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Plant Partners

March 14, 2023

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Missouri Valley Extension Master Gardeners



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Myth or Science?

Myth

- Anthropomorphism: carrots “love” tomatoes
- Sensitive crystals: plants attracted by their crystalline extracts
- No comparison studies



Science

- Controlled experiments—comparison studies
- Repeated studies
- Detailed outcome records



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What is Companion Planting?

- The practice of planting different crops close to each other in order to
 - Minimize disease
 - Reduce pests
 - Improve soil fertility
 - Enhance pollination



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How Plants Affect Each Other



- Use of shared resources: competition vs. sharing
- Improved nutrient availability
- Chemical signals
- Fungal (mycorrhizal) root colonies
- Allelopathy

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Soil Health

- Minimize tilling
- Add organic matter
 - Add 1-2" mulch (chopped leaves, compost)
 - Use cover crops
- Use legumes to add nitrogen
- Break up heavy soils with heavy roots (radishes, etc)

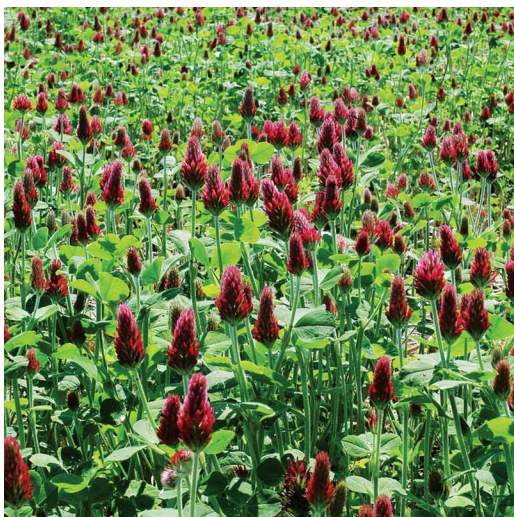


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Cover Crops



Crimson Clover



Buckwheat

- Non-harvested Crops :
 - warm-season: plant in spring
 - cool-season: plant late summer
- Reduce soil erosion
- Create habitat for beneficial insects
- Add organic matter
- Improve soil structure
- Suppress weed growth

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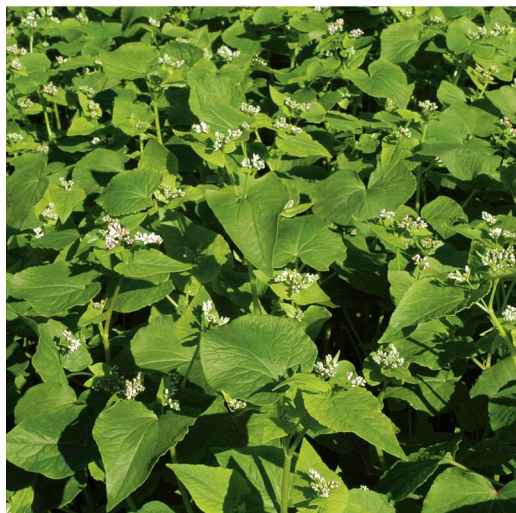


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Soil Conditioners

Annual Buckwheat

- Sow in spring
- Cut down when flowering
- Leave in place for mulch



Cowpeas

- Sow in early spring
- Excellent nitrogen fixers
- Mow when they begin to produce flowers



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Soil Conditioners

Crimson Clover

- Legume
- Plant late summer
- Winter mulch



Oats

- Spring plant for living mulch
- Will not overwinter—plant directly into dead debris
- Allelopathic



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Soil Conditioners

Winter Rye

- Sow in fall; mow in spring
- Allelopathic
- Plant transplants into residue



Winter Wheat

- Sow in fall; mow in spring
- Soil insulator
- Plant vine crops into residue



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Nitrogen Transfer Partners

Legumes

Improve yields

Increase soil fertility

- Garden beans + potatoes
- Cowpeas + peppers, tomatoes, eggplants
- Peas + lettuce on each side
- Edamame + fall greens



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Breaking up Heavy Soils



Thick roots

Root exudates (change soil
pH)

