n. A fertilizer made with or operated by chemicals, designed by science to help enrich the soil. The farmer spreads chemical fertilizer on her crops in hopes that it would increase her yield.

Climate -n. The average weather condition of a place as determined by the average yearly temperature and rainfall. The climate in the desert is considered hot and dry.

Compost -n. A mixture of decaying organic material, such as leaves and manure, which is used as natural fertilizer. We put all our scraps from dinner in the compost to help make healthy fertilizer.

Conventional Farmer -n. A farmer that uses chemical pesticides and chemical fertilizers. There are many more conventional farmers than organic farmers in the United States.

Cover crop -n. A crop, such as winter rye, which is partially grown and then turned under to fertilize the soil, improve texture, and help prevent soil erosion. In the fall we planted sweet clover as a cover crop.

Cycle -n. A series of events that regularly repeat themselves. The cycle of growing peas is predictable.

Double digging -n. A method of preparing the garden soil by deeply digging the soil, loosening the sublayer and adding compost or aged manure. Double digging our garden gave a richer soil with better drainage.

Garden bed -n. The area in a garden where the soil has been prepared to provide plants with the very best growing condition. Walking between our garden beds, we could observe all our plants.

Germinate -v. To begin to grow or develop. The seeds began to geminate and may soon begin to sprout.

Harvest -n. or -v. The picking or gathering in of a crop. We must harvest early in the morning so we can sell at the market in the afternoon.

Herbicide -n. Any chemical substance used to destroy plants, especially weeds. A person must be careful because some herbicides can kill other things besides the plant it was designedto kill.

Nitrogen -n. A colorless, odorless gas found in all living things. We found that there wasn't enough nitrogen in our soil for our plants to grow well.

Nutrient -n. Anything that provides nourishment to plants or animals. It is important to be sure the crops have enough nutrients.

Nutrient cycle -n. The recycling of nutrients when plants and animals die and decay, the nutrients that they took out of the soil while growing are released back into the soil to be used again by other living things. The nutrient cycle provides nourishment to be used over and over again.

Organic fertilizer -n. A fertilizer made from decomposing plant and animal material or natural rock. Our vegetable scraps from lunch are very useful in the organic fertilizer.

Organic matter -n. Substances derived from living organisms. We put only organic matter in our compost pile.

Pesticide -n. Any chemical used for killing insects or weeds, or whatever we consider pests and don't want in our garden. Organic farmers have found a way of controlling pests without using chemical pesticides.

Appendix item C

Questions and Answers about Organic Farming

What is organic?

"Organic agriculture is an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological harmony." Organic refers to the way agricultural products—food and fiber—are grown and processed. Organic food production is based on a system of farming that maintains and replenishes soil fertility without the use of toxic and persistent pesticides and fertilizers. Organic foods are minimally processed without artificial ingredients, preservatives, or irradiation to maintain the integrity of the food.

What does "Certified Organic" mean?

"Certified Organic" means the item has been grown according to strict uniform standards that are verified by independent state or private organizations. Certification includes inspections of farm fields and processing facilities, detailed record keeping, and periodic testing of soil and water to ensure that growers and handlers are meeting the standards which have been set.

Can any type of agricultural product become Certified Organic?

Yes, any agricultural product that meets third-party or state certification requirements may be considered organic. Organic foods are becoming available in an impressive variety, including pasta, prepared sauces, frozen juices, frozen meals, milk, ice cream and frozen novelties, cereals, meat, poultry, breads, soups, chocolate, cookies, beer, wine, vodka and more. These foods, in order to be certified organic, have all been grown and processed according to organic standards and must maintain a high level of quality. Organic fiber products, too, have moved beyond T-shirts, and include bed and bath linens, tablecloths, napkins, cosmetic puffs, feminine hygiene products, and men's, women's and children's clothing in a wide variety of styles.

Are all organic products completely free of pesticide residues?

Certified organic products have been grown and handled according to strict standards without toxic and persistent chemical inputs. However, organic crops are inadvertently exposed to agricultural chemicals that are now pervasive in rain and ground water due to their overuse during the past fifty years in North America, and due to drift via wind and rain.

Do organic farmers ever use pesticides?

Prevention is the organic farmer's primary strategy for disease, weed, and insect control. By building healthy soils, organic farmers find that healthy plants are better able to resist disease and insects. Organic producers often select species that are well adapted for the climate and therefore resist disease and pests. When pest populations get out of balance, growers will try various options like insect predators, mating disruption, traps, and barriers. If these fail, permission may be granted by the certifier to apply botanical or

other nonpersistent pest controls under restricted conditions. Botanicals are derived from plants and are broken down quickly by oxygen and sunlight.

Why does organic food sometimes cost more?

Prices for organic foods reflect many of the same costs as conventional items in terms of growing, harvesting, transportation and storage. Organically produced foods must meet stricter regulations governing all of these steps, so the process is often more labor- and management-intensive, and farming tends to be on a smaller scale. There is also mounting evidence that if all the indirect costs of conventional food production—cleanup of polluted water, replacement of eroded soils, costs of health care for farmers and their workers—were factored into the price of food, organic foods would cost the same or, more likely, be cheaper.

