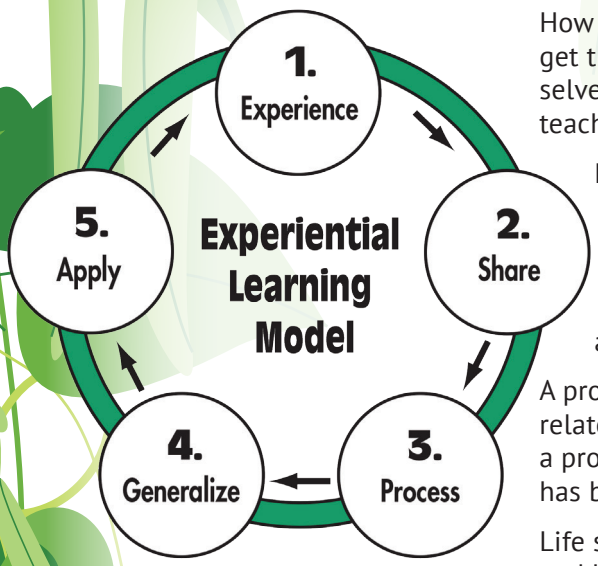
PURDUE EXTENSION

4-H-1040

Level D Grades 10-12

GROWING PROFITS

Note To The Project Helper



Pfeiffer, J.W., & Jones, J.E., "Reference Guide to Handbooks and Annuals"
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How wonderful that you've agreed to be a project helper to help youth get the most out of learning about vegetable gardens and about themselves. Whether you are a family member, project leader, junior leader, teacher, or neighbor, your help is greatly appreciated!

Each of the 18 activities in Level D, Growing Profits, is designed to give the young person an opportunity to learn by doing. Then the youth reflect on what happened, what they learned, and how they can generalize and apply it to everyday life. This is called the **experiential learning** process, and it distinguishes 4-H from most schools and other formal education programs.

A project skill and a life skill are listed for each activity. The project skill relates to the vegetable gardening subject matter. The life skill relates to a process that the member undergoes when doing the activity. The activity has been designed to teach both these skills.

Life skills are grouped into three categories. Level A, See Them Sprout, and Level B, Let's Get Growing, focus on competency and coping life skills. Level C, Take Your Pick, introduces contributing life skills, while this manual focuses on them in greater depth.

Life Skills Learning through 4-H

Competency	Coping	Contributing
Acquiring knowledge	Recognizing self-worth	Applying leadership skills
Using scientific methods	Relating to others	Taking community action
Mastering technology	Making decisions	Volunteering
Making career decisions	Solving problems	Conserving the environment
Managing resources	Dealing with change	
Communicating		

To encourage and challenge members, you can:

- Guide the member in thinking through why something happened or didn't happen
- Listen
- Be a resource person for understanding the subject matter
- Provide additional information to challenge the member

A project leader/helper's guide for the four youth manuals is available online for download. It contains a content overview, activities list by manual, background information not found in the members' manuals, and additional suggestions for group activities. The Solutions section of the project leader/helper's guide answers some of the the questions posed in the "Grow What You Know," "What's It All About?" and "Dig Deeper" sections of the 4-H members' manuals.

Acknowledgements

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What's Inside?

In Level D, Growing Profits, you will:

- Complete the activities in year 1, year 2, or year 3, depending on your level.
- Complete the record sheet for year 1, year 2, or year 3 at the back of this manual.

For exhibit options, see your county handbook/Fair Book.

Tight on Space

Intensive gardening techniques

With more people living longer on the same amount of earth, our world's farmers are under pressure to produce more and more food on the same amount of ground. Believe it or not, you can help. The activities you complete this year will introduce you to garden practices that allow you to produce two or more times more produce in the same container or garden that you are already using.

Many people think you have to have a big area to grow a garden. This isn't the case. Intensive techniques allow gardeners to use less space and produce just as much, and maybe more, as in larger traditional gardens. In this activity, you learn about intensive gardening techniques and how you can use them to help others.

You have several ways to practice intensive gardening and make every inch of space count. You can use compact, bush vegetable cultivars as well as vertical growing methods, shelves, and other techniques. Vegetables can also be grown in:

- Blocks or square foot gardens
- Wide, raised beds

Square foot gardening

A square foot garden is built up in a series of squares. Each square holds a different vegetable or herb. How many plants you place in each square depends on the particular vegetable cultivar, how big the plants get, and how far apart they should be planted.

You space the seeds according to the directions on the seed packet. But instead of being planted in rows with extra space in between, the plants are placed in a square, the same distance apart in all directions.

One advantage of a square foot garden is easy maintenance. Because the amount of space is limited, the time you must devote to your garden is limited as well. You can grow large plants in a square foot garden. Zucchini, tomatoes, pole beans, melons, and all other vining or climbing crops should be grown vertically to save space (see the activity in Two Crops in One). Vertical growing not only saves space, but it also saves stooping and bending over to harvest; you can do it standing up!

Some useful techniques for a square foot garden include:

- Companion planting for possible pest deterrence
- Succession planting for a continuous crop
- Double-cropping to replant an empty square as soon as the harvest is finished and to practice crop rotation
- Intercropping with a fast-growing crop to use the space around the outside edges of the square that won't be needed until the other plants grow bigger.

