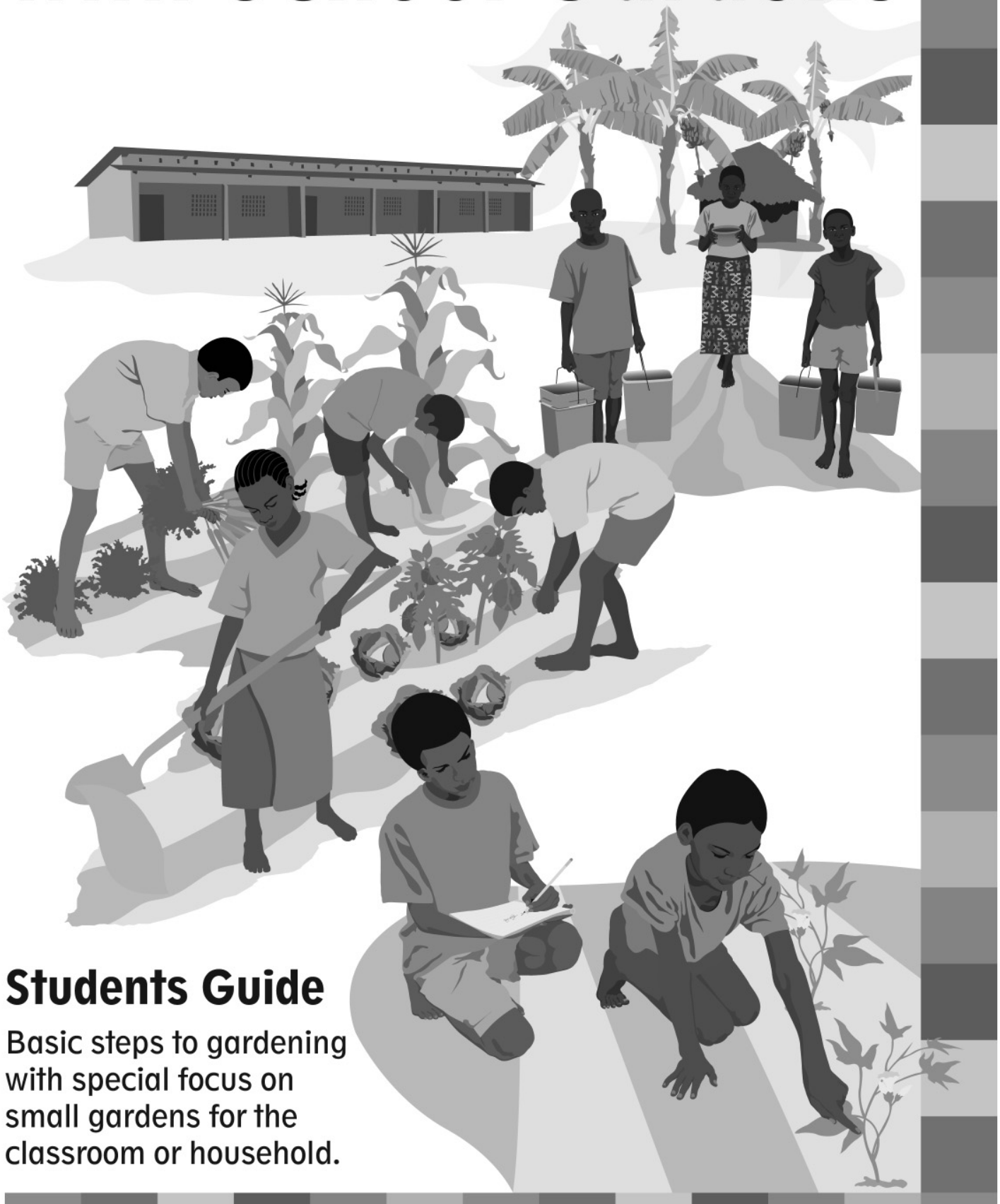
Cultivating Learning with School Gardens



Students Guide

Basic steps to gardening with special focus on small gardens for the classroom or household.

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This handbook is part of a package of materials on and trainings for school and classroom gardens for primary and secondary schools in Africa. The project was funded by the United States Agency for International Development's African Education Initiative and developed in partnership with the United States Department of Agriculture, the University of Wisconsin-Extension, Government of Rwanda's Ministry of Education, Technology and Science, Ministry of Agriculture, and Forum for African Women Educationalists (FAWE Rwanda).

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Benefits of Classroom or Club Gardens

Throughout human history people have used gardens of all sizes to produce foods for their households – and sometimes to sell. The science and techniques of gardening have been passed down to us by our ancestors. Growing sufficient and safe food is essential to life, and millions of scientists have devoted their professional lives and applied rigorous scientific methods to improving food production.

For more than 100 years, schools around the world have cultivated gardens, not just to grow food for school meals or to earn money, but also to use as a laboratory for classrooms. In this country, government leaders are interested in improving food security, while ministries of agriculture and education are concerned with improving academic outcomes. Small gardens near the school classroom can address both of these priorities.

Sciences used in Gardening:

Agronomy
Bacteriology
Biology
Chemistry
Economics
Entomology
Geography
Horticulture
Landscape architecture
Language
Mathematics
Nutrition and human physiology
Physics
Plant pathology
Social science
Soil science

