

Growing Garden Companions

Overview: Arranging crops so they complement each other in some way is known as companion planting. This lesson explores different types of garden companions and challenges students to devise experiments to test the validity of the reported beneficial relationships.

Grade Level/Range: 6 to 12

Objective: Students investigate companion plant claims and decide if reported benefits are scientific fact or garden lore.



Students will:

- Research the history of companion plant gardening and identify noted companion plants.
- Devise and conduct experiments to prove claims.
- Analyze and make conclusions about their results.

Time: 8 to 12 weeks

Materials:

- Garden space
- 2 or more companion plants
- Plant Observation Journals

Background Information:

Arranging crops so they compliment each other in some way is known as companion planting. Plants that have different requirements — for nutrients, sunlight, and space, for instance — often make good garden buddies. Because they are unlikely to compete for resources, you can plant them close together to save space. What's more, some combinations can actually help one or more of the companions flourish.

Consider the following factors:

Sunlight — Some plants are sun worshippers and others prefer or at least tolerate shady conditions. Tall crops, such as peas and corn, can shade lettuce and spinach from the midday sun, extending the harvest season of these cool-weather crops.

Nutrients and Water — All plants need water and nutrients from the soil to survive, but they don't all have the same needs nor do they meet them in the same way. Corn, for instance, is a nitrogen hog, but carrots require much less of that nutrient. Some plants, such as squash, have deep roots that can pull nutrients and water from greater depths than can onions, lettuce, and other shallow-rooted crops. A family of crops called legumes, which includes beans, peas, peanuts, lupine, and clover, can actually return more nitrogen to the soil than they consume.

Other Factors — Some plants make good partners because their life cycles, growth rates, or temperature preferences differ. For instance, you can plant fast-growing, cool-weather crops like lettuce, radishes, or cilantro early in the season alongside slower-growing, heat-loving tomatoes. You'll be able to harvest your early crops quickly, making room for the tomatoes to take over.

The Three Sisters growing system, long used by many Native American cultures, is one of the most familiar examples of companion planting. The ‘sisters’ (corn, beans, and squash) are planted together in such a way that they aid each others’ success. Tall corn stalks provide support for pole beans to climb. Beans, through their symbiotic association with a type of root bacteria, fix nitrogen from the air into a form that plants (especially nitrogen-hungry corn) can use. And large, ground-hugging, prickly squash leaves shade out weeds and may deter critters.

In addition to promoting better growth through complementary habits, companion planting is also practiced to prevent pest problems. Specific crops (typically flowers and herbs) are believed to repel certain pests, lure them elsewhere, or confuse them. Others entice beneficial insects, birds, and spiders that have a penchant for dining on problem visitors. The more diversity and variety of plants in your garden the greater will be the number of beneficial organisms that keep a check on the populations of pests. **Here are some examples:**

Plants that Attract Beneficial Insects: Many insects, such as small parasitic wasps, green lacewings, and lady beetles, depend on certain pests for nourishment. When pests are in short supply, these do-gooders feed on pollen and nectar. Plants with tiny flowers, such as members of the carrot (umbel family) and daisy (composite or aster) families, are among their favorites. You can encourage the pest-control squad by mixing the following members of those two plant families with your vegetables: anise, dill, caraway, fennel, yarrow, sweet cicely, zinnia, cosmos, and marigold, or by leaving related weeds (e.g., queen Anne’s lace and wild daisies) nearby. Other small-flowered herbs such as thyme and catnip also appeal to these garden helpers. If you devote a section of your vegetable garden to perennial flowers, try coneflower, aster, liatris, coreopsis, and black-eyed Susan. Fruit-bearing trees and shrubs also offer food and shelter to birds, many of which feed on garden pests.

Plants that Lure Pests Away: Some plants are simply so attractive to pests that you can use them to lure garden intruders away from your precious vegetable crops. These attractants are referred to as “trap crops.” Once the trap crops are infested with pests, you can pull them out and discard them, pests and all. Try these: nasturtiums for aphids, radishes or nasturtiums for flea beetles, dill and lovage for tomato hornworms, eggplant for potato bugs.

Plants that Repel Pests: Gardeners have long held that some plants are repugnant to certain pests. Lots of pests find their way to favorite crops through their sense of smell. Herbs often exude strong fragrances (from their essential oils) that are believed to repel insects or confound them by disguising the smell of neighboring plants. These aromatic plants include tansy, mint, basil, thyme, and santolina. Gardeners often tuck garlic and onions between other vegetables for the same purpose. Here are some plants thought to repel specific pests:

- onions for carrot rust flies.
- tansy for colorado potato beetles.
- marigolds and basil for flea beetles on eggplant.
- marigolds for Mexican bean beetles.
- nasturtiums for squash bugs.
- marigolds, mint, or thyme for cabbage moths.

Advanced Preparation: Locate space on school grounds to complete your experiments. This could be done in an established school garden or even in container gardens if you do not have garden space available to you. Another alternative, you can also try contacting local botanical gardens or community gardens to see if they would be willing to partner with your students on their experiments.

Laying the Groundwork:

- Ask students, what is the difference between a scientific fact and a traditional practice? Explain to students that through the ages, gardeners have observed that certain plants appear to do better when grown near others. Arranging crops so they compliment each other in some way is known as companion planting. Share some examples from the background information. Scientific research supports some of the claims about which plants make good bedfellows, but many are based on historical observation and tradition.
- Conduct Internet research on different types of companion plant claims and determine if they are based on scientific evidence or if they fall into the category of garden lore.

Exploration:

- Create a class list of all the companion plant combinations discovered through your Web search. Label each combination as a scientific fact or garden lore.
- Set up an experiment to test one or more of the listed combinations labeled garden lore. Obtain plants and then install in test plots where the selected plants are
- grown on their own and grown with their companion plants. You need at least 2 plots (a control and an experimental), but additional replications are best for
- the strongest results. Control all other variables that might impact growth (such as soil quality, water, and sunlight availability).
- Track growth and plant health. You can adapt the sample growth chart to fit your needs.
- Summarize findings. Determine if the results support companion plant claims.

Sample Growth Chart:

Target Plant: _____ Companion Plant: _____

Experimental Plot#: _____ Control Plot #: _____ Date Planted: _____

Plot #	Height	Leaf Appearance	Growth Rate	Insects Present	Additional Observations
Plot #1					
Date:					
Plot #2					
Date:					

Making Connections:

- Graph the results from your growth charts. Did you notice any differences between the experimental plants (the plants grown with a companion) versus the control plants (plants grown on their own)? Were the differences significant?
- Were you able to control all variables? Were there any environmental factors that may have influenced any differences in plant growth? Do you feel confident about your results?
- How could improve this experiment? Do you have any ideas for further experiments? What would you do differently? What would you do the same?

Branching Out:

History – Research Three Sisters Gardens. Discuss how the plants complement each other in the garden and also how the foods they produce are complementary in your diet. Create a Three Sisters Demonstration Garden.

Science – Relate companion garden to symbiotic relationships. Assess your list of companion plants and decide whether or not you would consider each pairing a symbiotic relationship.

Math – Use graph paper to design a vegetable garden that includes companion plants. Make sure students space the plants appropriately and draw the plans to scale.