

# GARDEN COVER CROPS & GREEN MANURES







# WELCOME

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Chat questions will be collected for Q&A throughout the presentation.

Please submit questions before we begin the Q&A. Once Q&A begins, we may not see new questions.

All audience chat messages are private.



# OUR PRESENTER



Collin Thompson

Farm Manager  
Johnny's Selected Seeds



# Johnny's Research Farm

Original farm was purchased in 1976 and still functions as our "home farm".

## Dedicated to:

- **Breeding**—development of new vegetable and flower varieties
- **Seed production**—foundation, stock, and commercial seed productions
- **Product trialing**—field and high tunnel trials of Johnny's and partner products

*Every product* in the Johnny's catalog has been field tested on the research farm.







## The Farm

### Consists of:

- 31 Farm Operations Staff
- Ten farm locations (3 owned, 6 leased)
- 203 acres total, 50-75 in active production
- 50% or more of acreage in cover crops annually



# Today's Discussion



**Understanding Cover Crops**



**Selecting the Right Crops**



**Cover Crops & Beneficial Insects**



**Methods & Management for Cover Crops**





A close-up photograph of a bee on a yellow flower stem, set against a blurred green background. The bee is positioned on the left side of the frame, facing right. The flower stem is diagonal, extending from the bottom left towards the top right. The text 'UNDERSTANDING COVER CROPS' is centered in a white rounded rectangle in the middle of the image.

