

World Café Round Table Discussion Harvest

Northeast Cover Crop Council Conference

State College, PA

Nov 15, 2018

1. SOIL HEALTH - Which cover crops and management practices are best for soil health improvement and soil conservation?
 - Broad definition of 'soil health' – multiple goals, site dependent
 - Cover crop mixtures – considerations : cost/benefit, targeted benefits
 - Green all year long – keep the soil covered
 - Water management with cover crops – strip cropping with hay
 - Planting early, interseeding, termination late
 - Honoring the interconnectedness of species – relationships within the system
 - Multiple inputs to feed soil microbes and the food web
 - Cover cropping to increase soil organic matter (and reduced tillage)
 - Benefits of temperature moderation, moisture holding (spring)
 - Connecting practices that target soil infiltration for soil health
 - Soil 'regeneration' instead of 'soil health'
 - Location/site dependent – both inherent properties (soil, climate) will inform goals and species selection
 - Incorporation of legumes in cropping systems in NE
 - Thinking about carbon inputs and stabilization
 - Maximize benefits by planting early- terminating late
 - Cover crops for soil cover – soil conservation (green mulch)
 - No-till / reduced till / conservation tillage
 - Planting green – need to plan for increased management challenges: adoption nervousness, equipment, timing
 - Integrating cover crops into vineyards (or other perennial systems) – species selection for suppression of vine vigor

2. NUTRIENT MANAGEMENT- How can cover crops be used to improve soil fertility and decrease fertilizer use?
 - Quantifying N, P, K contributions from cover crops
 - Decision support tools: from seed co
 - Climate data
 - Soil tests
 - C:N measured or Est
 - NDVI – Extension of canopy app
 - Modelling
 - Calculating N credits
 - Year to year uncertainty makes estimation difficult
 - Trial and error – year to year
 - Organic matter critical for reducing N inputs
 - Soil health – resilient soils
 - Cover crop mixtures
 - Late cover crop planting - physical soil benefits

3. WEEDS - Which cover crops and management practices can be used for weed management?
- Suppressive traits in cover crops:
 - Biomass
 - Canopy cover/growth rate
 - Good even establishment
 - Early establishment
 - Suppressive species:
 - Oats
 - Cereal rye – even without high biomass
 - Barley
 - Hairy vetch
 - Brassicas – winter annual weeds
 - Buckwheat
 - Tillage radish – legacy effect into spring
 - Forage soybeans
 - Sorghum sudangrass
 - Suppressive characteristics
 - Winter-kill to reduce herbicides
 - Rapid early growth and canopy
 - Establishment with or before weed germination
 - Management:
 - Early successful establishment
 - Higher seeding rate
 - Drilling rather than broadcasting
 - Mowing to control weeds
 - Mechanical termination and rolling or incorporation
 - Livestock termination
 - Mixtures only as supp. as most supp. monoculture
4. DISEASE RESISTANCE - Can cover crops be used to reduce diseases in main crops?
- Potential for disease problems (green bridge)
 - Manage through thoughtful crop rotation, avoidance, same plant families, etc. Brassica clubroot, cereals take all (potential problems of mixtures?)
 - Mulch can keep moisture and make more conducive
 - Timing of planting after cover crop termination
 - Mechanism of disease suppression
 - Prevent dispersal of spores
 - Change microenvironment
 - Biofumigation – does it work? Replace methyl bromide in strawberry?
 - Upregulating defense compounds (SAR Systemic Acquired Resistance)
 - Change microbial community and direct competition
 - Examples
 - Mulch from rolled cover crops and squash
 - Mulch from rolled cover crops and white mold on beans
 - Use cover crop that are tall to reduce pathogen dispersal
 - Maybe fire blight in apples

5. SLUGS – How can cover crops assist with slug management?
 - There is so much we don't know!
 - Mixed reviews on planting green potential to control slugs
 - Mixed information on cover crop species impact on slugs
 - Potential for more work looking at species (specifically radish and crimson clover) influence on slugs
 - How different management of cover crop species impacts slugs
 - Know risks going into planting (optimum slug weather) and be ready to react /rescue when necessary
 - We should develop economic thresholds for defoliation (i.e. is it aesthetic or a real problem?)

