

An aerial photograph of a farm. In the foreground, there are several long, covered walk-in greenhouses. To the right, there are rows of plants in a garden or field. In the background, there is a pond surrounded by trees. The sky is clear and blue.

# COVER CROPPING FOR FIELD AND GARDEN





## 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
- 9 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

Cover Cropping Goals

Species Selection

Establishment, Management,  
and Termination





A close-up photograph of a bee on a yellow flower stem, with a blurred green background. The text "COVER CROPPING GOALS" is overlaid in a white box.

# COVER CROPPING GOALS



# WHAT'S IN A COVER CROP

Potential goals:

- Increase soil organic matter
- Increase water holding capacity
- Improve soil texture and porosity
- Fix nitrogen
- Scavenge nutrients
- Suppress weeds
- Break pest and disease cycles
- Grow your own mulch
- Provide habitat and food source for beneficials

**Chart 2 PERFORMANCE AND ROLES**

Crop	Days to Maturity (Days)	Root System	Soil Moisture (Days)	N Scavenger	Soil Builder	Erosion Fighter	Wind Fighter	Seed Banking	Quail Brown
Alfalfa p. 74	100-120	30-120	8,000-10,000	●	●	●	●	●	●
Barley p. 77	50-200	50-200	3,000-9,000	●	●	●	●	●	●
Chia p. 81	40-160	40-160	4,000-7,000	●	●	●	●	●	●
Pea p. 98	75-220	75-220	6,000-10,000	●	●	●	●	●	●
Wheat p. 111	100-150	100-150	2,500-4,500	●	●	●	●	●	●
Black wheat p. 90	70-130	70-130	3,500-5,500	●	●	●	●	●	●
Sorghum-sudan p. 106	90-150	90-150	4,000-5,000	●	●	●	●	●	●
Mustards p. 81	90-200	90-200	2,300-5,000	●	●	●	●	●	●
Radish p. 81	50-120	50-120	1,500-4,000	●	●	●	●	●	●
Rapeseed p. 81	70-150	70-150	2,000-5,000	●	●	●	●	●	●
Berseem clover p. 118	90-170	90-170	3,000-8,500	●	●	●	●	●	●
Cowpeas p. 125	80-200	80-200	3,000-5,000	●	●	●	●	●	●
Crimson clover p. 130	100-250	100-250	2,000-6,000	●	●	●	●	●	●
Field peas p. 135	4,000-8,000	●	●	●	●	●	●	●	●
Hairy vetch p. 142									
Medics p. 152									
Red clover p. 159									
Subterranean clover p. 164									
Sweetclovers p. 171									
White clover p. 179									
Good vetch p. 185									

● = Good; ● = Very Good; ● = Excellent  
 N from all plant. Grasses not considered N source.  
 organic matter yield and soil structure improvement.  
 production, nutritional quality and palatability. Feeding pure legumes can cause bloat.  
<sup>2</sup>N Scavenger—Ability to take up/store excess nit.  
<sup>4</sup>Erosion Fighter—Soil-holding ability of



## WHERE TO START

Take a self-assessment:

- What are your challenges/limitations?
- What are your strengths/advantages?
- How do these help determine your cover cropping goals?





## JSS FARM CASE STUDY

### Challenges:

- High weed pressure/seed bank
- Logistical challenges – multiple farm sites, spread across wide footprint
- Hyper-diverse crop plan with complicated rotations
- Short growing season
- Lots of long-season crops = late termination

### Strengths:

- Skilled and hardworking team
- Land rich = more space and time for rotations
- Well-equipped





## JSS FARM CASE STUDY

### Goals:

- Reduce weed seed bank
- Continue to increase SOM and enhance microbial activity
- Break disease/pest cycles
- Provide pollinator/beneficial habitat
- Reduce overall cost of production





A close-up photograph of a bee on a yellow flower stalk, with a semi-transparent white box containing the text 'SPECIES SELECTION' overlaid on the right side of the image.