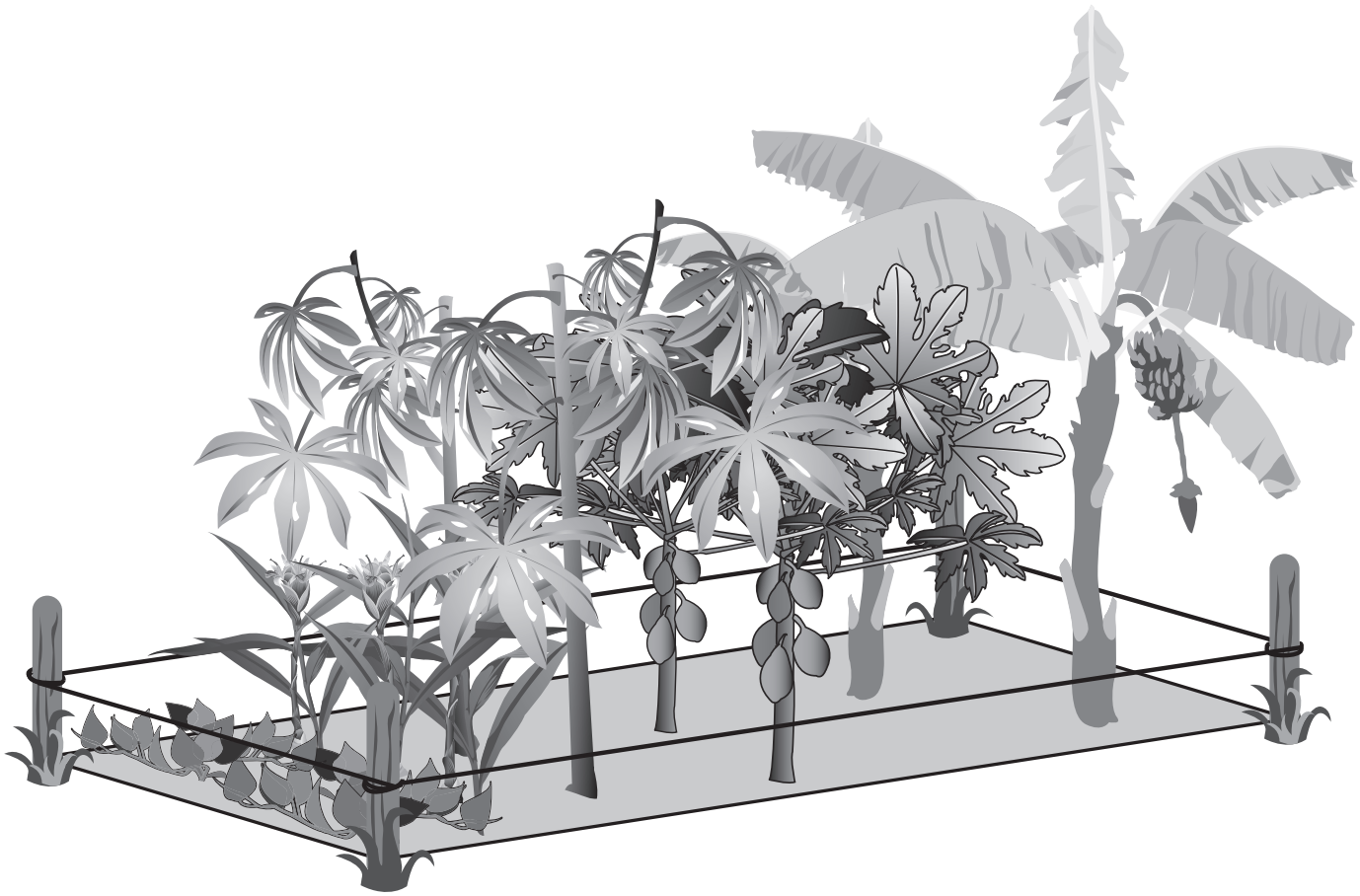
Skills used in Gardening:

Analyzing
Applying theory
Calculating
Consuming information
Critical thinking
Observing
Planning and designing
Questioning
Recording

Learning While Gardening

Students and communities can learn many things from classroom gardens. These include the following:

1. Intellectual development and academic skills: science, math, environment, scientific methods, problem solving.
2. Social and moral skills: patience, cooperation, joy and dignity of work, responsibility.
3. Vocational and other life skills: using resources wisely, environmental stewardship, transferring new skills to home or community.
4. Physical development: provide nutritious foods, reinforce personal and public health concepts.



Garden Myths – Fact or Fiction?

Myth: Gardening is for people who have few other skills or limited job opportunities.

Fact: While almost anyone can garden, the best gardeners apply scientific theories to grow a healthy and bountiful garden. The previous lists of sciences and skills suggest gardeners need to know a lot, that gardeners are intelligent! Nelson Mandela gardened when he was a prisoner in South Africa.

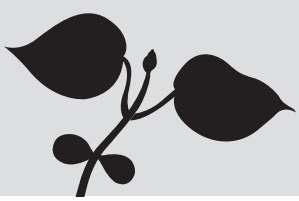
Myth: Educated people should not get their hands dirty.

Fact: When gardening, we use parts of the brain not used by many "office" or "professional" people on a daily basis. Many educated people like to garden because it is both rewarding and challenging. And if our hands or clothing get dirty, we can wash them!

Myth: A good garden needs to be large and takes a lot of time and space.

Fact: Even a small garden can provide nutritious additions to our diets if it is intensely planted and cultivated all year. Small gardens near the classroom or the house (a kitchen garden, for example) require only a few minutes a day to maintain. In countries where land is hilly and scarce, it is often most practical to manage a relatively small garden. This manual focuses on how to plant small gardens, although the principles and theories can be applied to gardens of any size.

Questions for Students



1. Do you like to garden? Why? Why not?
2. What do you already know about gardening? Who taught you? How did the person(s) who taught you learn?
3. What are three new things you would like to learn about gardening?
4. When you are an adult, what would you like to do to earn a wage? To contribute to your community?
5. Do you plan to be a parent some day? Will you care for family members? If so, how might a garden help you do this work?

Steps to Gardening

People around the world prefer a wide variety of gardening practices. Gardening practices depend on the culture, climate, and resources, as well as on the habits, knowledge and skills of the people doing the gardening. To put it simply, there are many correct ways to garden. The techniques taught here can be used in any garden, whether for a household, a classroom, a school, a group, or a community. The steps are the same, no matter the type of garden.

STEP 1
Choosing a Site: Where to Put Your Garden

Classroom garden – If you are going to use your garden as a laboratory to learn geography, mathematics, languages, and other academic disciplines you will want your garden right outside the classroom. If you use intensive gardening techniques like square meter gardens or container gardens, you will want to cultivate several gardens, perhaps one garden for each grade level, classroom or club. If you plant gardens side by side you can easily compare them and conduct experiments.

Here are some factors to consider when choosing a garden site, whether the garden is for your classroom, your school, your home, or your community:

- **Water** – You may have to carry water into the garden during dry periods. Is there a water source near by? Can you collect rain water? Use gray (recycled) water?
- **Traffic patterns** – It is easiest to manage weeds and monitor progress if the garden is near a well-used path. Plant classroom gardens close to the classroom to make it convenient to observe and conduct demonstrations or experiments.
- **Sun** – Most vegetables need at least 6 hours of full sunlight every day. Some plants do better in the shade and in cooler soil, and need shade during part of the day.
- **Topography** – Is your garden on sloping ground? If so, use techniques such as terracing to reduce erosion and retain water. Small, intensive gardens are best for hilly topography.
- **Ownership** – Sometimes a school garden can serve as a demonstration site for community and kitchen gardens. If you are going to do this, consider safety and accessibility for visitors.