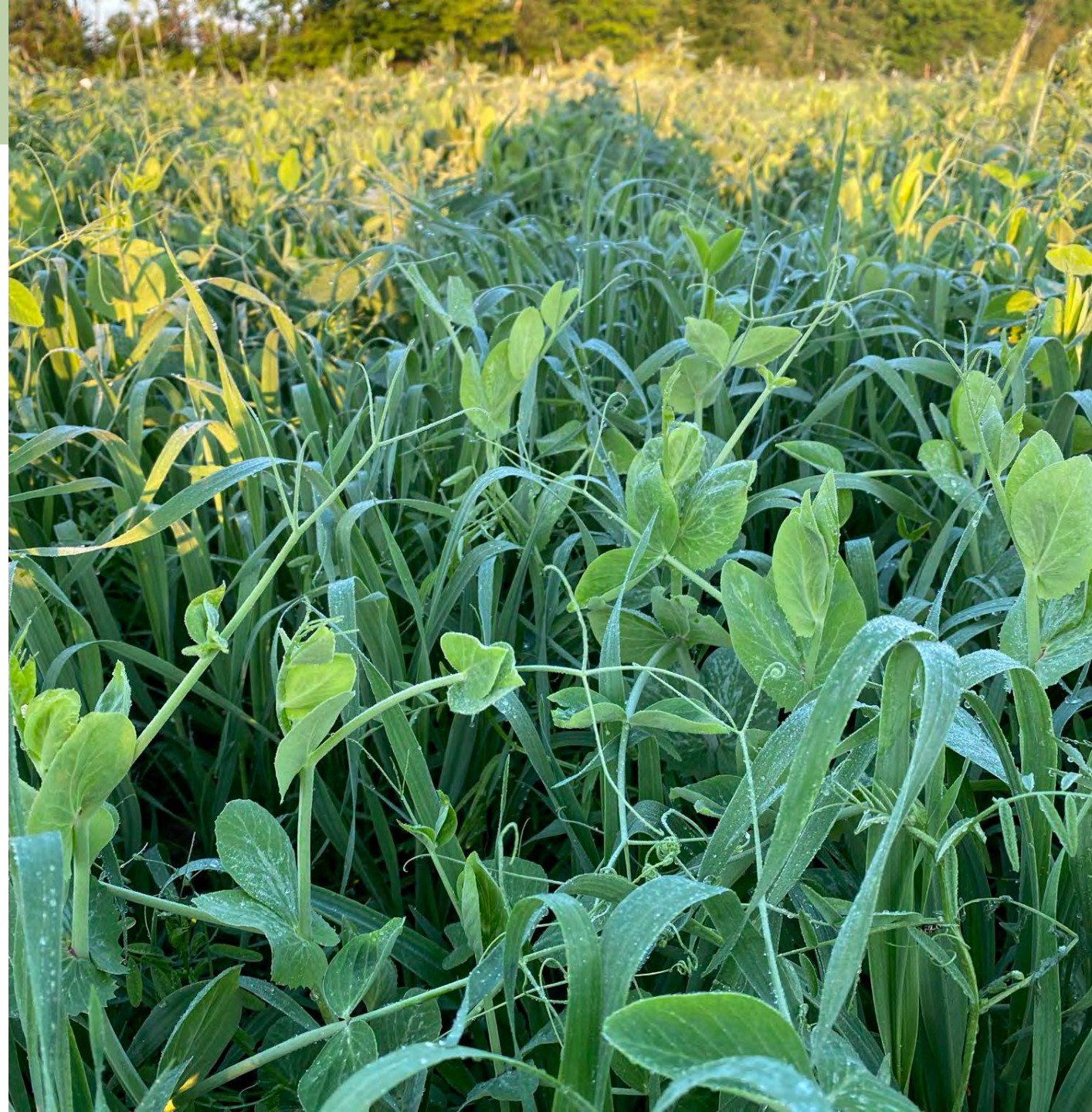
# UNDERSTANDING COVER CROPS



# What *IS* a Cover Crop/ Green Manure?

## Put simply:

- **Cover crops** cover the soil, protecting from erosion, reducing soil temperature, and retaining moisture
- **Green manures** are a type of cover crop that is incorporated into the soil via tillage to boost organic matter and release nutrients.





# What *IS* a Cover Crop/ Green Manure?

## Potential benefits/uses:

- **Improve soil structure and fertility:**
  - Increase water holding capacity
  - Improve soil texture and porosity
  - Fix nitrogen
  - Scavenge nutrients
  - Reduce erosion and nutrient leaching
- **Supress weeds**
- **Break pest and disease cycles**
- **Grow your own mulch**
- **Enhance biodiversity and support ecosystem needs**





A close-up photograph of a bee on a yellow flower stem, set against a blurred green background. The bee is positioned in the center-left of the frame, facing right. The flower stem extends from the bottom left towards the top right. The background is a soft, out-of-focus green, suggesting a field of similar plants.

# SELECTING THE RIGHT COVER CROPS



# Factors to Consider

- **Climate and local growing conditions**
  - Dry? Wet? Cold? Hot? Windy?
- **Cropping system and soil conditions**
  - Vegetables? Flowers? Fruit?
  - Bare soil? Existing crops?
  - Future crops?
- **Available tools or equipment**
- **Personal goals**





# Cover Crop Categories

## NON- LEGUME

*Cereals (rye, wheat,  
oats, barley, etc)*  
*Grasses (ryegrass, teff,  
millet, sudangrass)*  
**Buckwheat**  
**Sunflowers**  
**Brassicas**

## LEGUME

**True Clovers**  
**Sweetclovers**  
**Vetches**  
**Peas**  
**Beans**  
**Sunn Hemp**  
**Lentils**



# Non-Legumes

Grasses, grains, broadleaf species, brassicas etc.

## Services:

- SOM\* production
- Weed suppression
- Nutrient accumulation
- Biomass (mulch potential)
- Pollinator/beneficial support
- Compaction relief

\*Soil Organic Matter





# Legumes

Clovers, vetches, peas, beans, sunn hemp, lentils

## Services:

- Fix atmospheric nitrogen
- Reduce erosion
- Biomass production
- Pollinator/beneficial support

