Spring Management for Soil Health Management Systems

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2016

unlock the SECRETS IN THE SOIL

USDA United States Department of Agriculture

Soil Health Principles

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Regenerating Soil Health

Promoting Life

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We need to Start Building Soil Life….ASAP!

Response to soil aggregates after one season

Planning a Soil Health Cropping System

- Farmers in pursuit of high soil health must integrate a system of cropping practices
- With successful management, that the benefits of the whole system should exceed the sum of the parts.


Why all the buzz about Cover Crops?
Less Carbon Loss Here
It's all about the Carbon! (Organic Matter)
We want more Carbon here

Lack of cover is seldom a good thing!

Cover crops have the potential to:

- fix and/or hold onto unused nitrogen,
- provide carbs and protein through root exudates
- build organic matter…

Hairy Vetch Cover Crop w/N nodules

Soil Structure from high soil health after a 2” rain

Strategically…

CC should complement the following crop

Corn into a mix:

Winter Kill

- Easy spring management

And/Or…

High Protein

- Provides Optimum Nutrient Release

Strategically…

Soybeans do well into a High Carbon cover crop.

…Why?

Weed Control, Late Season Water and Nutrient Cycling

Herbicide Carryover Compatibility with

- Cover Crops

Selection Considerations

Herbicide Persistence

- Carryover potential
  - Challenging to predict potential carryover of herbicides to cover crops with exhaustive variables.
  - Careful planning can help increase confidence.
  - When in doubt, perform a bioassay.
- Resources:
  - PSU – Bill Curran and Dwight Lingenfelter (http://extension.psu.edu/plants/crops/soil-management/cover-crops/herbicide-persistence/herbicide-carryover-table
  - Univ. of Missouri – Kevin Bradley (http://weedscience.missouri.edu/extension/pdf/cover%20crop%20carryover.pdf)
  - Purdue University- Brian Young- Good summary of Literature and input from CC Experts.

Common corn herbicides, estimated half-lives, cash crop restrictions and potential to injure fall cover crops