Raised beds

A raised row is generally 2-3 feet wide and raised 4-6 inches off the ground. It differs from a square foot garden in that the plants are not spaced as uniformly in a pattern. However, raised beds and square foot gardens can be combined.

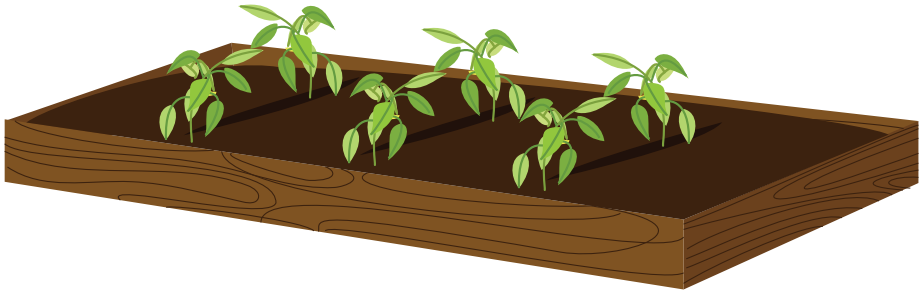
Many raised beds are bordered by wood, brick, or stone to prevent soil from washing away. Lots of organic matter such as well-rotted manure or compost is added to the garden soil to form a mounded bed with a flat top and sloping sides. Or the bed can be a long, rounded mound. Using extra materials can make a raised bed tall enough for a gardener in a wheelchair to reach easily.

Because it is above ground level, a raised bed offers several advantages:

- Solves problems with difficult soil because crops grow in deep, loose, fertile soil that people never walk on.
- Improves drainage.
- Warms soil faster in the spring, so you can plant earlier.
- Improves production; without rows, you can grow twice as many crops in the same space.
- Saves space, time, and money because you dig, fertilize and water only the beds, not the soil in the path.

Supplies: roll of paper towels, marker, flour, water, seeds of your choice

1. Identify someone in your community who could benefit from a small garden. Contact a local nursing home, an elderly neighbor, or even someone who has never grown a garden.
2. Ask what vegetables they would like to have in their garden. Use the knowledge you've gained from the garden project to suggest vegetables that are easy to grow.
3. Create a pre-made garden for them. Set out a piece of paper towel roughly 12 inches square, and draw a grid for the appropriate seed spacing. For example, spinach seeds should be planted about 1 inch apart; draw a 1-inch grid on your paper towel with a marker.
4. Mix the flour and water together to create a paste. Using a squeeze bottle or spoon, place a dot of the mixture in the center of each of the squares on the paper towel.
5. Place a seed on the flour mixture, which hardens to hold the seed in place. You can place two seeds per square to make sure you get good germination.
6. You have made a ready-to-plant seed mat! Because the paper towel and flour are biodegradable, simply place your seed mat on the ground, and cover it with the depth of soil the seed packet recommends.
7. Water and care for the garden as you normally would. Use the knowledge you've gained from the gardening project to help this new gardener along!



GREENHOUSES

One of the best ways to garden intensively is by using a greenhouse, because it turns gardening into a year-round activity. Greenhouses come in a variety of shapes and sizes perfect for a small backyard. Every greenhouse is unique in its location, shading and ventilation, and soil composition. But all of them are designed to trap and conserve sunlight, heat, and water.

A greenhouse extends the season to increase yield; allows you to grow stronger and healthier seedlings on a larger scale; and offers more flexibility to grow different cultivars and vegetables that need a long growing season or prefer sub-tropical/tropical conditions.

Greenhouses can be a haven for insect and diseases because their natural enemies are not part of the environment. See the IPM (integrated pest management) strategies detailed in Taking Action.

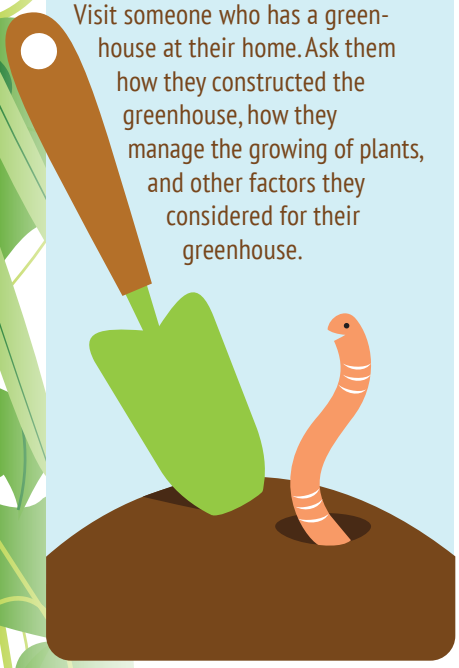
You might be wondering about the difference between a greenhouse and a cold frame. Greenhouses are just cold frames with a heat source. Cold frames can be constructed similarly to greenhouses and function in the same way, but they rely solely on heat from the sun. Greenhouses have controlled temperatures from a heat sources such as a gas heater.

DIG DEEPER

Think of another way you can relate to others through gardening, and do it!

Assist younger 4-H members just starting the vegetable garden project. Sometimes knowing someone is willing to help is incentive for joining a project. Encourage younger youth to join, or get a group of younger youth together and start your own garden club!