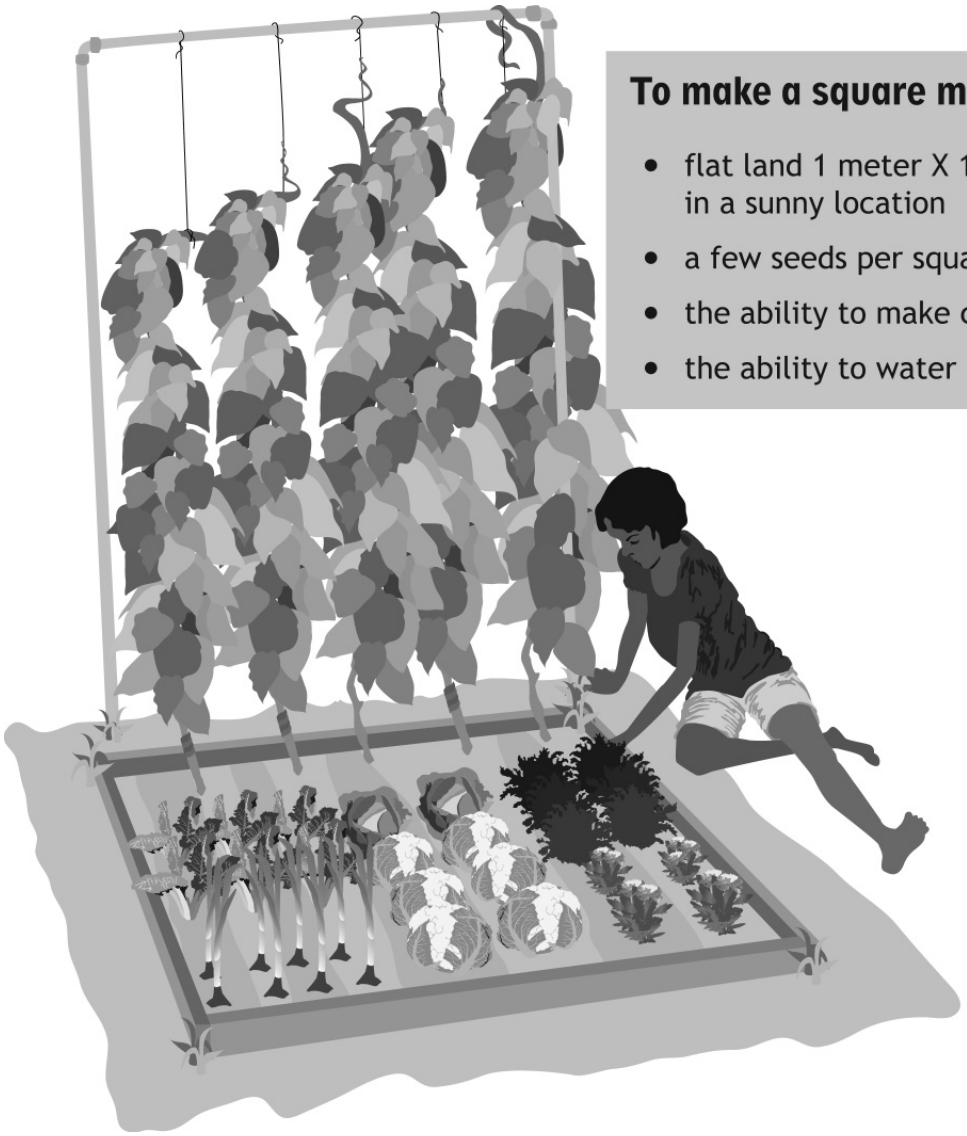
STEP 2
Preparing a Site: Choose Your Garden Design

After you have found a location for your school garden, choose a design for the garden. Besides traditional rectangular gardens, some options for your garden design include container gardens using sacks, buckets, or old tyres, sloped beds/terraces, trenched beds, and raised beds above ground level. Square meter gardens are ideal for classroom and kitchen gardens; these gardens also apply all the theories and practices of gardening but in a small space and with fewer resources.

Square Meter Gardens

Square meter gardening (SMG) is a type of intensive gardening that is gaining in popularity around the world. It works well for growing flowers, vegetables, herbs, and some fruits – in only 15-20 cm. of soil.

The garden is in production year round. As soon as one crop is harvested, compost is added and another crop from a different plant family is planted. This rotation enriches the soil and helps prevent plant disease.



To make a square meter garden you need:

- flat land 1 meter X 1 meter (or a container) in a sunny location
- a few seeds per square meter
- the ability to make compost
- the ability to water by hand

Benefits of square meter gardening:

1. **Less work.**
   The soil is never compacted in a SMG so smaller tools are sufficient. Weeding takes less time. The rich soil allows for growing more plants in a smaller space.

2. **Saves water.**
   Soil with ample compost holds more water and needs less watering than soil with no compost. With intensive planting, you can water by hand and waste little water.

3. **Little weeding.**
   Because plants are close together they form a living mulch and shade out many weed seeds before they have a chance to germinate.

4. **Pesticide/insecticide free.**
   Companion planting is a natural insect-repelling method. A large variety of crops in a small space prevents plant diseases from spreading easily. Rotating crops after each harvest further helps prevent disease and maintains soil fertility.

5. **Accessibility.**
   People with limited mobility can reach around a small garden space from 2, 3 or 4 sides to plant, water, weed, and harvest.

To prepare a square meter garden:

1. Use strings and sticks to mark off one or a series of beds, each 1 meter X 1 meter.

2. Raise the bed by putting logs, bricks or stones around the perimeter of the bed to hold in the soil. As an alternative, you can mark off the beds as is done in a standard raised garden bed.

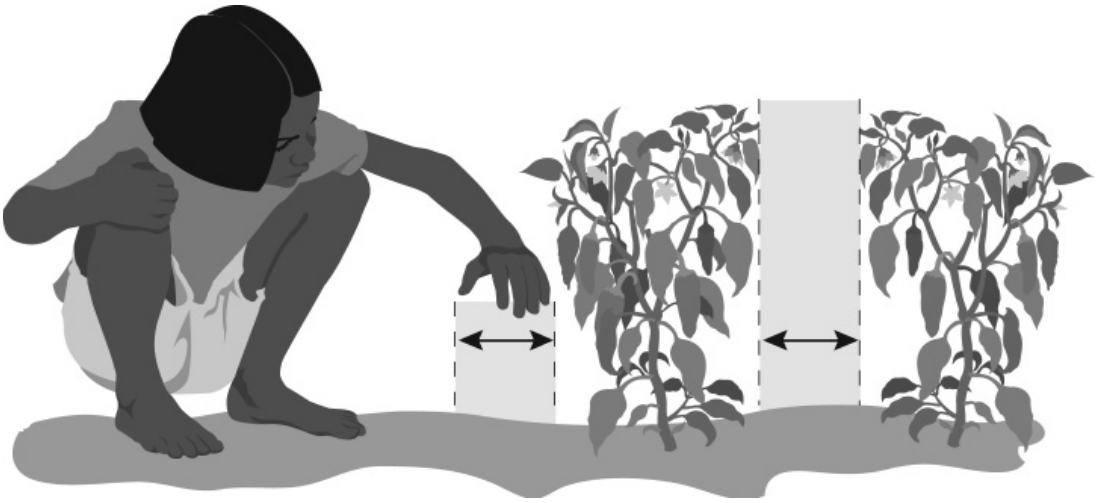
3. Dig up the top layer of soil (about 15 cm.) Add 5 cm. of compost-rich soil and work it into the garden.