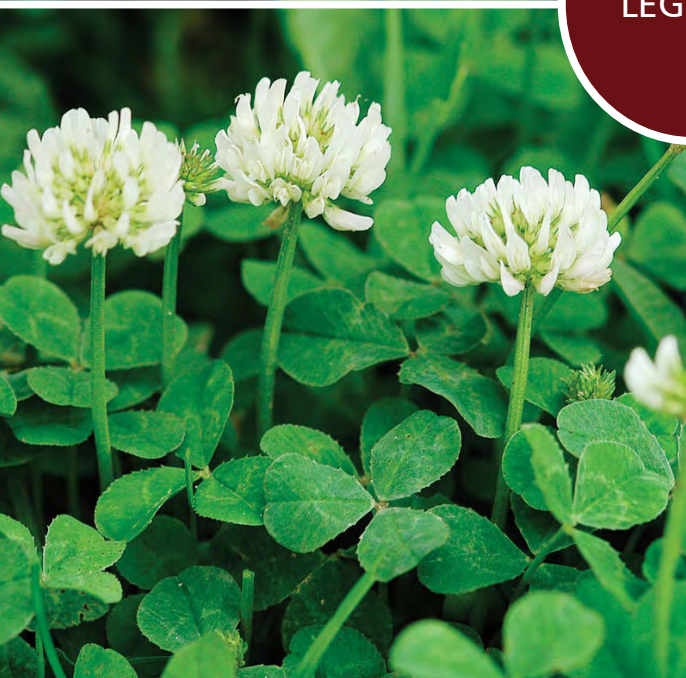
Rhizobia bacteria form a symbiotic relationship with legume plant roots, converting atmospheric nitrogen ( $N_2$ ) to usable ammonia ( $NH_3$ ) in exchange for sugars from the plant.







LEGUME



WARM SEASON

Cowpeas  
Sunn Hemp  
Soybeans

Buckwheat  
Sunflowers  
Sudangrass  
Millet  
Teff



NON-LEGUME

Most Clovers  
Vetch  
Peas  
Sweetclovers  
Alfalfa

COOL SEASON

Rye  
Wheat  
Oats  
Barley  
Radish  
Ryegrass  
Mustards





# Mixes

Mixes compound benefits from individual crops but require some planning.

Depending on time of year and field conditions, mixes will behave differently. Certain species will dominate or recede.

## When developing mixes, consider

- Timing/maturity of components
- Competitive nature of components
- Termination and establishment requirements

## Common mixes:

- Peas, Oats, and Vetch (Spring Green Manure)
- Rye, Ryegrass, Clover, and Vetch (Fall Green Manure)
- Rye and Vetch
- Buckwheat and Cowpea





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# COVER CROPS AND BENEFICIAL INSECTS



# Cover Crops & Beneficials

## Importance of beneficial insects:

**Pollinators:** pollinate fruiting crops  
(e.g., bees, butterflies, moths)

**Predators:** help manage garden pests  
(e.g. ladybugs, lacewings, parasitic wasps)





# Cover Crops & Beneficials

## Habitat and Shelter

- Cover crops provide shelter, nesting, and overwintering habitat for predators and beneficial insects.
- Diversity of vegetation provides necessary shelter for insect population growth.

## Food source

- Flowering crops provide pollen and nectar for pollinators. Larger pollinator population can also lead to improved pollination of cash crops.





# Garden Recommendations

## NON- LEGUME

- Buckwheat
- Radish
- Oats
- Teff
- Rye\*

## LEGUME

- Peas
- Cowpeas
- Clovers
- Vetch\*

## FLOWERING

- Buckwheat
- Phacelia
- Clovers
- Vetch\*
- Alyssum
- Sunflower\*

## MIXES

- Peas/Oats
- Rye/Vetch\*
- Buckwheat/Cowpea
- Oats/Clover

● = Warm season

● = Cool season

\*denotes more challenging crop for beginners



A close-up photograph of a bee on a yellow flower stem, set against a blurred green background. The image is overlaid with a semi-transparent green filter. A white rounded rectangle is centered on the right side of the image, containing the text 'METHODS & MANAGEMENT' in white, bold, uppercase letters.