Visit someone who has a greenhouse at their home. Ask them how they constructed the greenhouse, how they manage the growing of plants, and other factors they considered for their greenhouse.



1. Share with your project helper what you did for this activity. How did you arrange to help someone with their garden?

   How did you accomplish it?

2. Why is it important to relate to others?

   What did you do to help someone with their garden?

   What would have happened if you had done nothing?

3. What are two ways a friend or family member helps you and shows you that he/she cares for you?

4. How would you like to continue to help others in the future?

It's In-Between

Advantages of Intercropping

- Different crops planted together may take better advantage of sunlight. For example, lettuce and spinach do not grow well in intense light and heat; but planted in the filtered shade of tomato plants, leaf crops receive enough light for good growth without heat injury.
- Interplanted crops use soil nutrients and water better than when grown separately. For example, corn interplanted with beans might stimulate the beans to fix more nitrogen into the soil. The extra nitrogen encourages the corn plant to grow more. Corn stalks provide support for the beans, too.
- The quality of the soil can be improved. Many plants not only supply nutrients to the soil that are beneficial to crops nearby, but some have thick roots that work the soil, improving tilth and drainage.

Supplies: pencil and paper or graph paper (optional), or a digital garden planning program (optional)

1. Choose four vegetables and/or herbs you want to intercrop this year in your garden. Use the chart below to organize them by characteristics to help you decide how and when to plant them.

Plant	Vegetable or herb	Cool- or warm-season	Mature size	Days to maturity

Intercropping

No matter the size of your garden, intercropping is one way for you to produce as high a yield from as little space as possible.

Intercropping is the practice of planting two different vegetables alternately within a row. Usually one vegetable matures quickly and is ready for harvest by the time the other needs more room to grow. Lettuce matures quickly and is a good vegetable to plant between onions, cabbage, broccoli, and many other vegetables that mature more slowly. A popular example of intercropping is planting corn, beans, and squash together.

You can successfully interplant many leafy crops and/or root crops. Leafy vegetables require space above the ground, while root crops need belowground space. For example, shallow-rooted vegetables like chard and celery can be interplanted with onions and carrots, respectively, whose roots delve deep into the subsoil. This makes good use of the third dimension of garden space—depth.

Intercropping is especially useful for container or raised-bed gardens. Interplanting allows you to plant cool-season root and leaf crops in a container and then use the container for warm-season crops like cucumbers, for example.

GROW WHAT YOU KNOW

VEGETABLE COMPANIONS FOR INTERCROPPING

For centuries, farmers and gardeners have grown different crops together as companion plants in the same space to maximize resources. Remember from Change It Up in Level A how Native Americans used a corn-beans-squash interplanting method? It balanced each crop's requirements for light, water, and nutrients. Herb companions to vegetables were discussed in Don't Forget Herbs and Thyme for Planting, both in Level C.

Companion planting has become more popular in recent years because of concerns about pesticides and chemical fertilizers (although research doesn't yet support its effectiveness). Many gardeners recognize a possible natural protective benefit to companion planting, such as fewer pest problems. Research does show that planting large areas with a single plant species encourages heavier insect infestations than planting two or more plant species. Planting flowers or herbs in the middle of large patches or rows of vegetables confuses harmful pests and can sometimes attract beneficial insects. However, there is no definite science for "companion planting."

(continued on next page)

2. Use the chart to help you draw a garden plan in the space below or on the graph paper provided on page 57. Be sure the design includes at least four vegetables and/or herbs that will be intercropped. (Read ahead to Double Your Crops for more information about intercropping.)

Size of my plot (length and width in feet) or container _____

Location of my garden _____

Direction the garden rows or containers face _____

Type of soil in my garden plot or container _____

Vegetables I plan to plant

By intercropping _____

By seeding rows or hills _____

By purchasing transplants _____

By starting seeds indoors _____

Where I plan to purchase seeds or plants _____

Number of packets (or ounces) of seeds I need to buy ____ Cost ____

Number of transplants I need to buy _____ Cost _____

1. Share with your helper how you decided which vegetables to intercrop in your garden this year. How does your garden help conserve the environment?

2. How did planning for intercropping your vegetables this year compare to other years, for example, when you planned to use broadcast or succession planting methods?

3. What does your family do to help conserve the environment? Give two examples.

4. In what ways can you help others in your community think about conserving the environment?

DIG DEEPER

Ask other gardeners about intercropping and the vegetable combinations that were successful in their gardens.

Help a younger member or an adult with how to plant a garden to use the intercropping method.

Find out what scientific research has been done with companion planting. Search credible sources, such as Land Grant Universities online, to make sure the recommendations are based on science. What does the research say about companion planting?

Investigate how companion planting relates to allelopathy (see glossary). Allelopathy can sometimes be responsible for unexplained poor plant growth.

GROW WHAT YOU KNOW *(continued from previous page)*

Radishes might be the best all-around companion crop for garden vegetables, but you can consider others. They're easy to add to any kind of garden.

Give intercropping and companion planting a try this year! Even if you do not see spectacular results in increased yields or reduced pest damage, you will become more aware of how plants interact with one another and the environment. As you gain more experience with your own particular growing conditions in your garden, you can experiment with new companions.

