

MASTER GARDENER



YAVAPAI COUNTY

The Art of Companion Planting



THE UNIVERSITY
OF ARIZONA

What is Companion Planting?

Companion planting is a gardening technique where different plant species are grown near each other for mutual benefits.

Companion planting is best defined as the practice of planting different plant species in close proximity so that they can offer identifiable benefits to one another. Sometimes the benefit is one-sided, with one plant selflessly offering most of the partnership advantages to the other.

Why Use Companion Planting?

Companion planting is used to effect a change in your garden.

Do you hate seeing your tomatoes ravaged by hornworms?

Have aphids infested the plants and trees in your garden?

Do you want to attract beneficial insects this season?

Could your lettuce benefit from some shade this summer?

Are you just looking for a more natural way to grow plants?

Where's The Science?

Science and Companion Planting

Companion planting is not a proven science.

The basis for this type of gardening comes from folklore and experimentation. Organic gardeners have spent years trying different types of plants and herbs near other plants and vegetables.

Science and Companion Planting

Why is science so limited in this area?

Scientific methods - principles and procedures for the systematic pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of hypotheses (Merriam-Webster)

Issues Faced in Companion Plant Studies:

- Control of the variables
- Repeatability

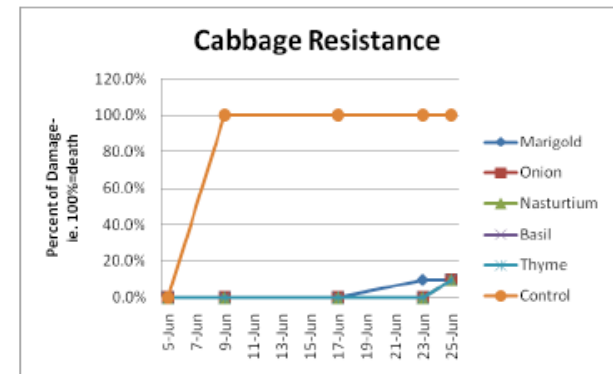
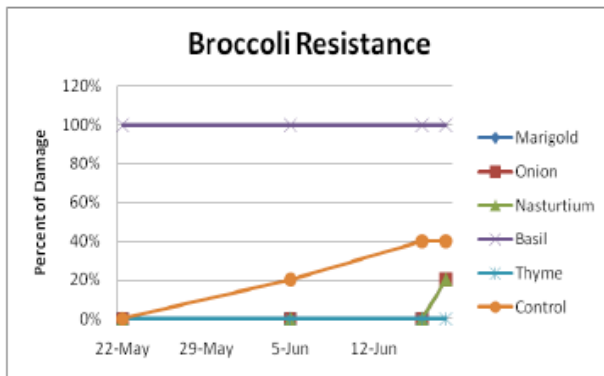
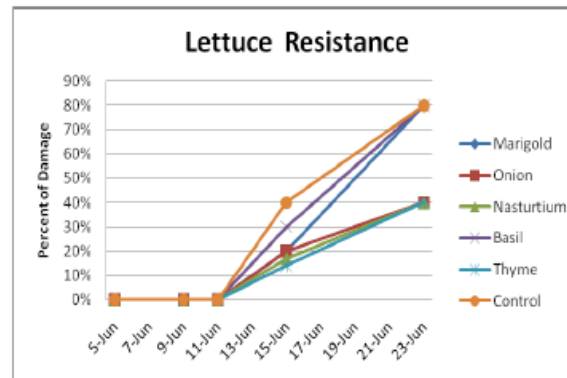
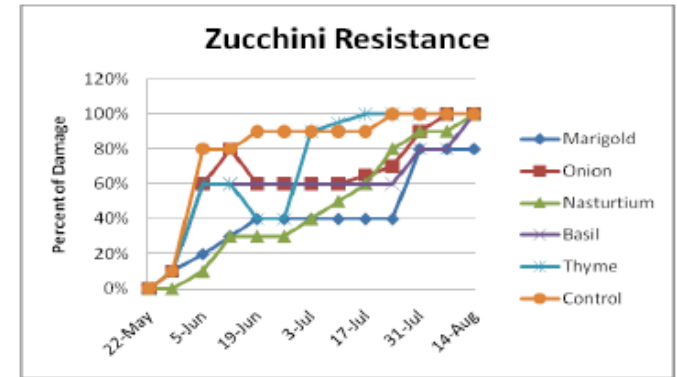
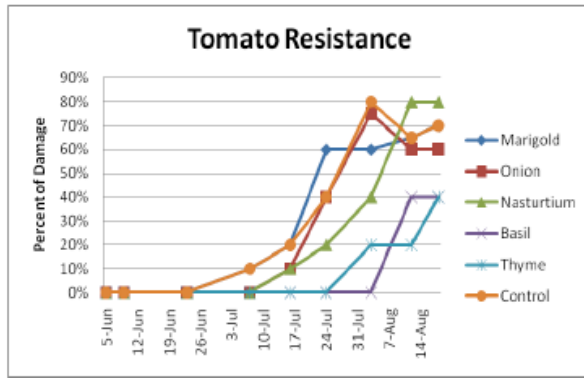
Iowa State U Study