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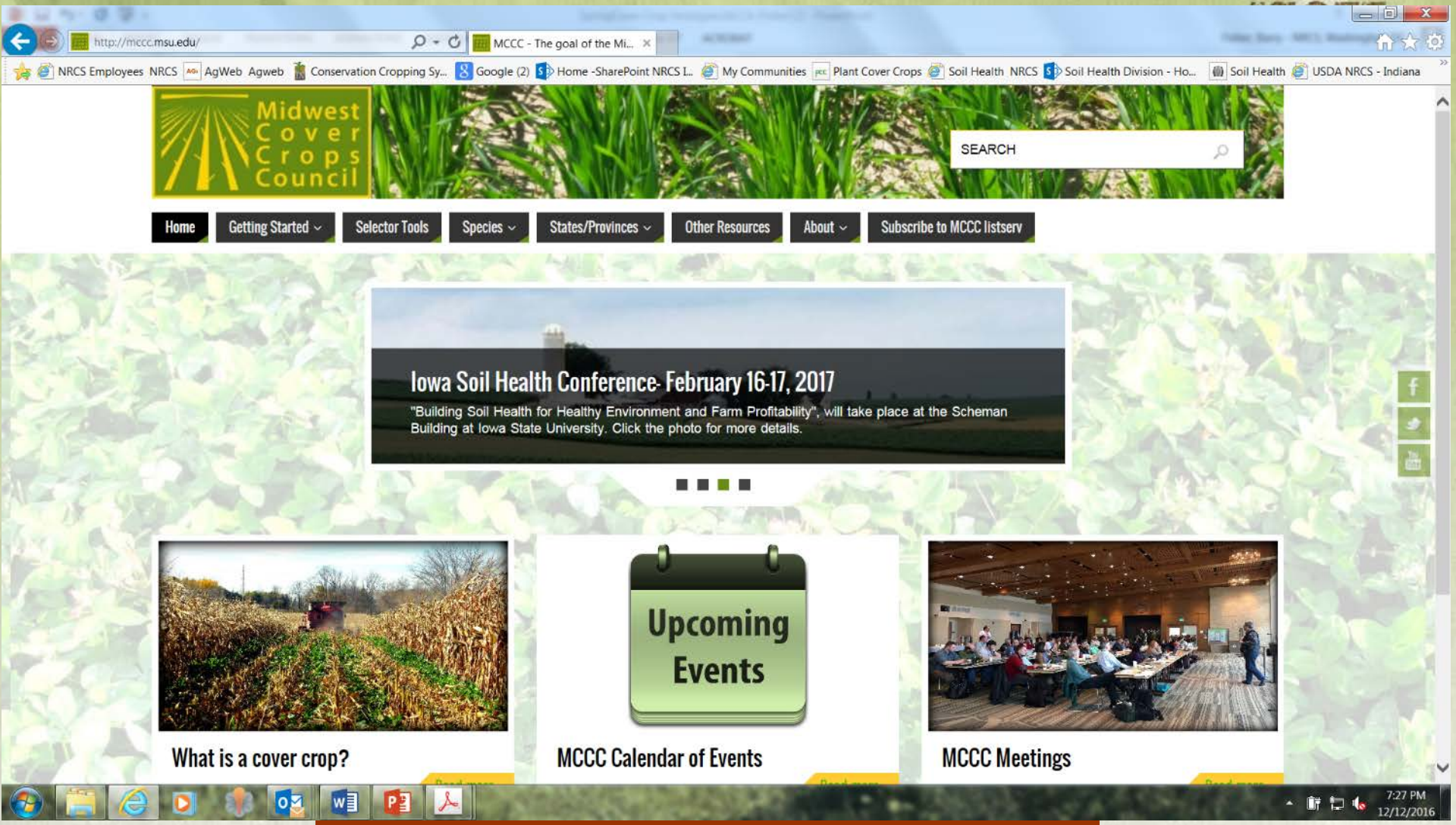
HERBICIDE	Active Ingredient	Normal Rate/acre	Half Life (days)[1]	Cash Crop Restrictions	Fall Cover Crops		Other
					OK to Plant	Concern for	
2,4-D 4S	2,4-D	1-2 pt	7	Plant anything 30 days after application	All grasses	Wait 30 days before planting sensitive broadleaves	Amine formulations more water soluble and can leach into seed zone
Accent 75DF/ Steadfast 75DF	nicosulfuron/ nicosulfuron + rimsulfuron	0.66 oz/ 0.75 oz	21	Sensitive crops have 10-18 month restriction	Fall cereal grains, ryegrass	Small seeded legumes, mustards, sorghum	More persistent in high pH soils (> 7)
Atrazine 4L	atrazine	1-2 qt	60	Can plant corn, sorghum, and soybean the following year (some products)	Sorghum species	Cereals, ryegrass, legumes and mustards	More persistent in high pH soils (> 7). Rates < 1 lb/acre can allow more flexibility
Balance Pro 4L	isoxaflutole	2 fl. oz	50-120	Small seeded legumes and vegetables have a 10 to 18 month restriction	Fall cereal grains	Cereals, ryegrass, legumes and mustards	15" of total precipitatio required from application to planting rotation crops except soybean, barley, wheat, sorghum, sunflower
Callisto (includes Lumax, Lexar, Halex GT)	mesotrione	3-6 lf. oz	5-32	10 to 18 months for legumes and vegetables	All grasses	Small seeded legumes, mustards	Sequential applications (PRE fb POST) increase the potential for injury
Clarity/Banvel 4S (Distinct and Status)	dicamba	16-24 fl. oz	5-14	15 days per 8 fl. oz/acre for small grains	All crops	Only at high rates or less than 120 days after application	Anything can be planted after 120 days with 24 fl. oz/acre or less
Dual II Mag 7.62E/Cinch	metolachlor	1.67 pt	15-50	Labeled for use on many crops	Almost anything	Annual ryegrass or other small seeded grasses	Higher rates and later applications more of a potential problem
Capreno 3.45SC	tembotrione + thiencarbazone	3 fl. oz	50-120	Four months for wheat, 10 months for barley, sorghum, oats and alfalfa	Wheat, triticale, rye	Small seeded legumes, mustards, sorghum	15" of total precipitation required from application to planting rotation crops except wheat
Corvus 2.63SC	isoxaflutole + thiencarbazone	5.6 fl. oz	50-120	Four mo. for wheat, 9 mo. for barley and 17 mo. For alfalfa, oats, sorghum, and canola	Wheat, triticale, rye	Small seeded legumes, mustards, sorghum	15-30" of total precipitation from application to planting for sensitive crops