Vegetable	May benefit by planting next to these vegetables:
Corn	Potatoes, peas, beans, cucumbers, melons, pumpkins, or squash
Cabbage	Radishes, onions, or beets
Cucumbers	Beans, peas, radishes, corn, lettuce, or spinach
Okra	Peppers or eggplant
Potatoes	Beans, corn, cabbage, or horseradish
Squash/pumpkins	Corn or radishes
Tomatoes	Chives, onion, parsley, garlic, radishes, or beets
Lettuce	Radishes, onions, or beets

All in the Row

More on intercropping

Successful intercropping requires combining plants in a logical pattern. Good combinations include mixing:

- Quick- and slow-maturing vegetables
- Cool-loving plants sheltered in the shade of larger plants that like hotter temperatures

To select the right combination of plants to intercrop, think about balancing the benefits of mixing crops and the possible competition between them for:

- Space
- Sunlight
- Nutrients
- Water

Here are some examples of intercropping

- Plant radishes in a row of carrots. The radishes germinate quickly and mark the row. When the carrots pop through the soil much later, the radishes have already started to leaf. Harvesting the radishes leaves spaces between the young carrot plants—a natural thinning process that promotes good root growth in the carrots.
- Interplant beets, lettuce, spinach, and Swiss chard with broccoli or cauliflower. The larger plants shade the leafy vegetables, which in turn, thrive in the cool and moist soil.
- Tall, slender vegetables like onions can be interplanted with compact vegetables, such as beans and lettuce, without being crowded.
- Interplant tall-stemmed broccoli among low-growing parsley.
- Quick-maturing lettuce can be planted among slow-growing Brussels sprouts. The lettuce is cleared from the bed by the time the Brussels sprouts have spread to cut off the light.

Supplies: seeds or transplants, tape measure or yardstick, four short stakes, rake, fertilizer (optional), organic matter (compost, such as dried manure), shovel, string, garden markers

1. When it's time to plant your garden, work the soil 4-6-inches deep. Add as much compost as you wish. (Refer to Garden Resources on pages 58-59 for where to find information about compost.) Plant your crop within two or three days of working up the soil. Set aside a place to do your cultivar trials for increased production in the garden, or consider container gardening. Plant at least two cultivars of each crop for comparison.
2. Mix in 3-4 pounds of organic matter for every 50 square feet of area you plan to plant using intercropping.
3. Smooth out the seedbed before sowing seeds. Review the plan you designed in It's In-Between. Mark the rows in the garden, and sow the seeds. Gently press the seeds into the ground using the back of a hoe. Tamp gently again. Water with a gentle spray.
4. If you're using transplants, water them well before taking them out of their containers, and follow the transplanting directions you learned in On the Move in Level B.
5. Keep the seedbed moist until the seedlings sprout. If the plants come up too close together, thin and harvest. (Add the thinnings to a salad!) You might not need to thin intercropped vegetables.
6. Watch your garden carefully as it grows. Hoe several times during the growing season to control weeds. Apply mulch, if you'd like. Consider fertilizing, especially if you are planting more than one or two crops in the same space. Check often for pests and diseases and to see when the harvest is ready.

Vegetable	Cultivar	Uniqueness	Yield
Ex: Tomato	*1. Celebrity* *2. Early Girl* *3. Jetstar*	*1. Heavy yield; med.-size fruit* *2. Heavy yield; early* *3. Big yield; no cracks, scars*	*1.* *2.* *3.*
I tested:			

INCREASING GARDEN PRODUCTION

You read about hybrids and the many different cultivars for numerous vegetables in Keep On Planting in Level C. Cultivars can differ in:

- Color
- Shape
- Disease and/or pest resistance
- Days to maturity

One way to increase production in your garden is to choose cultivars that claim a high or heavy yield. You can do your own testing to find out if the claims are true. This test is called a cultivar trial. It compares how different cultivars of the same vegetable grow in your garden. For example, some grow well in containers, but others do not. Some cultivars of lettuce grow well in heat; others do not. Some tomatoes resist certain diseases, while others do not.

Plant some different cultivars in your garden, and keep track of the production on the chart at left. See Trials of Resistance in this manual for rules to conduct a good cultivar trial.

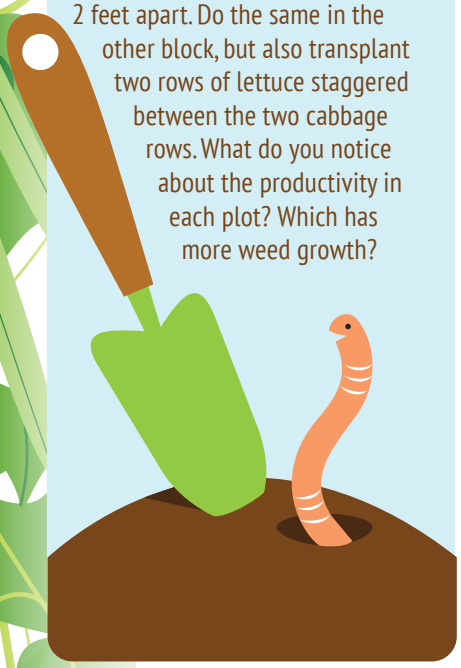
How did you decide to measure production in your trial? What cultivar was most successful?

DIG DEEPER

Conduct another cultivar trial, this time with another vegetable.

Consider interplanting other vegetables. Experiment to find out which crop grows best for you by intercropping. Is the effect the same in a container garden?