# SPECIES SELECTION



# COVER CROP CATEGORIES



## NON- LEGUME

**Cereals** (*rye, wheat,  
oats, barley, etc.*)

**Grasses** (*ryegrass, teff,  
millet, sudangrass*)

**Buckwheat**

**Sunflowers**

**Brassicas**



## LEGUME

**True Clovers**  
**Sweet clovers**

**Vetches**

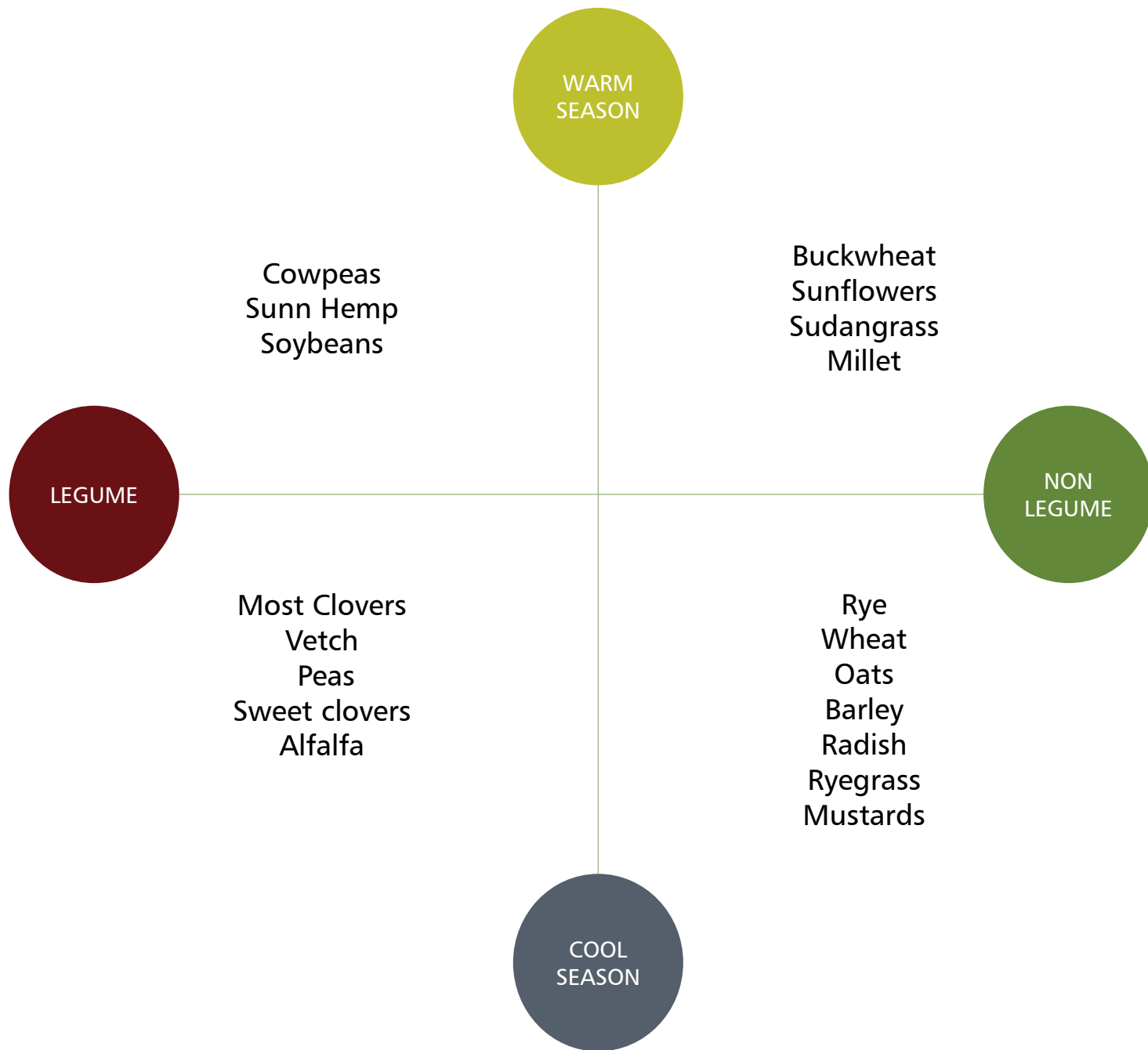
**Peas**

**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
  - Natural soil fumigant (mustards) against *Verticillium*, *Rhizoctonia*, *Fusarium*, *Pythium*, *Sclerotinia*, etc.
  - Compaction relief





















## 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 plant roots, converting atmospheric nitrogen ( $N_2$ ) to usable ammonia ( $NH_3$ ) in exchange for sugars from the plant.





