The objectives of this study were to determine if there is an advantage to intercrop plants for enhanced growth and to determine if selected companion plants would provide protection against common vegetable pests by methods of trap cropping and biochemical pest suppression.

Iowa State U Study

- Small sample size
 - 5 vegetable species and 5 companion plants
- Abnormal weather conditions produced anomalies
(Specifically disease and insect infestations)
- Results were considered “indicative” not
“conclusive”

Iowa State U Study



Iowa State U Study

Study Observations:

1. They felt there was evidence that planting multiple species together will always invite less pest pressure than one single crop.
2. Planting marigolds around zucchini plants significantly reduced the damage from squash bugs and striped cucumber beetle, and nasturtiums had a similar effect on reducing the population of squash bugs.

Notable Results from Studies

- Marigolds – African and French marigold roots produce biochemicals toxic to root nematodes. However, benefit is received AFTER growing the marigolds as a cover crop and tilling into the soil.
- Asters – The flower heads of certain plants within the aster family (Asteraceae) when powdered constitute the active ingredient in the insecticide called pyrethrin.
- Dill and Coriander – The flowers from both these plants encourage predators of the Colorado potato beetle and were highly successful in reducing damage to eggplants.
- Sweet Alyssum – The presence of alyssum resulted in more hoverfly larvae and fewer aphids in lettuce fields

Horticulture

horticulture - the science and art of growing fruits, vegetables, flowers, or ornamental plants (Merriam-Webster)

How Can a Plant Be a Companion?

Saving Space

- Plant early, short-season crops with later maturing crops
Example: plant lettuce, spinach or basil early and transplanting peppers or tomatoes in the bed as early crops mature
- Plant slow growing crops close to quick maturing crops
Example: plant radishes and carrots side by side

These ideas can help with weed management and soil health.



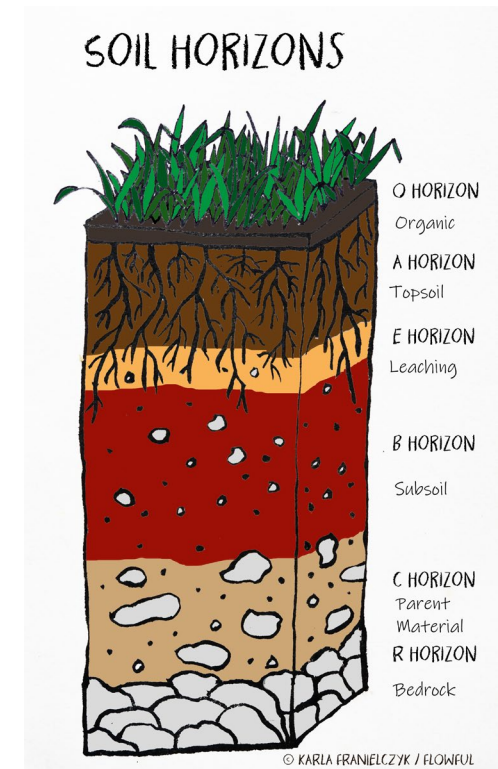
Photo: VitaminGreen, Flickr

Soil Health

- Planting crops with different root structures together aerates the soil and allows plants to pull nutrients from different parts of the soil profile.