Try this experiment: Tie off two sections in a garden bed with string. In one, transplant two rows of cabbage seedlings 18 inches apart in rows 2 feet apart. Do the same in the other block, but also transplant two rows of lettuce staggered between the two cabbage rows. What do you notice about the productivity in each plot? Which has more weed growth?

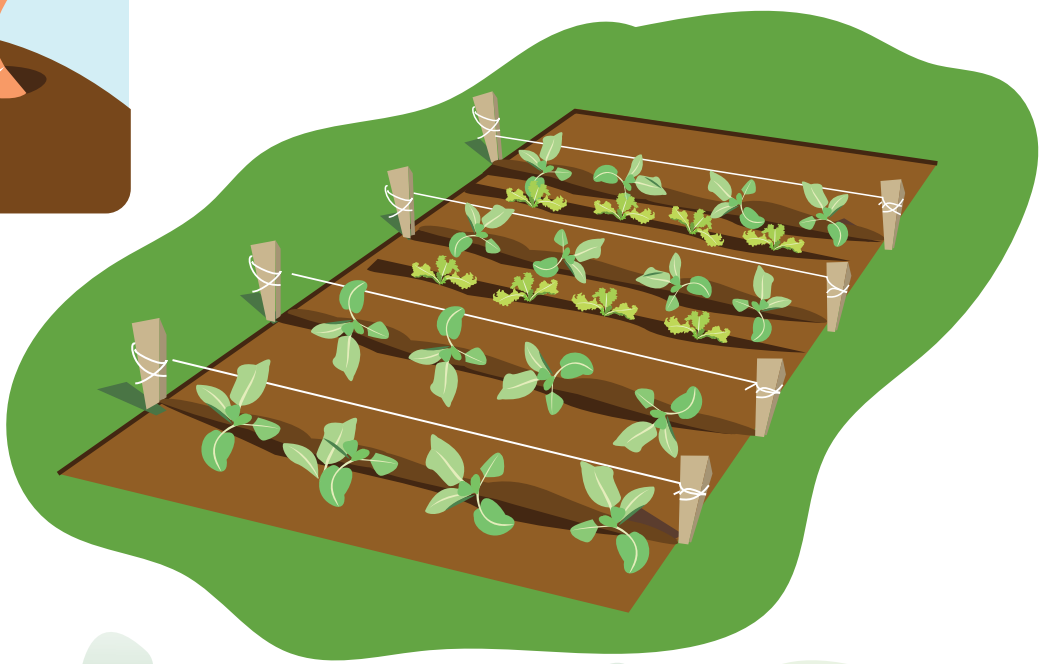


1. Share with your project helper how you incorporated a cultivar trial with your intercropping plants.

2. Why is it important to know the differences between cultivars by conducting trials?

3. What makes people accept or reject new ways of doing something?

4. How will knowing about and doing cultivar trials help you relate to change in the future?

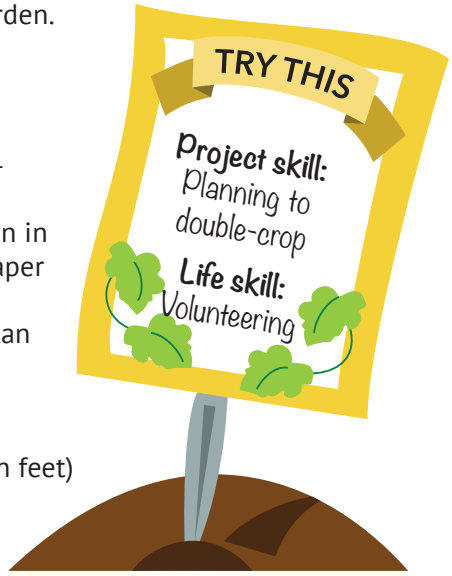


Double Your Crops

Examples of double-cropping

Your spring crop of peas, lettuce, cauliflower, or broccoli matures and is harvested by early summer. You remove the plants after harvest and fertilize the soil with 1 or 2 pounds of 12-12-12 (or similar analysis) fertilizer per 100 square feet. Then you can cultivate and sow a warm-season crop such as summer squash, beans, Swiss chard, or carrots. In another example, you can harvest two crops of lettuce from the same garden space by double-cropping. Lettuce can be planted as an early spring crop and replanted in the late summer for a fall harvest.

In this activity, you plan to plant one early crop, harvest it, and then plant another crop after the harvest. Choose cultivars that mature quickly for your summer planting, because the growing season is shorter than for vegetables planted in mid- to late spring. Then look for opportunities to help others plan their gardens. See "Grow What You Know" for tips you can use to help those with a small garden.



Supplies: pencil

1. Starting with your plan from It's In-Between or a completely new one, draw your plan for this year's garden in the space below or on the graph paper provided on page 57. Include the vegetables you will double-crop. Plan for three or more different crops to grow in the same space.

   Size of my plot (length and width in feet) or container

   _____

   Location of my garden

   _____

   Direction the garden rows or containers face

   _____

   Type of soil in my garden plot or container

   _____

   Vegetables I plan to plant:

   By double-cropping _____

   By seeding rows or hills _____

   By purchasing transplants _____

   By starting seeds indoors _____

Double-cropping

You have learned about intercropping. Now let's learn about double-cropping—growing two or more different vegetable crops in one growing season. You might have planned double-cropping on a smaller scale with cool- and warm-season vegetables in Level A, The Second-Year Garden. A crop is harvested and cleared from the garden and the space is replanted with the same or a different crop. This is a good way to get a second crop in the same season. Sometimes it might even be possible to have a third crop before fall frosts end the growing season.

