Cover Crops for Vegetable Growers

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Tristand Tucker
Specialty Crops System Specialist
Throckmorton Purdue Agricultural Center

• Cover crop choices
• Considerations for including cover crops on crop rotation
• Example vegetable rotation using cover crops

Cover Crop Choices

Cover Crops after July 15
(Midwest Cover Crop Council)

• Grasses
  – Oats
  – Cereal Rye
  – Annual ryegrass
  – Wheat
  – Sorghum x Sudan grass
• Brassicas
  – Oilseed radish
  – Mustards
• Broadleaf non-legume
  – Buckwheat

Cover Crops after July 15
(Midwest Cover Crop Council)

• Legumes
  – Clovers
    • Sweet
    • Berseem
    • Crimson
  – Annual Alfalfa
  – Field pea
  – Hairy Vetch

Spring/Summer Cover Crops

• Buckwheat
  – $30-40/A
  – Weed suppression
  – Fast growing
  – Easy to kill
  – Kill before seed production
• Sorghum x Sudan grass
  – $25-35/A
  – Weed suppression
  – High biomass production
  – Can be used as forage
  – Winter kills
  – N scavenger
Spring/Summer Cover Crops

- Hairy vetch
  - $35-75/A
  - N producer (90-200#)
  - Weed suppression
  - Soil builder
- Berseem clover
  - $20-40/A
  - Weed suppression
  - N producer (75-220#)
  - Winter kills
  - Frost susceptible

Fall/Winter Cover Crops

- Oats
  - $25-35/A
  - Quick growth
  - N scavenger
  - Weed suppression
  - Winter kills
- Cereal Rye
  - $25-35/A
  - Weed suppression
  - Durable residue for no-till planting
  - High biomass producer
  - N scavenger

Fall/Winter Cover Crops

- Tillage radish
  - $25-30/A
  - Weed suppression
  - Winter kills
  - Potential bio fumigant
  - N scavenger
  - Plant later in fall
  - Increase earthworm activity
  - Break compaction

Fall/Winter Cover Crops

- Austrian Winter Peas
  - $50-75/A
  - N producer 90-150 lbs N
  - Weed suppression
  - Quick growth
  - Winter kills (depends on temperature and snow cover)
- Wheat
  - $20-30/A
  - N scavenger
  - Potential as cash crop/forage
  - Weed Suppression
  - Soil Builder

Suppliers

- Local Coop
- Cisco Seeds, IN
- Albert Lea seedhouse, MN
- Johnny’s Selected Seeds, ME
- Fedco Organic Growers Supply, ME
- Seeds of Change, CA
- many others

Management of Cover Crops and Rotations
Management

• Continue rotation standards
  – Rotate between crops with different pest
  – Rotate between growth habit/management styles

• Plastic beds, row crops
• Vines with upright plants

• Consider a cover crop as a ‘crop’ when making rotations

Crop Botanical Family

- Apiaceae
  - Carrot
  - Celery
- Asteraceae
  - Lettuce
- Brassicaceae
  - Broccoli
  - Brussel sprouts
  - Cabbage
  - Radish
  - Turnip
  - Oilseed Radish
- Chenopodiaceae
  - Beet
  - Spinach
- Cucurbitaceae
  - Cucumber
  - Muskmelon
  - Pumpkin
  - Squash
  - Watermelon
- Fabaceae
  - Green Bean
  - Peas
  - Hairy Vetch
  - Clover
- Liliaceae
  - Garlic
  - Onion
- Poaceae
  - Sweet corn
  - Cereal Rye
  - Oats
  - ryegrass
- Solanaceae
  - Eggplant
  - Pepper
  - Potato
  - Tomato
- Polygonaceae
  - Buckwheat

Cover crops and N

• Accumulate or fix up to 200+ lbs N
• 50% + is available 1st year after killing (Chen et al., 2006, Leonard et al., 2007, Law et al., 2007, Yang and Sundin, 2008, Moll and Wagner, 2005, Tanaka and Ogawa, 2000, Raffel et al., 2002)

• N mineralization peaks 2-4 wks after killing under ideal (warm, moist, oxygen) conditions