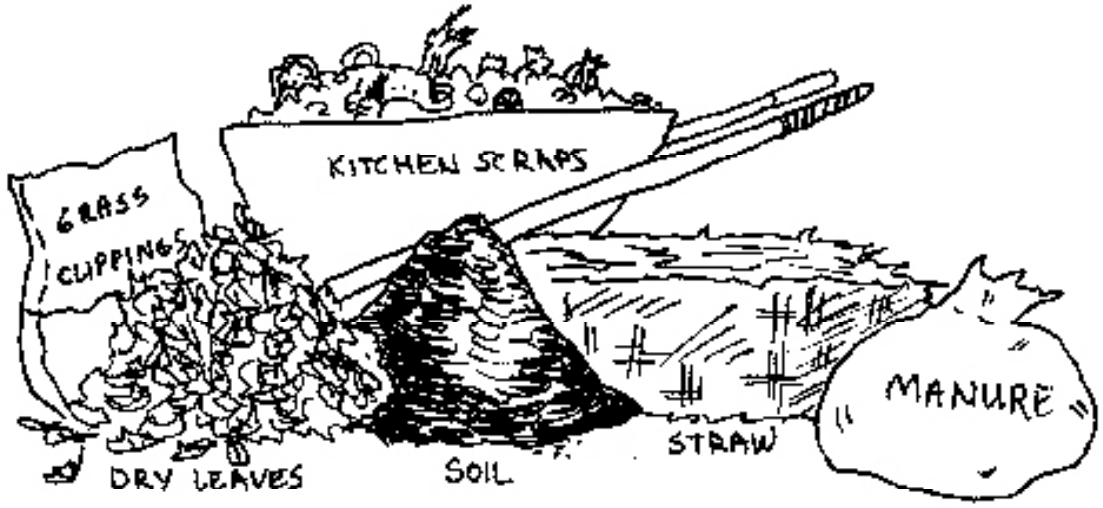
What are some downfalls of using chemical pesticides?

Pesticides are like a quick fix to the pest problem. With the use of pesticides there may be a high crop yield, but through increased exposure pests are more likely to develop resistance to those materials. The pests actually evolve to be more resistant! This sometimes leads to increased chemical use and the need for other chemicals. Ironically, pesticides don't seem to be improving agricultural yields; before their use farmers lost about 33% of their crops to pests. Today farmers lose the same 33%.

Many chemicals that conventional farmers apply do not only kill the intended pests, but everything they come in contact with. This includes beneficial (predators, decomposers, pollinators) bugs that prey upon pests and help maintain healthy soil and plants. All plant eaters have at least one natural predator; that's natures way of keeping nature in check. When pesticides are applied to eliminate a pest (bad bug) the natural predators (good bug) population (if not killed by the poison) will fall due to lack of food. With millions of pounds of chemicals being applied annually on our planet it is no wonder why chemical farming is sometimes associated with the following problems: human poisoning; increased cancer rates; hormonal imbalances; gene mutations; birth defects; ground/well water contamination; lake/river/reef contamination; and toxin accumulation in wildlife food chains.

Is the Organic Foods Industry Growing?

U. S. sales of organic food totaled $5.4 billion in 1998, about $6.5 billion in 1999, and reached nearly $7.8 billion in 2000. The market has grown 20%–24% annually during the 1990s. The adoption of national standards for certification is expected to open up new markets for U. S. organic producers. Internationally, organic sales continue to grow as well.

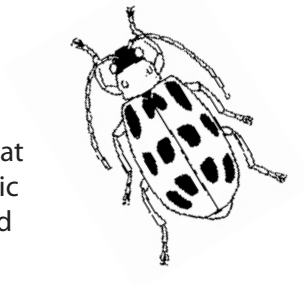


Appendix item D

Common Practices of Organic Farmers

Healthy soil is the foundation of a healthy society. Just like a healthy person who rarely (if ever) needs medicine, healthy soil rarely (if ever)needs synthetic chemical pesticides and fertilizers.
- J. Patrick Madden, President, World Sustainable Agriculture Association

Have you ever wondered how a forest or meadow grows and thrives with no added fertilizer or pest protection? The answer is that natural ecosystems cycle nutrients efficiently. Organic farming attempts to mimic these natural cycles. However, farmers remove crops from the garden during harvest, breaking the cycle. In an attempt to keep the natural processes that feed plants (biological decomposition) in balance, organic farmers add organic materials such as compost or incorporate cover crops into their soils. Simply put, healthy soil makes a strong healthy plant.



Insect Control

Many organic farmers and gardeners encourage the presence of beneficial animals, birds and insects (predators, decomposers, pollinators) by creating habitats for them (planting plants that attract them); by providing water and alternative sources of food; and by simply not using toxic chemicals. In addition, many beneficial insects are raised by the billions for deliberate planned releases on conventional and organic farms.

Other methods of insect control include the avoidance of mono-culture (single crop) by planting a diversity of crops, the strategic interplanting and rotation of crops, traps (used both to monitor and control pest populations), the planting of disease- or pest-resistant varieties, pheromone-scented disrupters, row covers and other reusable physical barriers, and natural substances like bacillus thuringensis bacteria that is toxic when ingested by specific pests but harmless to other living creatures.

Weed Control

In organic farming, weeds are controlled by innovative tillage practices, rotations, cultivation, flaming and as a last result manually pulling.

Organic Fertilizers

In place of chemical fertilizers, organic farming uses large amounts of organic matter to provide food for soil microbes which in turn provide nutrients for crops—much as a forest "feeds" itself with dead trees, fallen leaves, and the feces and remains of animals and insects. Cover crops such as rye, oats, barley or other grasses and nitrogen-fixing (legumes) clovers, peas, or beans are grown to be used as "green manures" they hold the soil in place during times of non-crop production, and their biomass is used to enrich the soil afterward. Composted manure from animals is also used, as are fish wastes, bone and blood meal, rock minerals, seaweed, and compost.

The goal in "sustainable farming" is to increase soil organic matter, which goes a long way toward improving crop vigor and overall system health.