Disclaimer: Some of this information is our best guess and only pertains to the eastern US, not heavy Midwest soils or the western US where soils have high soil pH and rainfall is lower. PSU



http://www.mccc.msu.edu/

COVER CROP Termination

- Have a good GAME PLAN…
  - What are your goals?
- Be adaptive to the season
  - Wet springs happen!

COVER CROP Termination

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RyegrassCovercrop.com

ANNUAL RYEGRASS MANAGEMENT

QUICK GUIDE

ANNUAL RYEGRASS CONTROL:

- **WHEN?**
  - ARG should be actively growing (5-7 days), with soil temp above 45° F.
  - Late March/Mid-April – with the plant typically 6-9" tall.
  - Good spray coverage with medium spray droplets is key.

- **USING GLYPHOSATE?**
  - Use full rates: **1.25-1.50 lb a.e./ac minimum** even if the ryegrass is small.
  - Daytime temp a minimum of 55° F (Soil above 45° F).
  - Night time temp should be above 38° F (3 nights above 40° F).
  - Spray at least 4 hours before sunset.
  - Reduce water volume to 8-12 gpa.

Aerial seeding into a standing crop is an efficient method of broadcasting seed.

COVER CROP Termination

How to kill annual ryegrass- “if you haven’t had to mow your yard it not time to spray annual ryegrass…Need to have new top growth (active growth) in order to get good kill”- Jamie Scott.

COVER CROP Termination

- Glyphosate
  - Use full rates
  - Avoid antagonism NO:
    - atrazine
    - mesotrione (Callisto)
    - Anything that Burns or
    - Shuts down photosynthesis

COVER CROP Termination

– Sprayer Water Quality and Management

- Use AMS plus water conditioners or pH buffers according to label directions- follow order of mixing carefully.

- Use 8-12 Gallons of Water
- Do not use nozzles that produce coarse spray droplets.

COVER CROP Termination

MAXIMIZE TRANSLOCATION

- Daytime temp a minimum of 55° F
- Soil above 45° F
- Nighttime temps should be above 38° F
  - 3 nights
- Spray at least 4 hours before sunset.

COVER CROP Termination

Tile Drainage

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So what happened in spring of 2016?

Agricultural Tile Drains Clogged With Cover Crop Roots?

PURDUE UNIVERSITY

Eileen Kladivko, Purdue University

Barry Fisher, Natural Resources Conservation Service

Larry Brown, The Ohio State University

- URL: http://www.ag.purdue.edu/agry/extension/Documents/TilesandCoverCropRoots.pdf

What Do We Know?

This issue is not common:

- **There are many long-term no-tillers who use cover crops that do not have plugged tile;**

- **Farmers who are experiencing this are not seeing it in every tile, so it appears to be site-specific and tied to other factors besides simply no-till with cover crops**

So what's down with that?

What circumstances may have led to roots in tile?

- Big June rains in 2015 followed by dry August and September
- N levels-Lots of leaching in June 2015> Low N availability late summer and fall
- Warm late fall and winter
- Continuous No-till= Continuous root channels
- Warm fall 2015> Warm Spring early and then very wet 2016=Big CCs with deep roots

Cover Crops had great conditions for extra growth

How might we adapt/manage Cover Crop systems?