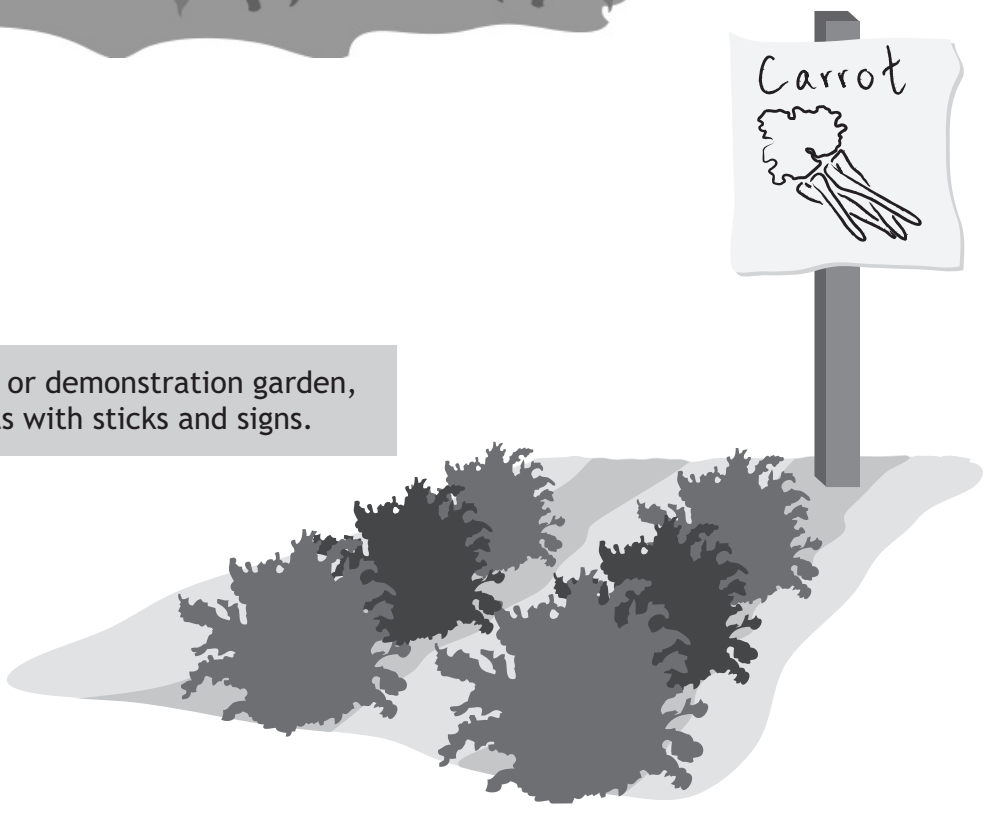
4. Use string and sticks to divide each square meter into 9 smaller squares, 3 squares x 3 squares. Your garden is now ready for planting.

STEP 3
Planting the Garden

Some general planting guidelines:

- Make a map of your garden and record what you plant. This is especially important when planting a square meter garden and when rotating your plants.
- Most seeds should be planted in the soil twice the depth of the seed size. (Example: Plant a 1.5 cm. squash seed 3 cm. deep.)
- Intensely planted seeds produce higher yields and conserve nutrients, water, and soil.
- Space seeds so that when plants are fully grown, they are about one hand-width apart.
- When transplanting seedlings, hold the plant gently so you do not damage the vascular system.





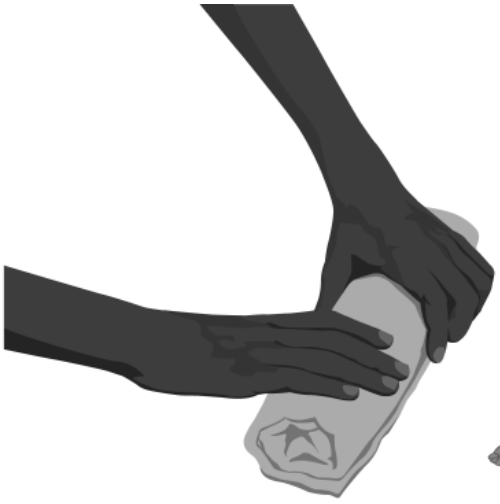
For a classroom or demonstration garden, label your plants with sticks and signs.

Are Your Seeds Viable?

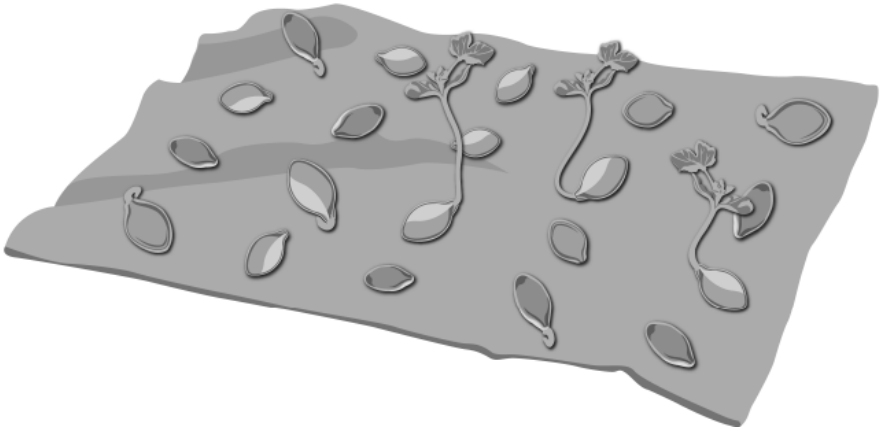
Before you plant, test your seeds. When you know how viable your seeds are you can make the most of them, either by planting more if the germination rate is low or planting fewer if the rate is high. While it is not necessary to test all seeds, seeds can be tested simply:

1. Select the seed type to be tested. If you have seeds from more than one source, be sure to label them, to keep them separate, and to conduct a separate test on each group. Place a minimum of 20 seeds in organized rows on a clean damp cloth. Cover the seed with another piece of clean cloth and roll the two cloths together. Place the rolled cloth in a shady place for 5-7 days. Keep it moist. Most seeds that are viable will have germinated within this time. Examine the seeds.