• Slower mineralization with grass and legume crop mix

Pest of cover and vegetable

- Root-knot nematodes
- Soybean cyst nematodes
- Pin nematodes
- Root lesion nematodes
- Sting nematodes
- Cutworms
- Potato leaf hopper
- Pea weevil
- Club root disease
- Cabbage root maggot
- Aphids
- Flea beetles
- Others

Management

- Seeding
  - Drill
    • Best method
  - Aerial
    • Great for earlier seeding into standing crops prior to harvest
  - Broadcast
    • Fast, cheap, can be combine with fertilizer application
    • Establishment issues

Broadcast Seeding

- Work at Meigs fall 2011, and in USDA-ARS Salinas, Ca (Brennan, Eric; Leap, Jim.)
- Broadcast seeding followed by lightly covering soil works best
- Rough till prior to seeding, heavy rain, cultipacker, harrow after seeding
Management

- Killing
  - Allow 2-4 weeks between killing and planting cash crop
  - Kill after goal is accomplished and prior to cover crop becoming a problem.
  - Burn down with nonselective herbicide (glyphosate, mix with 2-4D for broadleaves)
- Tillage
  - Moldboard plow
  - Rotary tiller
  - Disc
  - Some covers can be difficult to complete kill with tillage unless there is complete burial or pulverization of crop
  - Moldboard Plow
  - Multiply rotary tiller passes

Killing method depends of Cash crop planting method

- Plastic
  - Completely bury (moldboard plow) residue
  - Till 2-4 weeks ahead of plastic laying to allow decomposition of residue
  - Residue to cause problems when laying plastic
  - Direct seeding, bare ground transplanting
    - Seed corn maggots can be a problem
    - Allow for sufficient decomposition prior to planting.
  - No-till
    - Early Burn down
    - Mowing
    - Rolling

Other considerations

- Results vary from year to year and farm to farm
- Kill at correct time
- Additional management required
- Consider crops needs and limitations
- Pay attention to crop and pest interactions
- Start small, try different covers see what works for you

Example Rotations Using Cover Crops

Staggered Crop planting dates

- Winter killed cover for early planting dates
  - Oats, Radish, Annual Clover, Sorghum Sudan Grass, Annual Alfalfa
- Winter hardy or quick cycle following winter killed for later planting dates
  - Cereal Rye, Hairy Vetch, Wheat, Annual ryegrass, Clovers
  - Buckwheat, Oats

Vegetable/Grain Crop Rotations

- Vegetables
  - Oats/Tillage Radish
- Corn
  - Cereal rye
- Soybeans
  - Hairy Vetch/Cereal rye
  - Berseem Clover/Oats
  - Oats/Tillage radish
# Short Season Crop Rotations

- **Spring crop**
  - Cabbage, Lettuce, Carrots, Peas

- **Summer Cover**
  - Buckwheat
  - Sorghum/Sudan

- **Fall Cool Season**
  - Cabbage, Broccoli, Carrots, Peas
  - Interseed annual ryegrass, cereal rye, clover

# Intensive Vegetable Crop Rotations

- **Solanacea-Tomatoes/Peppers**
  - Plastic beds
  - Oats/Radish, Rye/Vetch

- **Sweet Corn**
  - Cereal rye/winter killed legume after harvest

- **Cucurbits-Melons/Squash**
  - Plastic beds
  - Oats/Radish, Oats/Berseem Clover after final harvest

- **Cabbage/Broccoli/Spring-Fall Crops**
  - Buckwheat between crops in summer
  - Ryegrass, Wheat, Rye, Oats after harvest or seeded prior to harvest

- **Green Beans/Peas**
  - Sorghum x Sudan and Pea, Vetch, Clover

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## Austrian Winter Peas

![Austrian Winter Peas](image1.png)

## Cereal Rye/Radish

![Cereal Rye/Radish](image2.png)

## Oats/Radish

![Oats/Radish](image3.png)

## Austrian Peas/Sorghum Sudan Grass

**11-8-2011**

![Austrian Peas/Sorghum Sudan Grass](image4.png)
Austrian Peas/Sorghum Sudan Grass
11-8-2011

Additional Information
• Knotts Handbook for Vegetable Growers
• Managing Cover Crops Profitably
• Northeast Cover Crop Handbook
  http://www.sarep.ucdavis.edu/ccrop/
  http://www.mccc.msu.edu/
  http://mcccdav.msu.edu/

References