Where I plan to purchase seeds or plants

_____

Number of packets (or ounces) of seeds I need to buy____Cost ____

Number of transplants I need to buy _____Cost ____

2. Now that you've planned your garden for this year, help others plan theirs. Check with neighbors, younger youth, schools, community groups, and nursing homes, and let your local Cooperative Extension Service educator know that you are available to assist.

VERTICAL GROWING

If garden space is limited, consider growing vegetables that can be trailed up fences, stakes, trellises, poles, sticks, wire, and other forms of support. Growing crops vertically has other advantages. The crops often have better shape and fewer diseases than fruit produced on the ground, partly because the plants get more sunlight and better air circulation. As a side benefit, growing vertically is visually appealing.

Growing vegetables vertically takes up only a fraction of the ground space of regular gardening. Cucumbers and pole beans prefer to grow this way. But they do require more frequent watering and mulch to keep the ground moist. Prepare solid supports before planting the vegetable to avoid disturbing or damaging roots after the plants start to grow.

Straight-up support

Staking: Best for tall-growing vegetables such as tomatoes, cucumbers, and peppers. These can be trained to a single wood, metal, or plastic stake using string or twist-ties that secure their stems to the supports. Vegetables such as pole beans and tall cultivars of peas can be trained up tripods and teepees. Use three or more poles set in a circle at the bottom, and tie the poles together at the top. If you're volunteering with younger youth, they'll enjoy the handy hideout you helped them make!

Towers or cages: The most efficient and easiest vertical training method. Tomato towers should be at least 5 feet high and 2 feet across. The wide mesh lets you harvest fruit by reaching through the wire rather than from the top. Plant one tomato plant in the middle of each cylinder. Do not prune its branches. As the plant grows, the branches push through the wire spaces to support it. Cucumber and squash towers should be 3 feet high and 2 feet across. Plant several vines spaced 1 foot apart inside the tower, and thin as desired. Allow vines to climb up the middle and spill over the sides.

Netting and chicken wire: Attach between tall wooden stakes to support many vining crops, or drape them against a wall to form a trellis.

A-frames: Short sections of trellis, usually 6 feet long. Frames are set over the soil (like an "A") to support vining crops. They are usually constructed of wood and covered with chicken wire or plastic netting. A-frames are useful for growing cucumbers, peas, vining squash, melons and similar vines. As melons gain weight, support them with a sling made of old pantyhose, sheets, towels, or other cloth so they don't slip from the vine and burst when they hit the ground.

Bamboo poles: Can be used in many different ways because they are strong, long lasting, and decorative. Use them to support beans, peas, and other vining crops. For beans it's best to erect them in a tripod or as an A-frame.

Recycled material supports: Use your imagination to use items in the garden that you would normally throw away. For example, a collection of bicycle wheels can be mounted against a wall for trellis-like support for vining plants.

1. Share with your project helper how your garden plan was different this year when you practiced double-cropping. Compare your plan using double-cropping with last year's plan using intercropping to determine which is best for your garden.

2. How and where were you able to volunteer to assist others who needed help planning a garden?

3. Describe a situation in which you learned from helping someone else.

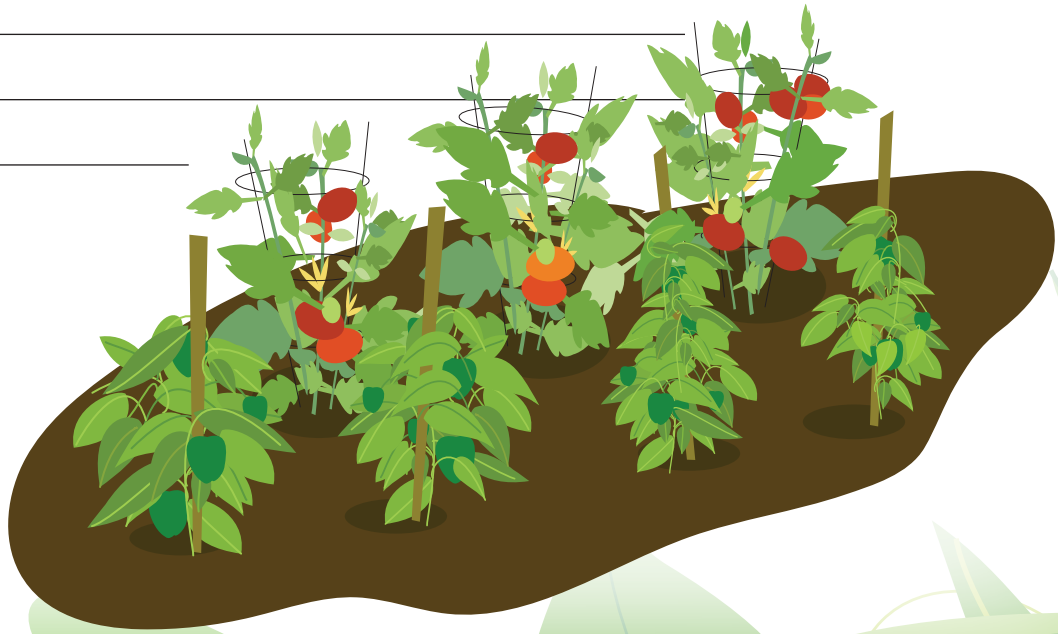
4. How would you apply what you learned in this activity to similar helping situations in school, church, youth group, and other organizations?