# METHODS & MANAGEMENT



Garden Crop	Cover Crop Planting Window(s)	Common Garden Options
Spring Lettuce/Greens	<ul style="list-style-type: none"> <li>• Prior Fall</li> <li>• Summer</li> <li>• Fall</li> </ul>	<p><b>Spring</b></p> <ul style="list-style-type: none"> <li>• Peas</li> <li>• Oats</li> <li>• Radish</li> <li>• Clovers</li> <li>• Flowering</li> </ul> <p><b>Summer</b></p> <ul style="list-style-type: none"> <li>• Buckwheat</li> <li>• Cowpea</li> <li>• Teff</li> <li>• Sunflower</li> </ul> <p><b>Fall (winterkill zone 5)</b></p> <ul style="list-style-type: none"> <li>• Peas</li> <li>• Oats</li> <li>• Radish</li> <li>• Some clovers</li> </ul> <p><b>Fall (winter hardy zone 5)</b></p> <ul style="list-style-type: none"> <li>• Rye</li> <li>• Vetch</li> <li>• Wheat</li> <li>• Some clovers</li> </ul>
Spring Brassicas/Roots	<ul style="list-style-type: none"> <li>• Prior Fall</li> <li>• Summer</li> <li>• Fall</li> </ul>	
Tomatoes/Peppers	<ul style="list-style-type: none"> <li>• Prior Fall</li> <li>• Fall</li> </ul>	
Pumpkins/Squash	<ul style="list-style-type: none"> <li>• Prior Fall</li> <li>• Fall</li> </ul>	
Potatoes	<ul style="list-style-type: none"> <li>• Prior Fall</li> <li>• Fall</li> </ul>	
Cucumbers/Melons	<ul style="list-style-type: none"> <li>• Prior Fall</li> <li>• Fall</li> </ul>	
Beans	<ul style="list-style-type: none"> <li>• Prior Fall</li> <li>• Fall</li> </ul>	
Onions/Shallots	<ul style="list-style-type: none"> <li>• Prior Fall</li> <li>• Fall</li> </ul>	
Fall Brassicas/Roots	<ul style="list-style-type: none"> <li>• Prior Fall (winter hardy)</li> <li>• Spring</li> <li>• Summer</li> </ul>	

## Timing

- Work around garden crops, finding blocks of time when the space is inactive.
- Think about what an upcoming crop may need (soil conditions, fertility needs, residue)
- Consider ways of extending the cover cropping season, like undersowing or living mulches.



# Planting Methods

Seeding depth will depend on cover crop species – see crop details for production guidelines.

General rule – the smaller the seed, the shallower it is planted.

- **Broadcasting:**

- Pros – Requires few, if any, tools
- Cons – Higher seeding rate to account for losses, less precise seed placement, often requires an additional pass to incorporate

- **Drilling:**

- Pros – Accurate seed placement, single pass planting, lower seeding rate required
- Cons – Requires special tools







## Water/Irrigation

- Ideally, time seeding before a rain or provide irrigation.
- For robust plantings, irrigation can be supplied regularly, though most species do not require it.
- In dry areas or during dry periods, consider drought tolerant species, such as sorghum-sudangrass, cowpeas, sweetclovers, mustards, etc.



# Termination

- Critical and often overlooked
- Residue management can be the hardest part of cover cropping
- Things to consider:
  - At what stage of growth is the cover crop?
  - What tools are available?
  - How much time is available before the next crop goes in the ground?
  - What cover crop species is being terminated?
  - Winterkill vs. winter hardy





# Stage of Production

- Ease of termination at different stages is species dependent.
- For example, this rye would likely have regrown if we mowed one week earlier (before anthesis).
- Prevent crops from setting seed, unless you are seeking a second crop
- In mixes, termination will likely need to occur before the fastest maturing crop sets seed.
- Research individual crop requirements for effective termination.





# Termination Methods

- **Mowing/cutting** – lawn tractor, push mower, weed whacker, scythe, clippers
- **Crimping** – Requires correct timing and appropriate crop selection. Multiple tools available, as well as DIY options. Residue acts as a mulch.
- **Tarping** – Often used after cutting or crimping to ensure termination, often in no-till systems.
- **Tillage** – Rototillers or other garden tools that work cover crops into the soil. Can be harder with high-residue crops but can lead to faster breakdown and more usable nutrients.





