Session 6

Cover crops in vegetable systems, Part I
Outline

• Plasticulture vs. No-till vs. Strip-till
• High tunnels
• Pollinators impotence
• Cover crops are required for organic production systems
Cover Crops for Vegetable Production

- High values crop production
  - Returns of >$4,000-20,000/acre
  - Can afford the cost of cover crops
  - Little year round production so can fit cover crops into system of production
- **Summer vs. winter** cash crops
- Small to large scale of horticultural production
  - Ability to rotate crops on small plots
  - What equipment do growers have on hand

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COVERCROP
VEGETABLE PRODUCTION TRAINING
Planning for Cover Crops in Horticultural Production

- **Choose cover crops that fit in the existing cropping system**
  - Members of the *Brassicas* and *Legumes* are also horticultural cash crops.
  - Use drive rows for cover crops
  - Use marginal land for beneficial habitat
  - Use cover crops that fit the crop timing
    - EX. The market demands that watermelons be ready before July 4th

- **Example**
  
  *Plan to use cover crops in a no-till watermelon system.* Need a grass to head out early enough in the spring to easily roller terminate and be able to plant on time in late-March to early April. Will the soil be warm enough at that time?
Crop Rotation Examples

- Clover + Cereal Rye cover crop (Winter) -> Tomato (Summer) -> Mustard cover crop (Late summer) -> Fall Kale Crop

- Clover + Cereal Rye cover crop (Winter) -> Tomato (Summer) -> Japanese millet (45 days) (Late summer) -> Fall Kale Crop

- Avoid the same plant families one after the other.
Cover Crops in Plasticulture Vegetable Systems

- Cover crops will be used for Nitrogen and soil organic matter contributions under the plastic and/or weed control in the row middles.
- **Time**: Cover crops can be integrated into crop rotations between cash crops.
- **Soil Management**: Cover crops should be incorporated into the soil prior to laying plastic.
  - Tillage or Strip-tillage
    - Generally 2-4 weeks is enough time for the biomass to break down.
Cover Crops in No-Till Vegetable Systems

• **Why?** Reduce reliance on plastic and soil disruption via tillage and cut input costs associated with laying and removing plastic

• **Time:** Success is dependent on the biomass produced if the cover crops is to be used as a weed mat/ green mulch before cash crops

• **Soil Management:** cover crops should be terminated and allowed to *die down* before the cash crop is transplanted, Preference for rye as wheat has been shown to break down more quickly ²
Cover Crops in No-Till Vegetable Systems

• No-till mulches rarely result in season long weed control -> Challenge for organic producers
• Cool soil temperatures under the biomass -> Use transplants to help with delays and achieve more rapid canopy closure (not feasible with all crops)
• Must wait for appropriate crop timing to terminate, which may delay planting
• Use drip irrigation to combat possible moisture competition between the cover crop and cash crop
• May need to supplement Nitrogen to compensate for high C:N cover crop residues
• May need to reduce between row spacing so the crop canopy can close and help shade out weeds
Strip-Tillage

Combines no-till and plasticulture production
• Cover crop is left standing in the row middles
• Cover crop is mowed and tilled into the soil where the beds will be laid
(+) Weed coverage in row middles, warm soil to transplant into
(+ ) Reduced tillage across the field.
(-) Will need to supplement weed control next to the beds where soil is disrupted.

Example: Watermelons
• Winter cover crops planted to precede spring planted melons
• Cover crop in row middles provides a wind-break and weed control. The grass will die down naturally or can be rolled after plants establish
High Tunnels

- High Tunnels extend the growing season
  - Accumulation of salts in the soil
  - Very hot temperatures in mid-summer
  - Too cold or short days in mid-winter

- Cover crops grown in high-tunnels
  - Can accumulate salts
  - Crop can be removed
  - Can withstand hot temperatures
  - Opportunity for crop rotation
  - May require specialized equipment
  - Will require irrigation
Pollinator Strips

• Cucurbits in particular require pollinators for good fruit set
  – Native pollinators have been demonstrated to be as or more effective pollinators than honeybees for certain crops.
• Pollinator strip flowering should be synchronized with cash crop flowering
  – Mixes preferable due to differences in pollinator preferences
• Opportunity for Agritourism operations
  – Some cut flower production
    • Sunflowers are good at smothering weeds and salt accumulators
Organic Requirements for Cover Crops

The National Organic Program Rule: Soil fertility and crop nutrient management practice (§205.203)

The organic regulations state that a producer must select and implement tillage and cultivation practices that maintain or improve the physical, chemical, and biological condition of the soil and minimize soil erosion.

- Required crop nutrient and soil fertility management practices:
  - Crop rotations (perennials as an exception)
  - Cover crops
  - Application of plant and animal materials

- Organically grown seeds must be used, unless the producer can demonstrate lack of commercial availability or prohibitive cost (CFR 205.204).
- If a grower can demonstrate a lack of availability, they may use conventionally-grown, untreated seed.
  - Should consult their certifier prior to proceeding
  - Must have support documentation
  - GMO seed is never allowed
Take Home Message

• Cover crops can benefit horticultural crop production

• There are specific considerations unique to vegetable production systems that require careful planning to successfully integrate cover crops
Authors and Acknowledgements

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Resources and Sources


- USDA. The Cover Crop Chart (v. 3.0). https://www.ars.usda.gov/plains-area/mandan-nd/ngprl/docs/cover-crop-chart/

Free SARE guide for organic farms on planning rotations