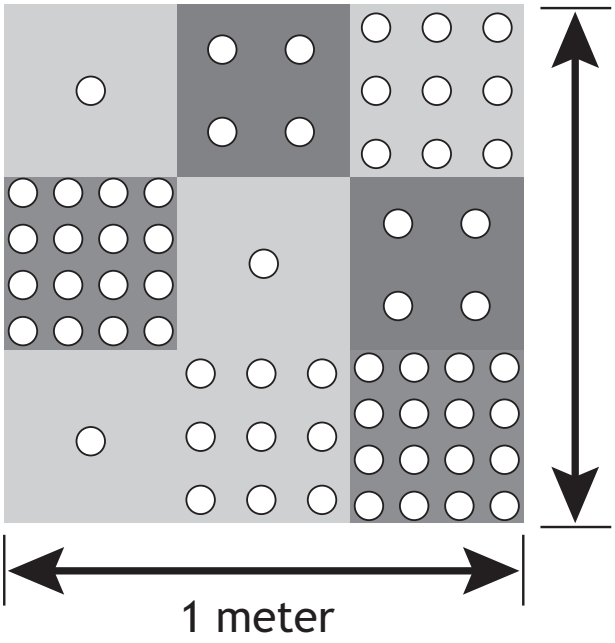
2. Count the number of seeds that have germinated and divide that number by the number you first tested. This is your germination rate. If the germination rate (GR) is less than 85%, you need to plant extra seeds. The lower the GR, the more (extra) seeds you need to plant to ensure that the beds are fully planted. For example, if you want four squash plants but the germination rate was only 70%, you will need to plant enough seeds for five or six plants.



$$\frac{\text{14 Seeds Germinated}}{\text{20 Seeds Tested}} \times 100 = 70\% \text{ Germination Rate}$$



Planting a Square Meter Garden

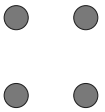
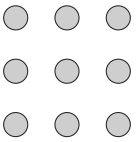
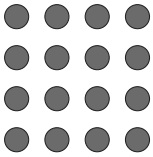


Plant a different crop in each square. This planting method (called “companion planting”) helps ensure that many types of crops are grown, maintains crop diversity, and makes it easier to rotate crops. To help prevent disease, do not plant vegetables from the same family next to each other.

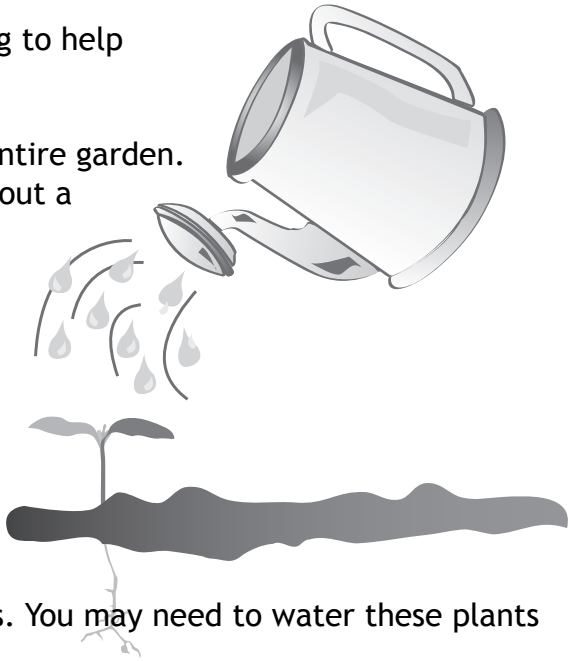
How many plants per square? It depends upon the size of the plant at maturity. Plant seeds for either 1, 4, 9 or 16 plants per square, evenly spaced. Your garden might look like this with different numbers of plants in different squares, all planted intensively within one square meter.

Some plants normally cover many meters of space as runners. Pumpkins are an example. Plant vining plants in an outside square so you can string the vines to climb a frame. Or plant them in a corner square so the vines can grow over the edge.

If you plant fewer than nine different types of plants and are planting more than one square of the same vegetable, do not plant vegetables from the same plant family in squares that are next to each other.

	1 plant: amaranth, cabbage, cauliflower, eggplant, kale, pepper, tomato
	**4 plants:** bush beans, greens, lettuce, spinach, Swiss chard
	**9 plants:** beetroot, large radish, onion, peas, upright lettuce
	**16 plants:** carrot, garlic, radish, scallion or spring onion

Watering



- Gently water your seeds immediately after planting to help them germinate.
- Use water wisely. Irrigate only the plant, not the entire garden. Plants need about 3 cm. of water each week. (Set out a container to measure the rain.)
- Water in the morning or early afternoon so leaves can dry before nightfall, therefore reducing the chance of mildew and disease from mildew.
- Tomato plants do best when their leaves do not get wet. Water deeply at the base of the plant to avoid wet leaves.
- Maintain moist topsoil for plants with shallow roots. You may need to water these plants more frequently than elsewhere in the garden.
- Plants with medium-length roots can have dry topsoil. Keep moisture about 2 cm. below the surface.
- Plants with deep roots can have dry topsoil. Keep moisture about 4 cm below the surface.

Gardening Game

How to play:

1. Use a small stone or button as a game piece for each player.

2. Move around the board in a clockwise direction, starting from the **"School"** space.

3. Roll a die to determine who will go first. The player with the highest number starts the game.

4. Roll the die to determine how many spaces to move.

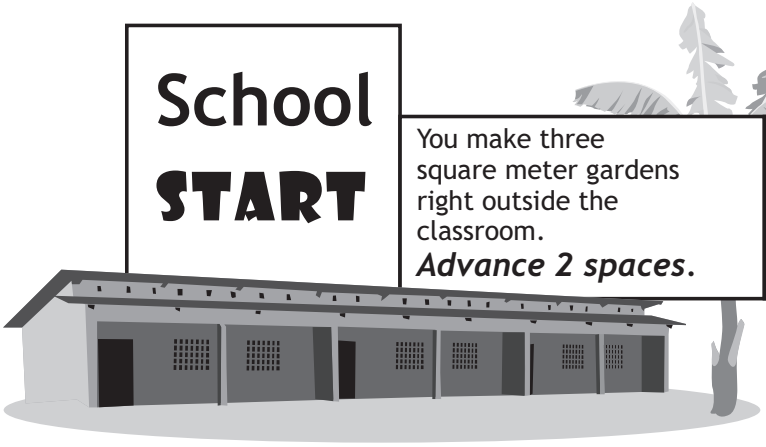
5. Follow the instructions on the space where you land. If you land on an open space, stay there until your next turn.

6. Roll the die once per turn. Once each player is finished, the next player to the left takes a turn.

7. The first player to make it from School to Home wins! You do not need to land directly on the Home space to win.

School

START



You make three square meter gardens right outside the classroom.
Advance 2 spaces.

You plant a vegetable you have not grown before.
Advance 2 spaces.

You lose your classroom garden notebook and cannot remember how to rotate crops.
Skip the next turn.

You start a garden club at school.
Advance 1 space.