DIG DEEPER

Add a space-saving idea to your garden.

Help someone with a container garden, and show that person how to use one or more space-saving ideas.

Interview other gardeners about their best space-saving ideas.



Double Your Fun

More about double-cropping

Some vegetables— radishes, lettuce, and green onions are examples—grow so quickly that you can raise a second crop in the same space and during the same season after you completely harvest the first crop. For example, the space where carrots were planted could be replanted for a second summer harvest. Double-cropping is different from succession planting, where you planted seeds or transplants at roughly two-week intervals to provide a continuous supply of a certain vegetable.

In this activity, you plant your garden using double-crop planting methods. You plant one early crop, harvest it, and then plant another crop in the same space. Record the whole gardening project. Make a photo album with pictures of each stage of your garden, produce a short video, or draw pictures to communicate about your garden to others. Perhaps this will prove useful when others consider if they want to double-crop their garden.

Supplies: camera, video camera or cell phone/tablet; seeds or transplants, shovel, string, garden markers, organic matter (compost, such as dried manure), photo album or paper for video storyboard, tape measure or yardstick, four short stakes, rake, fertilizer (optional)

1. When it's time to plant your garden, work up the soil 4-6-inches deep. Plant your crop within two or three days of working the soil. Take pictures or record what you do every time you're in the garden.
2. Mix in 3-4 pounds of organic matter for every 50 square feet of area you are planting using double-cropping.
3. Smooth out the seedbed before sowing seeds. Review the plan you developed in Double Your Crops. Mark the rows in the garden, and sow the seeds. Gently press the seeds into the ground using the back of a hoe. Tamp gently again. Water with a gentle spray.
4. If you are using transplants, water them well before taking them out of their containers, and follow the transplanting directions you learned in On the Move in Level B.
5. Keep the seedbed moist until the seedlings sprout. If the plants come up too close together, thin and harvest. (Add the thinnings to a salad!)
6. Watch your garden carefully as it grows. Hoe several times during the growing season to control weeds. Apply mulch, if you'd like. Consider fertilizing, since you're planting more than one or two crops in the same space. Check often to see when the harvest is ready. As soon as a crop is ready, harvest it and prepare the soil for the next planting.
7. At the end of the growing season, assemble your photographs in a print or online album, or edit your video to share with others.

DIG DEEPER

Try double-cropping other vegetables. Experiment to find out which crop(s) grow best for you by double-cropping as compared to intercropping.

If you made a photo album for this activity, in next year's garden, expand your album or record a video.

Assist younger youth or adults with planting their garden this year.

1. Share with your project helper any problems you had when using the double-crop planting method. What were the advantages of double-cropping?

2. How did pictures or videos help you communicate your garden's "story" in a way that words alone could not?

3. Describe other times you communicate to others without speaking.

4. How might you use your pictures or video to help people planning to garden?

GROW WHAT YOU KNOW

SMALL-GARDEN STRATEGIES

Right now you probably have a traditional or larger container garden. Once you are living on your own, you might want just a few crops that you can eat by yourself.

If you have only a small space for a traditional garden, you need to make good management decisions to get the most out of it. In addition to double-cropping, try one or more of the following to get the most produce for the least space.

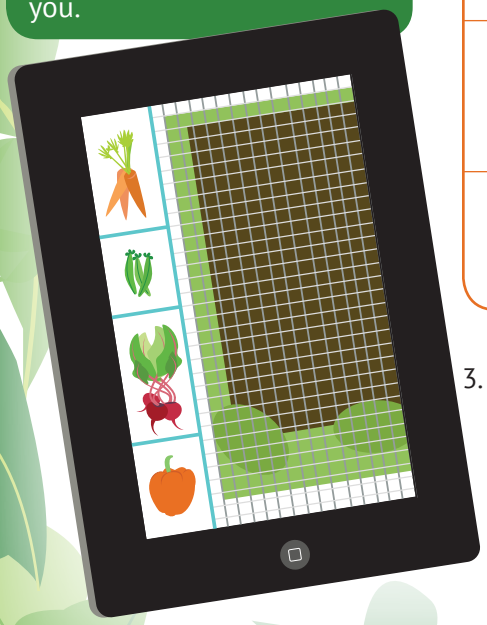
- Emphasize vertical crops that grow up rather than out. (See Double Your Crops.)
- Interplant fast-maturing salad crops, such as lettuce, radishes, spinach, and beets together with slow-maturing crops. (See It's In-Between.)
- Succession plant every two weeks in early spring and early autumn to stretch the season. (See Stretch it Out in Level B.)
- Avoid overplanting any single vegetable. Summer squash is the number-one offender in overproduction. Two plants could be sufficient.
- Choose medium- and small-fruited cultivars of tomatoes and peppers, if quantity is important to you. These plants tend to produce more small fruits than large fruits.
- Grow high-yielding vegetables such as tomatoes, lettuce, turnips, summer squash, and edible-pod peas.
- Experiment with dwarf cultivars of larger-sized vegetables and/or unusual plants that are naturally compact, such as kohlrabi, bok choy, and oriental eggplant.
- Maintain permanent clumps of certain perennial vegetables (come up every year) such as chives, hardy scallions, asparagus, rhubarb, horseradish, and certain herbs.
- Choose compact or bush-type cultivars of tomatoes, cucumbers, and zucchini.
- Plant both early-maturing and late-maturing cultivars of the same vegetable.
- Plant earlier, making use of hardy vegetables and plant protectors such as cold frames and cones.