Examples:

- Plants with taproots or tubers (carrots/potatoes) can help break up compact soil
- Deep-rooted crops (melons/tomatoes) pull water and nutrients from deeper in the soil profile



Flowful.com

Soil Health

- Adding legumes (peas, beans, clover) is another method to improving soil health. The legume family of vegetables fix nitrogen from the air creating nitrates to enrich your soil

Examples:

Add edible legumes (peas – sugar or snap, beans – green or hard shell) for harvesting while enriching soil at same time

Use a legume like red clover as a cover crop underneath your main crop

Mutual Support

- Sun Protection
 - Larger/taller plants offer shade for smaller plants growing under them (tomatoes with carrots)
 - Shade can help prevent some plants from bolting (pole beans with cabbage)
- Shelter Plants
 - Larger/taller plants can provide windbreaks as well as providing protection from heavy rain
 - Ground covers and intercropping can prevent the erosion of soil during heavy rain and wind
- Companion plants can provide physical support for one another
 - Classic example is the Three Sisters model

Three Sisters Model

A traditional Three Sisters garden consists of corn, pole beans and summer squash

- The corn is planted first.
- When the corn is about 6 inches tall, plant pole beans around each stalk.
- Next plant squash on the outer edge of the area

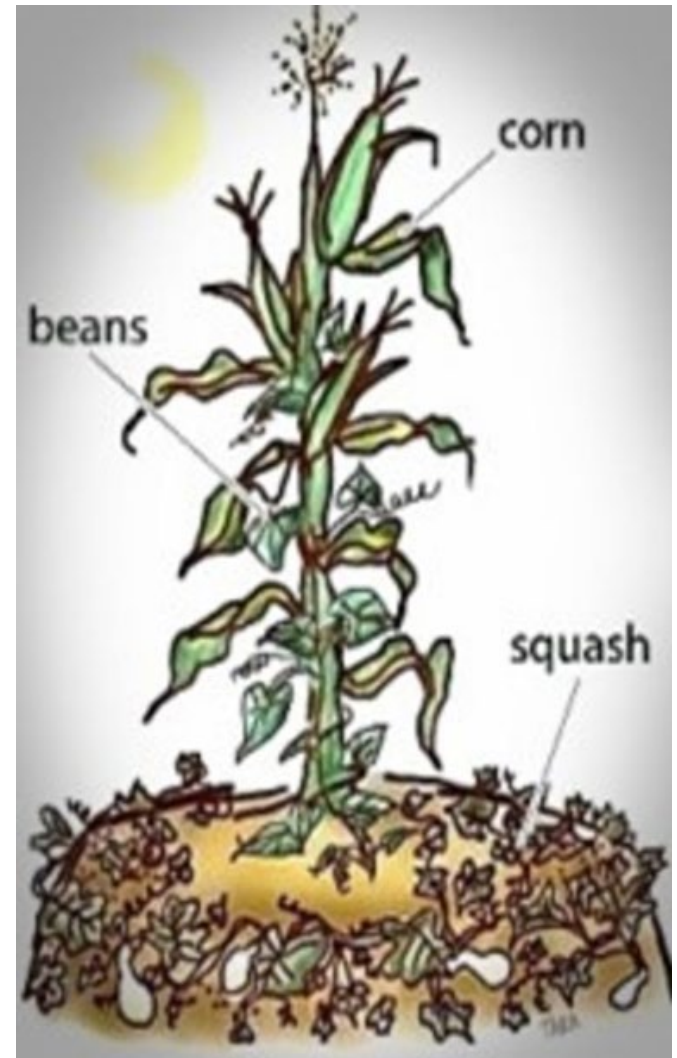


Photo: University of Illinois Extension

Three Sisters Model



Insect Management

Plants can be used to attract beneficial insects or repel destructive insects

Three primary ways plants attract insects:

1. Producing a variety of smells/scents
2. Providing habitats and food
3. Visually distracting or attracting

Insect Management

Smells:

- The odors put off by plants may repel or attract insects. Also, the odor of one plant can mask the odors of other plants.
- These odors can be used to attract pests away from other plants (trap crops)
- Odors can deter or repel them from an area (repellent crops)
- A variety of odors can confuse insects because there are too many “signals” to the insects

Insect Management

Attracting predators or parasitoids:

- Predator insects eat other insects, and parasitoids lay their eggs inside of other insects.
- Providing food and a habitat for predators and parasitoids attracts them to your garden

Visual Distractions:

- Interspersing plants with different heights, colors, odors and textures may make it more difficult for insects to find their target plants

Trap Crops

- Trap crops are plants that are placed in the garden in a somewhat sacrificial capacity.
- They attract insect pests away from the primary crops you're trying to protect.
- The pests congregate on the trap crops in larger numbers rather than on other plants in your garden.

Common Trap Crops

- Radishes – This is quick growing vegetable is one of the easier trap crops to grow and is beneficial among many varieties of vegetables.
- Nasturtiums – An excellent trap crop for flea beetles and aphids.
- Mustard – Your Brassica's best friend. Most of the insects that love brassicas love mustard more.
- Sunflowers – If you have stink bugs, this is a great trap crop for your yard. Aphids are among the insects that love sunflowers too.
- Stinging Nettles – While not a crop itself, stinging nettles attract a broad spectrum of insects both pests and beneficials.

Companion Plant Charts



To Use or Not to Use?



Plants that Play Well Together

Companion Plant Combinations

Tomatoes and Basil:

The pungent aroma of basil can help repel harmful insects, such as tomato hornworms and whiteflies, which



Farmgirlfare.com

are known to attack tomato plants. In addition, basil can help enhance flavor of tomatoes, making them taste sweeter and more delicious.

Tomatoes, on the other hand, can provide some shade for the basil plants, which can be beneficial in hot and sunny climates.

Companion Plant Combinations

Carrots and Onions:

Carrots and onions are often planted together as companion plants because they compliment each other well. Onions are a natural pest repellent that can help keep carrot flies and other pests away from carrot plants.



morningchores.com

Carrots, on the other hand, can attract beneficial insects like ladybugs, which can help control pests that attack onion plants. In addition, the strong odor of onions can help mask the scent of carrots, making them less attractive to pests.

Companion Plant Combinations

Potatoes and Marigolds:

Marigolds can help repel pests such as nematodes and beetles that can damage potato plants while also attracting beneficial insects such as ladybugs and lacewings. In addition, marigolds can help prevent the growth of weeds around potato plants.

Cucumbers and Chamomile:

Chamomile can help attract beneficial insects, such as hoverflies and wasps that prey on cucumber pests, while also providing some shade for the cucumber plants.

Companion Plant Combinations

Lettuce and Chives:

Chives have insect-repelling properties and can help deter aphids, slugs, snails, and other pests that can damage lettuce plants. Chives can also improve the overall health of lettuce plants by attracting pollinators, such as bees and butterflies, which can help increase lettuce yields.



Theplantguide.net

Companion Plant Combinations

Beans and Corn:



Offthegridnews.com

Beans can fix nitrogen in the soil, which corn requires, while the corn provides support the beans to climb.

Companion Plant Combinations

Radishes and Chervil:



Gardenandgreenhouse.net

Chervil attracts beneficial insects such as hoverflies, which can help control pests that may damage radishes. Additionally, chervil improves their growth and flavor.



Nature-and-garden.com

Companion Plant Combinations

Borage and Strawberries:

Borage helps to repel pests that attack strawberries and attracts pollinators, which can help to increase the yield of strawberry plants. Borage also enhances the flavor and vigor of strawberry plants.