Your biology class shows the school gardeners how to make compost.
Advance 2 spaces.

You spend time on the internet after school instead of helping your classroom build a classroom garden.
Go back 5 spaces.

Your tomatoes have blight disease. You make a natural fungicide and apply it to the tomato plants.
Advance 1 space.

You are in a hurry and throw water on your tomato plants during lunch.
Go back 1 space.

Your entire cabbage crop is attacked by insects because you failed to plant a variety of vegetables in one area.
Start over at School.

You ask the ministry of agriculture extension experts to help you get some seeds. →
Advance 2 spaces.

Home
FINISH

After harvesting some carrots, you immediately add compost and plant a cabbage.
Advance 2 spaces.

Your tomatoes have blight disease. You spray a commercial fungicide on your entire square meter garden.
Go back 4 spaces.

You use the garden to experiment on composting.
Advance 3 spaces.

During school holiday, you show your mother how to rotate crops in her kitchen garden.
Advance 2 spaces.

It is time to replant and you do not have any compost ready to use.
Go back 4 spaces.

You fail to make arrangements for tending the classroom garden during school holidays.
Start over at School.

As a club or school activity, you demonstrate square meter gardens and crop rotation to community members.
All players advance 1 space. As the organizer you advance 3 spaces.

The geography teacher who was leading your classroom gardens has shifted to another school. Decide what you will do. Depending on your decisions,
your opponent will determine how many spaces you advance or go back.

STEP 4
Tending the Garden

A large part of tending a garden involves controlling the garden's ecosystem by rotating crops, watering, composting, weeding, and controlling pests and diseases.

Rotating Crops

Rotating crops is the practice of planting a vegetable from a different crop family after each harvest or season in the same location. Rotating crops has two main benefits:

Better yields from improved soil fertility – Plants use and/or return different nutrients to the soil. When you rotate crops you lessen the depletion of the nutrients from the soil and actually help to rejuvenate it. With rotation, you do not need to use as much fertilizer. Improved fertility also lessens erosion.

Benefits of Crop Rotation

- Better yields
- Fewer disease and insect problems
- Improved soil fertility
- Reduced soil erosion

Fewer disease and insect problems – Plants that are related tend to have similar pest and disease problems. If you rotate your crops, pests will be less likely to eat them, and diseases may not establish or spread as easily.

Fruit Vegetables and Leafy Vegetables are the most

Rotating Crops in Square Meter Gardens

It is easy! As soon as a crop is harvested, add compost, and replant a crop from a different plant family. Do not plant crops in the same family side by side, because the close proximity makes it easy for insects and disease to spread. To grow more of certain types of vegetables, plant additional squares, but not next to each other. The more variety in your garden, the easier it is to rotate the crops.

The theories and practices of crop rotation...

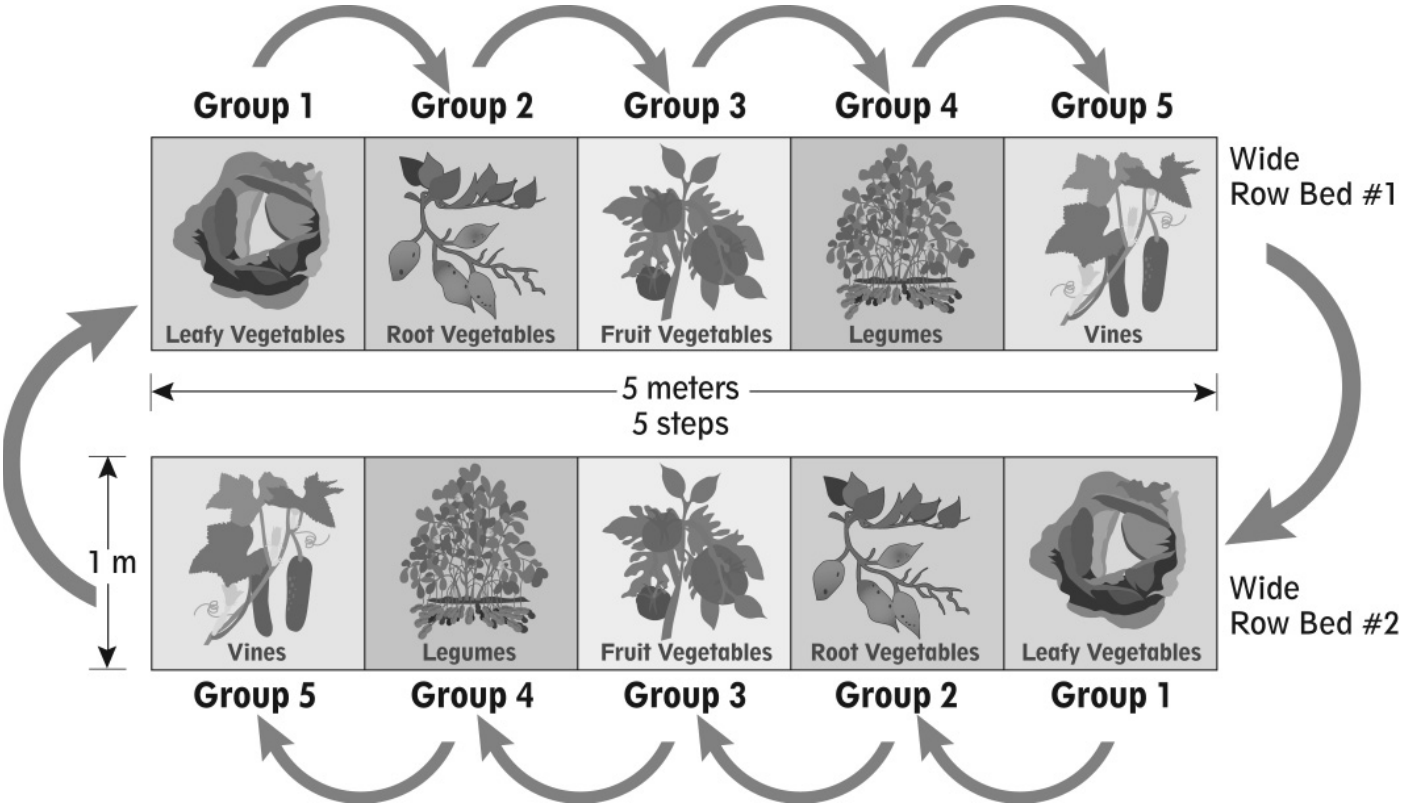
...can be applied to any size, shape, or location of garden - large, small, round, square, rectangular, in containers, on terraces, in the field, near the kitchen...

Crop rotation improves soil, reduces disease, and boosts yields.

Not all types of plant families are the same. For example, for the purposes of crop rotation, plant families are determined by the nutrients a plant needs from the soil and the diseases to which a plant is susceptible. These are ***different*** from the plant families used for human nutrition.