6. INTEGRATION WITH PERENNIALS - How can perennial crops such as grass and alfalfa be integrated with cover crops?

7. MIXTURES - Cover crop mixtures – how and what?
 - Research side:
 - Usually one monoculture that performs as well as best mixture
 - Mismatch
 - Seed mixing company
 - After small grains opportunity for more species
 - Can become cheaper in mixtures when you cut back seeding rates
 - Oatlage in fall
 - Cereal rye and triticale
 - Rye/radish
 - Rye/clover
 - Planted after cereals
 - Mix seeding and fert. Appl
 - Planting green
 - Mixing on farm
 - Costs – \$35-50/A
 - Bio strip-till with 12 species for next year in rows for corn
 - Vetch although growing
 - Vetch to address (scouting and herbicides)
 - Care: about seeds/pound
 - Gramoxone (not translocated to roots) and roundup combo
 - Problems killing clovers with herbicides
 - Purple bounty vetch
 - Crimson clover
 - Everything is coming up
 - Tradeoffs are real!
 - We tried species once – what about other varieties?
 - Tall annual ryegrass that grows short, straight stature
 - Big radish with smaller corn populations in interseeding and vice versa
 - Mixes – maturity dates of species
 - Early maturing vetch vs steve groff winter late maturing vetch
 - DE rye/radish mix – rye can capture lost radish N
 - Lots of vetch
 - Not necessarily more services with mix, but ameliorate disservices from certain species
 - Need a long enough window
 - Having trouble with mixtures due to late start
 - MA interseeding – all radish expression
 - Plant more species – what works / what's dominant – can learn from that
 - Some cover crops can thrive more in wet areas

8. NEW SPECIES - Are there new cover crop species on the horizon?

- New species
 - Sunn hemp
 - Teff (ethnic food)
 - Faba bean (ethnic food)
 - Canola
 - Sanfoin
- New varieties of species
- Perennials
 - Kura clover
 - White clover
- Cover crop species acting as nurse crops
- Could adding small grain rotations work? (wheat, barley)

9. ESTABLISHMENT PRACTICES - Innovations in cover crop establishment and planting crops into cover crops?

Challenges to planting green

- Cover crop seeding rate guidance
- Attachment guidance – row cleaners etc
- Ensuring proper downforce on row units – is the planter heavy enough?
- Teaching operators to check more often – don't set and forget it.
- Ensuring proper row closure
- Getting farmers off to a good start - beans before corn
- Could we plant green earlier in the south?

Seeding methods:

- Adapting vertical tillage tool already on the farm
- Looking into grazing of interseeded cover crops. Should we look for new species (brachiaria)?
- Making aerial seeding more site/time specific (wet vs dry year).
- Making more guidance for interseeding (geographic, high/low yield environments, mating cc with cash crop)
- Matching herbicide recommendations with interseeding
- Managing for slugs

10. GRAZING - What are the benefits of grazing cover crops and how can it be encouraged?

- Custom grazing -explore grazing cover crops on grain farms by livestock farmers
- Fall and spring grazing options of cover crops
- Establish cover crops in dormant perennial stands by broadcasting and trampling
- Explore opportunities for grain farmer-livestock farmer collaborations
- Contrast benefits of grazing versus hay feeding
- Do comparison of effect of grazing cover crop mixtures on soil health and moisture conservation
- Evaluate cover crop forage quality
- Evaluate compaction and grazing
- Effect of grazing cover crops on following crop yields
- Effect of grazing on cover crop root growth
- Effect of cover crop grazing on nematodes/insects/diseases

11. POLLINATORS – How can cover crops be used to improve pollinator habitat?

- How do cover crops fit –
- Suppressive cover crops for establishing pollinator plots
 - Instead of pesticides/herbicides
 - Continuous cover cropping
- Weed suppression
- Seed depth – tiny to deep
- Frost seeding to deal with depth versus drilling – broadcast
- Till n’seed
- Add fluff
- Seeding heavy
- Nurse crop
- Don’t feed feeds
- Mowing as management – 6-8”
- Food plot seeder
- Broadcast
- Suit to field conditions
- Seed supply important
- Don’t fertilize
- NRCS, other partner agencies
 - EQIP
 - CREP
- More challenging for multiple years (i.e. cost share stays constant)
- Tie into other areas – hedgerows