Pinterest.com

Companion Plant Combinations

Thyme and Eggplant:

Thyme attracts beneficial insects like bees and predatory wasps, which in turn help to control pests that attack eggplants. Additionally, thyme can help to improve the flavor eggplants, and it also helps to repel some pests like whiteflies and cabbage worms.

Calendula and Broccoli:

Calendula's strong scent can repel pests that might attack broccoli, such as aphids and whiteflies, while also attracting beneficial insects like beneficial ladybugs to dine on the aphids.

Companion Plant Combinations

Roses and Garlic:



Pinterest

Garlic is believed to help repel aphids, which can attack roses, while also deterring Japanese beetles and other pests. Some gardeners also believe that garlic can help improve the health and vigor of roses.

Companion Plant Combinations

Cabbage and Nasturtium:

The strong odor of nasturtium helps to repel cabbage moths, which are common pests for cabbage plants.



Pinterest.com

VEGETABLES YOU SHOULD NEVER GROW TOGETHER



CORN & TOMATOES



PEPPERS & CABBAGE



SAGE & CUCUMBER

Plants that Don't Play Well Together



POTATOES & ZUCCHINI



CARROTS & PARSNIPS



BEANS & ONIONS



PUMPKINS & SUMMER SQUASH



FENNEL & EGGPLANT



ASPARAGUS & BROCCOLI

@TASTEOFHOME

Questionable Plant Combinations

Incompatible heights

Just as a plant can be a positive companion plant and provide shade, it can be a very negative if one plant restricts the light requirements of another.

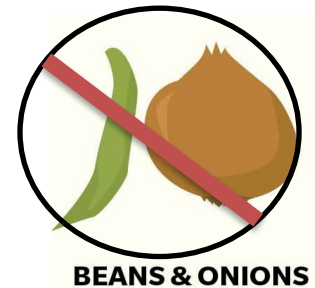
An example would be tomatoes and bush beans. The tomatoes will very likely shade out the beans which need full sun.

Allelopathic Plants

Allelopathic plants have the capability to chemically impede the vital systems of competing plants.

Beans and Onions

Beans are considered allelopathic plants, which means they produce biochemicals that can hinder the growth of another plant. Beans do not do well with members of the onion family, such as onion, leek, chives and garlic.



Allelopathic Plants

Potatoes and Sunflowers

One grows deep and the other rises high. However, they don't get along because sunflower seeds contain a toxic ingredient that prevents potatoes from growing fully.

Eggplant and Fennel

Eggplant is a member of the nightshade family, and fennel produces a chemical that slows nightshade growth.

Allelopathic Plants

Walnut is well known to have allelopathic properties as well as sorghum and sunflower. Each of these release chemicals through their root system to suppress growth of other plants.

All brassicas, such as cabbage, mustard, kale, rapeseed, radish, and more have some allelopathic properties. Interestingly they don't share the same properties!

Some brassicas contain a growth enhancing hormone called brassinolide. Mustard when tilled in the soil can suppress fungal pathogens. Others limit germination of legumes.

Summing It All Up

How can I use Companion Planting in my garden?

1. Identify known issues in your garden
OR
Identify improvements you could make
2. Plant companion plants that could impact these
3. Closely monitor what works and doesn't work
4. Document in your garden notes for future years

ENJOY YOUR GARDEN!!

Acknowledgments

<https://extension.umn.edu/planting-and-growing-guides/companion-planting-home-gardens>

<https://dr.lib.iastate.edu/server/api/core/bitstreams/9f6c0efd-b8b1-4ecc-b8d1-2abdbfb16548/content> (.pdf)

<https://ulster.cce.cornell.edu/resources/companion-planting-and-flower-borders>

[How to Grow a Three Sisters Garden – Native-Seeds-Search](#) (web)

[https://cdn.shopify.com/s/files/1/0157/0808/files/How to Grow a 3 sisters Garden.pdf?v=1631142579](https://cdn.shopify.com/s/files/1/0157/0808/files/How_to_Grow_a_3_sisters_Garden.pdf?v=1631142579) (.pdf)

<https://harvesttotable.com/>

Yavapai Insect Photos: <https://extension.arizona.edu/yavapai-insect-photos>



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