Rotate Crops by Plant Family		
Leafy Vegetables	amaranth, cabbage, cauliflower, lettuce, spinach	Plants in this family take a lot of nutrients from the soil. Provide plenty of animal dung and plant compost fertilizer for optimum growth.
Root Vegetables	beet, beetroot, carrot, garlic, onion, sweet potato	Do not apply fresh dung near the planting time for root vegetables as it may cause the roots to fork. Too much nitrogen fertilizer may produce many leaves but fewer roots and tubers. Plant these vegetables in different places after each harvest to prevent disease.
Fruit Vegetables	eggplant, green and red pepper, potato, tomato	The first four vegetables in this group must not be grown one right after the other. Lettuce and Swiss chard are in this group because they can harbor similar pests in the soil.
Legumes	bush bean, French bean, pole bean, pea, peanut, soy	Legumes are not very heavy feeders so they require less fertilizer. Legumes replenish the soil by fixing nitrogen in the soil. This makes them particularly valuable for crop rotation, because nitrogen is generally the nutrient most commonly lacking that limits plant growth.
Vines	cucumber, melon, pumpkin, squash, watermelon	These crops are all part of the Cucurbits family and are subject to relatively few soil-borne diseases.

This picture shows how to rotate plants in a large garden. Note the 5 categories of plant families.



Compost: A Recipe for Success in the Garden

You can make compost by combining organic materials to make a natural fertilizer. It is easy to create and costs nothing but can make a big difference in garden yields.

Compost provides the essential nutrients plants need to grow healthy and complete their life cycle – nitrogen for green growth and protein in the plant; phosphorus for reproduction (flowers, fruits and seeds); and potassium for root growth, water uptake, and disease resistance.

To make compost you need:
Air + Water + Carbon + Nitrogen + Microorganisms + Moisture = Compost

Compost Materials	
"Green Materials" High in Nitrogen Comes from things that are green or relatively fresh.	**"Brown Materials" High in Carbon Comes from things that are brown or drying up.**
• animal dung ok: dung from cattle, chickens, goats not ok: dung from cats or dogs • kitchen waste banana peel coffee and tea grounds egg shells fruit waste green leaves green weeds • banana leaves-fresh	banana leaves-old banana stalks-old bean pods corn stalks dried grasses dried leaves millet stalks

Moisture – Damp, not wet, materials make good compost. During the rainy season, cover the compost pit or heap with a layer of grasses or long leaves to shed the extra rain. In the dry season, keep desired moisture levels by covering the heap with leaves.

Wood Ash – Sprinkle a little clean wood ash on the layers of materials when starting compost. Besides neutralizing the acidity that can build up during decomposition, ash helps to accelerate the decomposition process.

Starter Compost – Add some complete compost to a new compost pile. The starter has microorganisms and bacteria that speed up the decomposition process.

To use compost:

1. Add it to your garden when you plant a new crop. Work it into the soil; a good ratio is approximately one part compost to three parts soil.
2. While a plant is growing, add compost to the base of it every several days so the soil depth remains constant.
3. Compost fertilizer works best when you use a small amount frequently, rather than a lot at one time.
4. For square meter gardens, apply approximately 3 cm. of compost to the top of the soil.

Make a Compost Heap or Pile

1. Cover an area 2 meters x 2 meters square with a thick layer of brown/ high carbon materials.
2. Add a layer of green/high nitrogen materials.
3. Sprinkle with wood ash calcium, or limestone.
4. Add a few shovelfuls of finished compost or good garden soil.
5. Repeat the process until the pile is heaped high.
6. Water well and cover.
7. Turn the pile in a few weeks, adjust the moisture level and cover again.
8. Turn one more time.
9. After several more weeks the compost should be complete and ready to use.

Plant compost is like “black gold” in your garden. It is important for...

- soil composition,
- moisture retention,
- good drainage, and
- erosion control.

While animal dung provides important nutrients to the soil, dung alone does not improve soil the way compost does.

Make a Compost Pit

1. Choose a place at the edge of the garden to build a compost pit.
2. Dig a pit 2 meters x 2 meters wide and 1 meter deep.
3. Mix two parts brown/high carbon materials to one part green/high nitrogen materials.
4. Let the mix rest for 1-2 weeks until it breaks down. Move it to another pit and begin again.
5. You may want to make several compost pits so that you have compost at different stages and ready for fertilizer when you need it. If so:
   - Spread compost from pit 3 on the garden.
   - Move compost from pit 2 to pit 3.
   - After 2 weeks, move compost from pit 1 to pit 2.
   - Start new compost in pit 1.

Questions for Students

1. Knowing what you do about carbon and nitrogen, how do these chemicals help compost materials decompose?
2. What does animal dung contribute to compost?
3. Is compost made with dung more fertile, the same fertility, or less fertile than compost made with plant materials only?
4. Is animal dung alone more fertile than a compost of animal dung and plant materials?

For the answers to these questions, ask your biology teacher, see the ***Teacher's Guide to School Gardens***, or try an experiment. The ***Teacher's Guide*** offers instructions for conducting many experiments about compost.

Pest and Disease Control

The garden is an ecosystem, and a sustainable garden generally does not use synthetic pesticides. Besides being expensive, these chemicals usually have side effects which can interfere with natural, ongoing ecological processes. Here are some eco-friendly ways to manage pests and diseases in your garden:

Pests

- **Include a variety of plants.** Diversity helps to discourage dissemination of crop diseases by insects, which must crawl, hop, or fly to find the particular plant they desire.
- **Plant with a fragrance.** Onions, garlic, marigolds, cosmos, and basil, for example, deter insects. These plants mask the fragrance of other plants, and at the same time repel harmful insects.
- **Closely monitor your garden.** If you discover pests early you can eradicate them before they do much damage. To do so, remove them and their eggs by hand, with a stream of water or a brush. Drop the insects into a bucket of soapy water.
- **Use a natural insecticide.** Recipes are on page 22.

Diseases

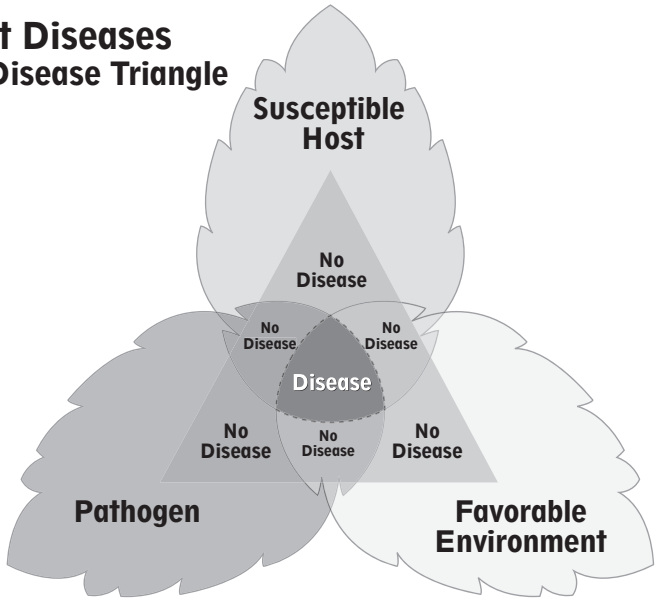
In comparison to insect-borne problems, it is more difficult to control plant diseases that are caused by viruses, bacteria, and fungi.