12. ORGANIC - How can cover crops be employed for organic no-tillage?

- Strategies for no-till corn
 - Compaction from roller-crimper
- Identify biggest hurdles
- Closing planting furrow in no-till systems (RJ planter)
- How to terminate mixtures
- What is organic no-till – organic rotational no-till?
- Is there potential for long-term organic no-till?
- Fertility without incorporation
- Rotate with perennial crop – permanent beds
- High residue cultivators
- Tine cultivator – lilliston, I&J in-row cultivator in organic no-till corn
- Stale seedbed prior to rye, then plant soy at 7.5” spacing - virtually weed free
- Veg through thick rye can get a slow start – possibly due to N tie-up or cooler soils or both
- Hurdles:
 - Timing window for planting no-till corn
 - Timing for planting cover crop prior to no-till system
 - Transplanting into residue
 - Weeds
- How widespread is organic no-till?
- Rotational no-till (organic)
- Are herbicides a useful tool to get established for long-term organic no-till?
- Impact of reduced till versus no-till
- Weeds = a big hurdle
- Access to specialized equipment through equipment share program (could NECCC support this?)

- Connect with students (engineering dept) for competition to develop organic no-till / reduced till equipment
- Mowing for termination while getting even spread of residue and not chopping so fine
- No-till transplanter needed
- Increase mechanization – specialized equipment
- Knowledge transfer about ecological practices from organic to conventional farms and of cultivation practices from conventional to organic farms needed.

13. ECONOMICS - How can benefit-cost ratios of cover crops be increased?

- More efficient planting techniques/technology
- Better matching cover crop species / varieties to soils, systems and context
- Multi-species mixes can sometimes involve wasting money on seeds that don't establish
- Better connect cover crops to highest priority challenges
- Tools/methods to better quantify benefits
 - N-credits
 - Yield benefits
 - Lower herbicide costs
 - Consider time horizon of benefits
- Improved genetics for successful cover crops in more situations (e.g. winter-hardy hairy vetch)
- Cover crops as forage
- Harvest cover crops for seed
- Certifications or labels that could add value/ premium to farms that use cover crops
- More transparent, competitive markets for cover crop seeds (supply, quality, price currently variable)
- Improving decision support tools
- Cost-share on equipment
- Consider economic context (hard sell to PA dairies right now)
- Winter forage production
- Cutting fertilizer costs
- Improving compliance with nutrient management plans
 - Save costs of trucking out manure
 - Can keep dairy or animal operation 'in compliance' without needing to lease new land to spread manure
- Change incentive programs, so that they don't necessarily prohibit to sales of cover crops
- Develop recommendations to specific objectives and context, and consider time horizon
- Present cover crop benefits as part of land-lease negotiations. Cover crops should reduce rental rate ... education of land owners
- Lower seeding rates; figure out minimum needed seeding rates
- Cost-share equipment rental programs
- Better tools and models to estimate more benefits at farm – scale

14. ADOPTION AND PROMOTION - How can the government help increase cover crop use and innovation among farmers?

- Implement multiple strategies
 - Government incentives, regulations
 - Social media outlets,
 - NRCS tool to show benefits and bottom lines
 - Support for underserved farmers
- Allowing flexibility
- Timing of outreach
 - Should be when farmers make decisions
- Long-term (7-10 yrs) government programs to allow for adoption
- Have votes for adding taxes to better waterways
- Champion farmers and brand ambassadors
- Environmental behavior change research
- More census data on soil health topics
- Marketing strategies:
 - Change aesthetics of soil:
 - Bare soil 'ugly'
 - Covered soil 'beautiful'
 - Target farmers and land owners specifically
 - Hire marketing professionals
 - Cost / benefit analysis on marketing strategies