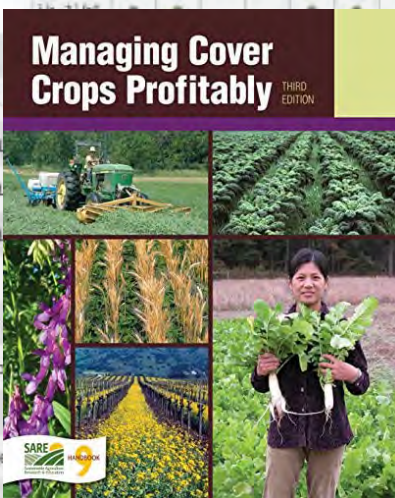






## FARM SEED COMPARISON CHART

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)	NFT	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.	1/4–2"					•	•		•
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"	•	2Y		•	•	•	•	•
Clover, Sweet	Spring to Summer	42°F (6°C)	4	Medium	1/2 Lb.	10–20 Lb.	1/4–1"	•	2Y	•	•	•	•	•	•
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.									
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.	110–140 Lb.									
Oats, Hullless	Spring	38°F (3°C)	8	Medium	4 Lb.	110–140 Lb.									
Peas and Oats Mix	Spring or Fall	41°F (5°C)	8	Medium	5 Lb.	120–200 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.	10–20 Lb.									
Rye, Winter	Anytime (Fall for Grain)	34°F (1°C)	3	Medium	4 Lb.	60–120 Lb.									
Ryegrass	Anytime	40°F (4°C)	6	Fast	1 Lb.	40 Lb.									
Sunflower	Spring	70°F (21°C)	NFT	Medium	1,500 seeds	20,000 seeds									
Vetch, Hairy	Anytime	60°F (16°C)	4	Slow	1 Lb.	25–40 Lb.									
Wheat, Spring	Early Spring	38°F (3°C)	7	Fast	4 Lb.	60–150 Lb.	1/2–1 1/2"								



## TOOLS TO HELP

- Johnny's Selected Seeds 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



## FILTER

## PLANT HARDINESS ZONE ^

Zone 4

Zone 5

Zone 6

Zone 7

## Cover Crop Name

Search by cover crop name

## COVER CROP TYPE v

## ENVIRONMENTAL TOLERANCES v

## SEEDS v

## SEEDING METHODS v

## GROWTH v

## ROOTS v

## TERMINATION METHODS v

## WEEDS v



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

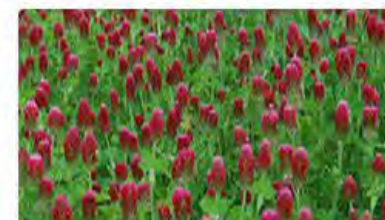


LEGUME

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



A close-up photograph of a bee on a branch of small yellow flowers. A white rectangular box with a thin border is overlaid on the right side of the image, containing the text 'ESTABLISHMENT & MANAGEMENT' in white, bold, sans-serif capital letters. The background is a soft, out-of-focus green.

# ESTABLISHMENT & MANAGEMENT





## **ANOTHER SELF-SURVEY:**

- What types of soil am I working with? How wet is it?
- What are my tillage practices?
- What kind of acreage am I managing?
- What was most recently grown and what kind of residue is present?





## GROUND PREP

- Some species of cover crops can be more forgiving, but...

**What you put in = what you get out**

- Smaller seeded crops need finer soil texture (e.g., teff)
- Larger seeded crops can take more residue (e.g., field peas)
- For the field:
  - Plow (maybe) > disc > field cultivator
  - Additional stale bedding passes for weedy fields
- For the garden:
  - Broadfork > rake or rototiller/Tilther





## SEEDING

- 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 – Scalable, requires little to no equipment at a small scale, fast
  - Cons – Higher seeding rate to account for losses, less precise seed placement, typically requires an additional pass to incorporate
- Drilling:
  - Pros – Accurate seed placement, single pass planting, lower seeding rate required
  - Cons – Requires special equipment





## IRRIGATION/CROP CARE

- 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, sweet clovers, mustards, etc.
- Weed and pest control as needed, though oftentimes not required



# 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 equipment is available?
  - How much time is available before the next crop goes in the ground?
  - What cover crop species is being terminated?





# 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





# EQUIPMENT

- Mowing – flail mower preferred, though rotary mowers work. Push mowers, weedwhackers, or hand cutting work at a small scale.
- Crimping – requires correct timing, equipment/tools available for different scales
- Tarping – effective at a smaller scale, requires more time, but can be a great tool
- Tillage – many types of equipment available, depending on scale





## 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!





A first-person perspective from the driver's seat of a tractor, looking out over a vast agricultural field. The field is divided into sections of dark brown tilled soil and green grass. In the distance, a dense line of green trees marks the horizon under a clear blue sky. A small red barn is visible on the right side of the horizon. The foreground shows the red and black metal components of the tractor. A white rectangular box with a thin border is centered in the middle of the image, containing the text "PUTTING IT TOGETHER" in white, bold, sans-serif capital letters.