Garden in Your Computer

Computer planning

Many gardeners use computer software to plan their garden. Before you use a computer, think through your garden, including cool- and warm-season plants, succession planting, intercropping, or double-cropping for a container or in-ground garden. Then use a garden planner on a computer or tablet.

If you have access to the Internet, research different garden-planning programs available for computers or tablets. Some can be purchased and installed on your computer. Others are part of gardening websites. Ask other gardeners if they use digital planning programs. Explore the possibilities, and choose the program that works best for you.



Supplies: computer with Internet access, smartphone or tablet (optional)

1. Go online, and search "garden planning" to get started. Research a few of the garden-planning programs you find. If you have access to a smartphone or tablet, search for garden-planning applications. (Be careful when searching for apps, because some cost money to download. Ask your parent or leader for permission before downloading.)
2. Make a list of the programs. Fill out the chart below.

Name of program or app	Platform (online, CD, app, etc.)	Cost	Advantages	Disadvantages

3. Based on your research, choose the planning program that works best for you, and plan your garden for this year.

1. Share with your project helper how you used the computer program to plan this year's garden. How does the computer plan compare to your own plan?

2. What advantages of using a new technology did you experience when planning a garden? Disadvantages?

3. Explain which technologies from the past 10 years would be hardest for your family to live without. Which ones would be easiest to give up?

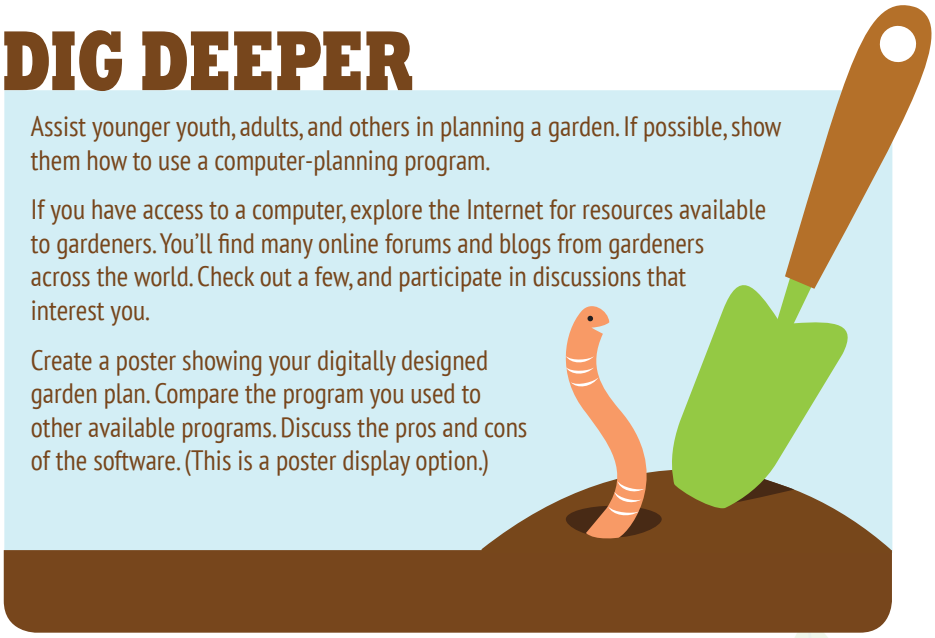
4. How will mastering technology be important for you in the future?

DIG DEEPER

Assist younger youth, adults, and others in planning a garden. If possible, show them how to use a computer-planning program.

If you have access to a computer, explore the Internet for resources available to gardeners. You'll find many online forums and blogs from gardeners across the world. Check out a few, and participate in discussions that interest you.

Create a poster showing your digitally designed garden plan. Compare the program you used to other available programs. Discuss the pros and cons of the software. (This is a poster display option.)



CHOOSING A PROGRAM

We can use technology to plan a garden. In today's world of apps and online tools, you have many options. Consider these when choosing a garden-planning program:

- Is it an online download?
- Is it a disc you have to purchase?
- Is it an app on a smartphone or tablet?

Consider your garden needs, too. Some online programs limit the size of garden you can plan, or you must pay to access special features that give you more plants to choose from or a larger plot. If you have a big garden, you might need to purchase a program. Check if it allows you to use your own spacing. Some only allow for square-foot gardening, with spacing by 12-inch increments without the freedom to move plants any closer. This feature is useful if you have a smaller urban garden.

Some programs have special features that estimate yield or alert you if your plants are planted too close. Others even help you plan for crop rotation or double-cropping.

Think about how you'll use the design after it's done. Does the program allow you to download and print your plan so you can take it outdoors? Or do you have to bring your device to the garden with you? (Don't do this in the rain!)