# Timing/Crop Type

- More carbonaceous/lignified material will take longer to break down (i.e. wood chips vs. grass clippings).
- Smaller particles and incorporated residues will break down faster.
- Deep tillage that buries residue is fastest but creates the most soil disturbance.
- **Plan ahead!**



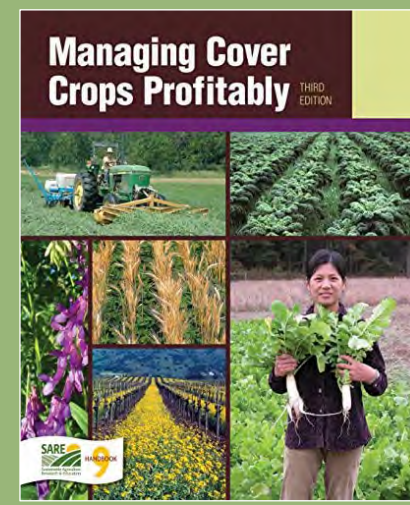


# Tools to Help

- **Johnny's Grower's Library**
  - Cover Crop Uses & Benefits
  - Farm Seed Comparison Chart
- **SARE Managing Cover Crops Profitably**
- **Cooperative Extension resources**
- **Northeast/Midwest/Southern Cover Crops Council Decision Tool and Resources**

## FARM SEED COMPARISON CHART

Crop Type	Sowing Season	Minimum Germ. Temp.	Hardiness Zone	Growth Rate	Sow Per 1,000 sq.ft.	Sow Per Acre	Seeding Depth	Nitrogen Fixation	Bees/Beneficial Insects	Compaction Control	Erosion Control	Weed Suppression	Green Manure	Forage	Biomass (Organic Matter)
Alfalfa, Summer	Early Spring to Late Summer	45°F (7°C)	5	Fast	1/2 Lb.	15-25 Lb.	1/4-1/2"	•	•	•	•	•	•	•	•
Barley	Early Spring to Late Summer	38°F (3°C)	7	Fast	2 Lb.	80-125 Lb.	3/4-2"					•	•		•
Buckwheat	Spring to Summer	50°F (10°C)	NFT	Fast	2-3 Lb.	50-90 Lb.	1/2-1 1/2"		•			•	•		
Clover, Crimson	Anytime	45°F (7°C)	7	Medium	2/3 Lb.	22-30 Lb.	1/4-1/2"	•	•		•	•	•	•	•
Clover, Mammoth Red	Anytime	41°F (5°C)	4	Fast	1/2 Lb.	5-15 Lb.	1/4-1/2"	•	•	•	•	•	•	•	•
Clover, Medium Red	Anytime	41°F (5°C)	4	Medium	1/2 Lb.	5-15 Lb.	1/4-1/2"	•	•	•	•	•	•	•	•
Clover, New Zealand White	Spring to Summer	40°F (4°C)	4	Slow	1/4 Lb.	5-15 Lb.	1/4-1/2"								
Clover, Sweet	Spring to Summer	42°F (6°C)	4	Medium	1/2 Lb.	10-15 Lb.	1/4-1/2"								
Manure Mix, Fall Green	Summer to Fall	45°F (7°C)	Various	Medium	1 1/2 Lb.	50 Lb.									
Manure Mix, Spring Green	Spring to Summer	38°F (3°C)	Various	Medium	5 Lb.	200 Lb.									
Millet, Pearl	Summer	60°F (16°C)	NFT	Fast	1/4 Lb.	6-10 Lb.									
Mustard	Spring to Summer	40°F (4°C)	7	Fast	1 Lb.	15-20 Lb.									
Oats, Common	Spring to Summer	38°F (3°C)	8	Medium	4 Lb.	110 Lb.									
Oats, Hullless	Spring	38°F (3°C)	8	Medium	4 Lb.	110 Lb.									
Peas and Oats Mix	Spring or Fall	41°F (5°C)	8	Medium	5 Lb.	120 Lb.									
Peas, Field	Spring or Fall	41°F (5°C)	7	Fast	3 Lb.	120 Lb.									
Radish, Oilseed	Late Summer	45°F (7°C)	6	Fast	1 Lb.	10-15 Lb.									
Rye, Winter	Anytime (Fall for Grain)	34°F (1°C)	3	Medium	4 Lb.	60-80 Lb.									
Ryegrass	Anytime	40°F (4°C)	6	Fast	1 Lb.	40 Lb.									
Sudangrass	Early Summer	65°F (18°C)	NFT	Fast	1 Lb.	30-40 Lb.	1/2-1 1/2"				•	•	•	•	•
Sunflower	Spring	70°F (21°C)	NFT	Medium	1,500 seeds	20,000 seeds	1/2-1"		•						•
Vetch, Hair	Anytime	45°F (7°C)	7	Medium	1/2 Lb.	15-20 Lb.	1/4-1/2"								