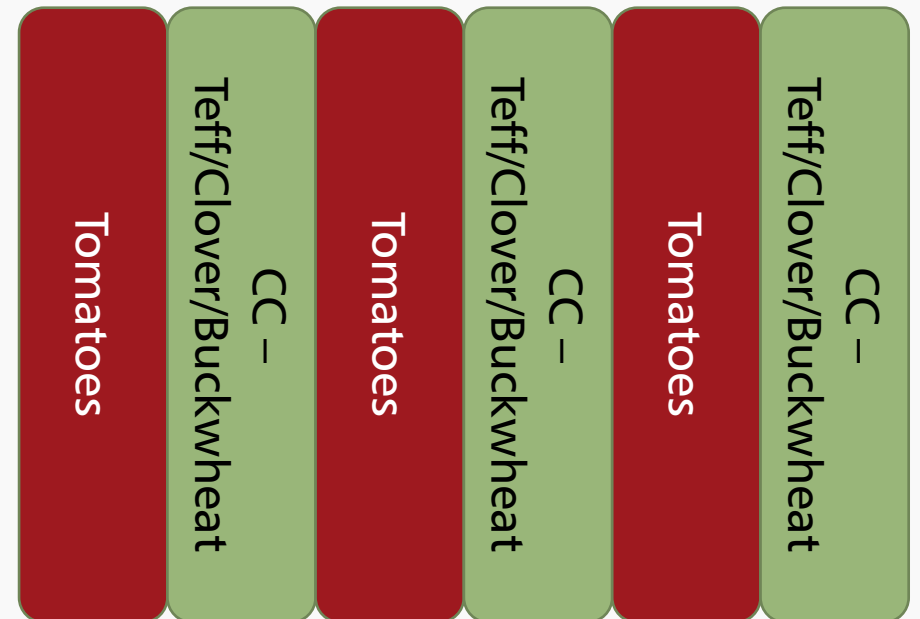
PUTTING IT TOGETHER





## JSS CASE STUDY - ROTATION

Year One – Main Season



















## JSS CASE STUDY - ROTATION

Year One – End of Season

CC – Winter Rye

CC – Winter Rye

CC – Winter Rye

CC – Winter Rye

CC – Winter Rye

CC – Winter Rye





## JSS CASE STUDY - ROTATION

Year Two – Main Season

CC – Terminated Winter  
Rye

Squash

CC – Terminated Winter  
Rye

Squash

CC – Terminated Winter  
Rye

Squash













## JSS CASE STUDY - ROTATION

Year Two – End of Season

CC – Winter Rye, FS Clover

CC – Winter Rye, FS Clover

CC – Winter Rye, FS Clover

CC – Winter Rye, FS Clover

CC – Winter Rye, FS Clover

CC – Winter Rye, FS Clover





## JSS CASE STUDY - ROTATION

Year Three – Main Season

CC – Clover/Summer Mix

CC – Clover/Summer Mix

CC – Clover/Summer Mix

CC – Clover/Summer Mix

CC – Clover/Summer Mix

CC – Clover/Summer Mix









## JSS CASE STUDY - ROTATION

Year Three – End of Season

CC – Winterkill/Rye, FS  
Clover

CC – Winterkill/Rye, FS  
Clover

CC – Winterkill/Rye, FS  
Clover

CC – Winterkill/Rye, FS  
Clover

CC – Winterkill/Rye, FS  
Clover

CC – Winterkill/Rye, FS  
Clover

**THEN REPEAT...**





## 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 branch of small yellow flowers. The background is a soft, out-of-focus green. A white 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 farm and garden.
- Planning for all stages can make your cover cropping experience more successful (and enjoyable).
- There are many tools available to help you make decisions, but your own experience will provide the best guidance.
- Have fun and be creative!





# Q&A



Moderated by Wesley Palmer  
Commercial Sales Representative  
Southeastern U.S. and U.S. Island Territories





# SOME HELPFUL RESOURCES

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





An aerial photograph of a large farm. In the foreground, there are several long, covered walk-in greenhouses. To the right, there are rows of colorful flowers in the fields. A red tractor and a blue tractor are visible in the lower right. In the background, there is a pond surrounded by trees. The text "THANK YOU" is overlaid in large white letters.

# THANK YOU



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