- Buckwheat
- Forage radish
- Turnips

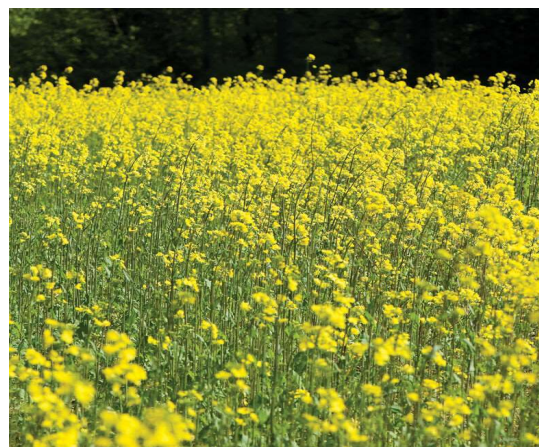
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Weed Management: Living Mulches

- Annual mulch with annuals
- Perennial mulch with perennials
- Consider plant height
- Alternate rows with vegetables
- Sow directly under tall crops
- Use for walking paths
- Mow or cut back

Yellow
mustard



White
clover



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Pest Management



- Trap cropping
- Mask/hide host plants
- Interfere with egg laying
- Physically impede movement of pests
- Improve plant diversity



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Trap plants

- “Sacrificial” plants to lure pests
- Plant prior to desired plants
- Plant away from desired vegetables for mobile pests
- Interplant with desired vegetables for pests with limited mobility



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Trap Partners

Pest	Trap Plant	Plant Partner
Flea Beetle	Radish/Chinese mustard	Tomato/beans
Cabbage worm	Collards	Cole Crops
Squash bugs	Blue Hubbard squash	Squash varieties
Pepper maggot	Hot cherry peppers	Bell peppers
Aphids	Sunflowers	Many



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Masking Host Plants



Mask by appearance, chemicals, proximity

- Intercropping (plant diverse species in close proximity)
- Avoid long rows of same crop
- Don't leave large areas of bare ground
- Plant both vegetables and flowers

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Masking Partners

Pest	Mask Plant	Plant Partner
Aphids	Onions, garlic	Peppers
Squash bugs	Nasturtiums	Zucchini
Thrips	Basil	Tomatoes
Potato beetles	Tansy/Catmint	Potatoes



Thrips damage

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Impede Egg Laying

Make landings on host plant “difficult”

- Separate plants of same species
- Cover bare soil—mulch
- Plant fragrant herbs and flowers



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Impede Egg Laying

Pest	Limit Eggs	Plant Partner
Cabbageworm	Sage, Dill, Thyme	Cole Crops
Hornworm	Basil	Tomatoes
Armyworm	Thyme, Basil	Tomatoes
Root Maggot	Marigolds	Onions/Cabbage



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Impede Pest Movement

- Create barriers to physically impede pests

Hedgerows of shrubs/grasses

- Echinacea
- Elderberry
- Serviceberries
- Sunflowers
- Switchgrass



Low-growing Cover Crops

- Crimson Clover
- Sweet Alyssum
- Thyme



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Benefits of Diverse Planting

Attract pest-eating insects

- Ground beetles
- Lacewings
- Ladybugs
- Parasitic wasps
- Syrphid flies



Plant attractors

- Carrot family
- Dill
- Mint family
- Lacy Phacelia
- Sweet alyssum



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Benefits of Diverse Planting

Flowering plants attract pollinators

- Bumblebees
- Squash bees
- Sweat bees
- Native bees
- Butterflies & moths
- Hummingbirds
- Bachelor Buttons
- Borage
- Basil
- Chives
- Sunflowers
- Zinnias



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Walliser, Jessica. Plant Partners: Science-based Companion Planting Strategies for the Vegetable Garden, 2020.

E-resources:

"Is Companion Planting Scientific?"

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"Cornell Gardening Resources: Companion Planting"

<https://web.uri.edu/wpcontent/uploads/sites/336/P1-Companion-Planting-Ecogardening.pdf>

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