PLANT HARDINESS ZONE ^

ZONE  
Zone 6 ▼

Q Cover Crop Name

FILTERS ^

- WEEDS ▼
- ENVIRONMENTAL TOLERANCES ▼
- GROWTH TRAITS ▼
- SOIL CONDITIONS ▼
- PLANTING ▼
- TERMINATION ▼



GRASS  
**Barley, Spring**  
*Hordeum vulgare*  
[VIEW CROP DETAILS](#)

ADD TO LIST



GRASS  
**Barley, Winter**  
*Hordeum vulgare*  
[VIEW CROP DETAILS](#)

ADD TO LIST



BRASSICA  
**Brassica, Forage**  
*Brassica oleracea*  
[VIEW CROP DETAILS](#)

ADD TO LIST



BROADLEAF  
**Buckwheat**  
*Fagopyrum esculentum*  
[VIEW CROP DETAILS](#)

ADD TO LIST



GRASS  
**Cereal Rye, Spring**  
*Secale cereale*  
[VIEW CROP DETAILS](#)

ADD TO LIST



GRASS  
**Cereal Rye, Winter**  
*Secale cereale*  
[VIEW CROP DETAILS](#)

ADD TO LIST



LEGUME  
**Clover, Balansa**  
*Trifolium michelianum*  
[VIEW CROP DETAILS](#)

ADD TO LIST



LEGUME  
**Clover, Berseem**  
*Trifolium alexandrinum*  
[VIEW CROP DETAILS](#)

ADD TO LIST



LEGUME  
**Clover, Crimson**  
*Trifolium incarnatum*  
[VIEW CROP DETAILS](#)

ADD TO LIST



LEGUME  
**Clover, Red**  
*Trifolium pratense*  
[VIEW CROP DETAILS](#)

ADD TO LIST



LEGUME  
**Cowpea**  
*Vigna unguiculata*  
[VIEW CROP DETAILS](#)



GRASS  
**Millet, Japanese**  
*Echinochloa esculenta*  
[VIEW CROP DETAILS](#)



GRASS  
**Millet, Pearl**  
*Pennisetum glaucum*  
[VIEW CROP DETAILS](#)



BRASSICA  
**Mustard**  
*Brassica juncea*  
[VIEW CROP DETAILS](#)



GRASS  
**Oats, Black**  
*Avena strigosa*  
[VIEW CROP DETAILS](#)





## Be Flexible...

- Sometimes conditions don't fit into a tidy rotation
- Weeds, weather, seed quality, etc. can all lead to poor results.
- Reevaluate and try again, learning from the mistake
- Don't be afraid to try new species, timing, mixes!



A close-up photograph of a bee on a yellow flower stem, set against a blurred green background. The bee is positioned on the left side of the frame, facing right. The flower stem is diagonal, extending from the bottom left towards the top right. The background is a soft, out-of-focus green, suggesting a natural outdoor setting. A white rounded rectangular box is overlaid on the right side of the image, containing the word 'SUMMARY' in white capital letters.

# SUMMARY



# Summary

- Cover crops can provide many benefits to your garden.
- Understanding management requirements and having a plan for cover cropping will yield a more resilient, productive, and biologically diverse garden.
- There are many tools available to help you make decisions, but your own experience and trialing will provide the best guidance.
- Have fun and be creative!





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Q&A



# Helpful Resources

- [Johnny's Farm Seed & Cover Crop Library](#)
- [USDA Cooperative Extension System Directory](#)
- [Northeast Cover Crop Council](#)
- [Midwest Cover Crop Council](#)
- [Southern Cover Crop Council](#)
- [Western Cover Crop Council](#)
- [SARE Managing Cover Crops Profitably](#)





**THANK YOU**