- **Provide a favorable growing environment.**
  Plant disease-resistant varieties. A monoculture (one type of plant, harvested over and over again), poor soil, improper watering (too much or too little), incorrect plant culture, or inadequate insect pest management all increase the possibility of plant diseases.
- **Water properly.**
  Avoid getting water on leaves late in the day or in the night.
- **Use early detection.**
  Try to remove the infected parts of plants as soon as possible. (After treatment, be sure to wash your hands before handling healthy plants.)
- **Remove spent and diseased plants to remove the pathogen.**
  Discard at a distance far from your garden. Do not put diseased tomato plants in the compost heap.

Diseases can be controlled in various ways. As is shown in the Disease Triangle illustration, there are three main factors in disease prevention and control. They are listed on each corner.

A susceptible host must be planted, the pathogen must be present, and the environment must be favorable for the disease. **All three factors must be present** or there will be no disease, as inside the center of the triangle.

Plant Diseases
The Disease Triangle



Chemical use is a last option. The following simple, inexpensive, and natural solutions are safe to use in the garden. To make these recipes stronger, add one small spoon of cooking oil. Remember to never apply during the hot and sunny part of the day, especially if the mixture contains oil. Doing so could cause the leaf to burn.

Consider these NATURAL REPELLANTS

A garlic solution will repel aphids, catepillars, cutworms and flea beetles.
Put 3 small spoons of chopped garlic and 2 small spoons of mineral oil in a pint of water for 24 hours.

A hot pepper solution will repel aphids, beetles and thrips.
Put 2 spoons of chopped hot peppers, 2 small spoons of chopped garlic, and 1 small spoon of soap in a liter of water for 24 hours.

A neem leaf solution suffocates soft-bodied insects like aphids. It also is effective as a repellant to many insects early in their life. Chop the leaves and seeds of the neem tree into a bucket of water to soak for a day.

Natural tea
Crush the leaves and make a strong tea from marigold, cosmos, or licorice basil.

Method:
- Strain the mixture through a cloth (a sock will work).
- Mix the first or second pesticide mixture in a bucket of water; the third and fourth solutions need not be diluted.
- Apply to portions of plants being attacked by pests (include both upper and lower leaves). Use a small mop, broom or brush made from twigs, grass, or strips of cloth tied together. Rain will rinse off the insecticide; reapply when necessary.

Recipe for NATURAL INSECTICIDES

Soapy mixture
To control soft-bodied insects like aphids, use a small spoon of soap in four liters of warm water.

Recipe for a NATURAL FUNGICIDE

Ingredients:
1 heaped spoon of grated soap
2 cups hot water
1 heaped spoon of sodium bicarbonate (baking soda)

Method:
1. Dissolve soap in water.
2. Add baking soda and mix well.
3. Mix one cup of fungicide mixture with 10 cups (1 small bucket) of water.

Always test a homemade solution before using it.

To test, apply a little of the natural pesticide on a few leaves of several types of plants, wait a day, and check for damage. If no problems occur, go ahead and apply the solution.

Apply the solution carefully.

After preparation and pre-testing, apply solution to portions of plants being attacked by pests. Be sure to include both upper and lower sides of leaves. Use a small mop, broom or brush made from twigs, grass, or strips of cloth tied together. Rain will rinse off the solution; reapply when necessary.

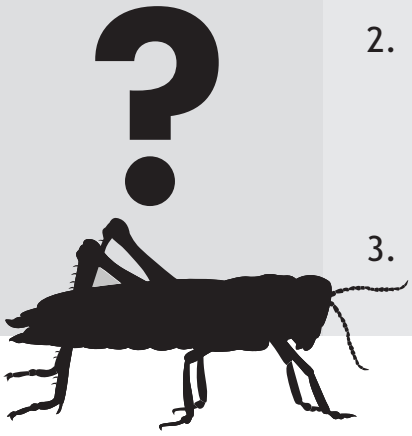
For square meter gardens...

...you need to treat only the plants that are diseased or damaged by insects.

That is because certain insects like certain plants, and diseases attack each plant family selectively.

By planting a variety of vegetables, the diseases or insects are less likely to spread to the entire garden.

Questions for Students



1. Study the poster your school has that shows the life-cycle of insects. What is the connection between the life-cycle and the application of natural pesticides? What does a natural pesticide do to stop or limit the spread of pest damage?

2. Talk to your elders. What do they use to naturally control pests and disease? Are these methods based on science (perhaps unknown theories) or on myths?

3. Is some folk wisdom credible? How do you know?

STEP 5
Harvesting, Preparing and Eating

One of the best parts of gardening is enjoying the fruits of your labor. A benefit of classroom and kitchen gardens is that they can provide a variety of foods to supplement staple foods and improve our diets. Many people in Africa have health problems due to poor diet, including diabetes. Many children have stunted growth, which will likely lead to a lifetime of poor health and underachievement. Proper nutrition can help prevent these and other maladies.

Here are some ways to use your garden to improve your nutrition.

1. Harvest foods at peak nutrition. Vegetables that are too mature may have already lost nutrition and also may need to be cooked longer.
   (See the ***Pocket Guide*** for specific harvest time for each vegetable.)
2. Cook foods for maximum nutritional value. Cook as little as possible to avoid nutrient loss.
3. Eat a variety of foods. Different plants provide different benefits and no single food has all the nutrients we need. Our bodies need fruits, vegetables, grains, meats or proteins, and dairy or calcium every day.
4. Eat nutritious foods. The vegetables listed in this workbook contribute essential vitamins and minerals for people of all ages. While cassava, maize, and yams are filling, they do not provide all of the nutrition needed by growing boys and girls. Eat foods rich in vitamins, minerals, and proteins every day.

The ***Teacher's Guide*** and the ***Pocket Guide*** for school gardens include information on nutrition. Read more about it.

Questions for Students

1. What are the main families or types of foods? How are these families different than the vegetable families we think about when we are rotating crops?
2. What is your favorite garden vegetable? What are the nutritional or health benefits of this vegetable?
3. What are some vegetables you have never eaten that you would like to plant in your classroom or kitchen garden?