- Don’t let it rain so much!
- Earlier termination
- Later establishment
- Alternate winter kill with winter hardy

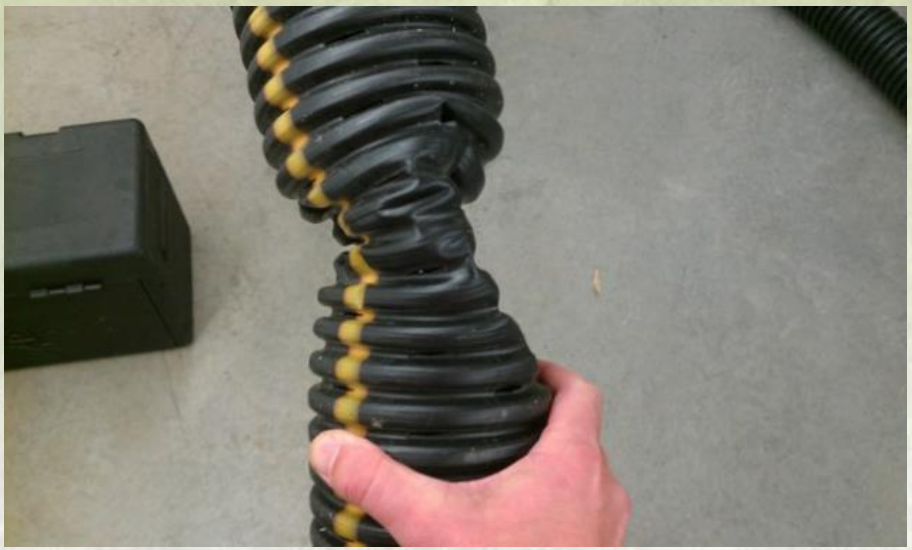
How might the tile system conditions have contributed?

- Nearly impossible to control all possible tile constrictions/damage with the speed and amount that has gone in over the past decade

How might the tile system conditions have contributed?

- Grade of tile, dips, humps or constrictions in the tile may have been collection points for nutrient rich sediment and crop residues

- Any rocks down there?



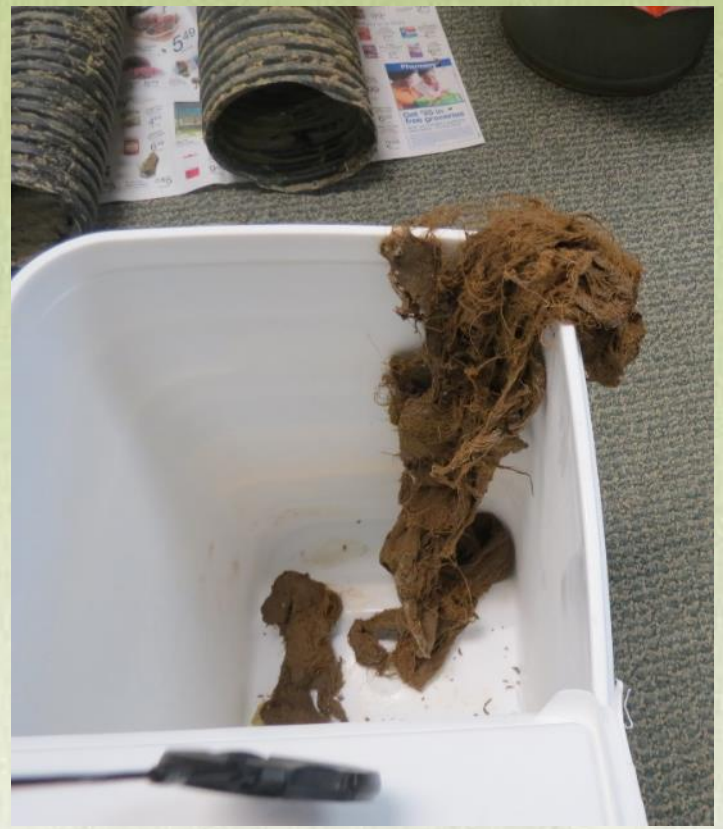
How might the tile system conditions have contributed?

- New connections may also provide opportunity for residue log jams.

How might the tile system conditions have contributed?

- **Fact Sheet 555…Farm Tile Drains and Tree Roots**

T. Leuty
Ontario Ministry of Ag.



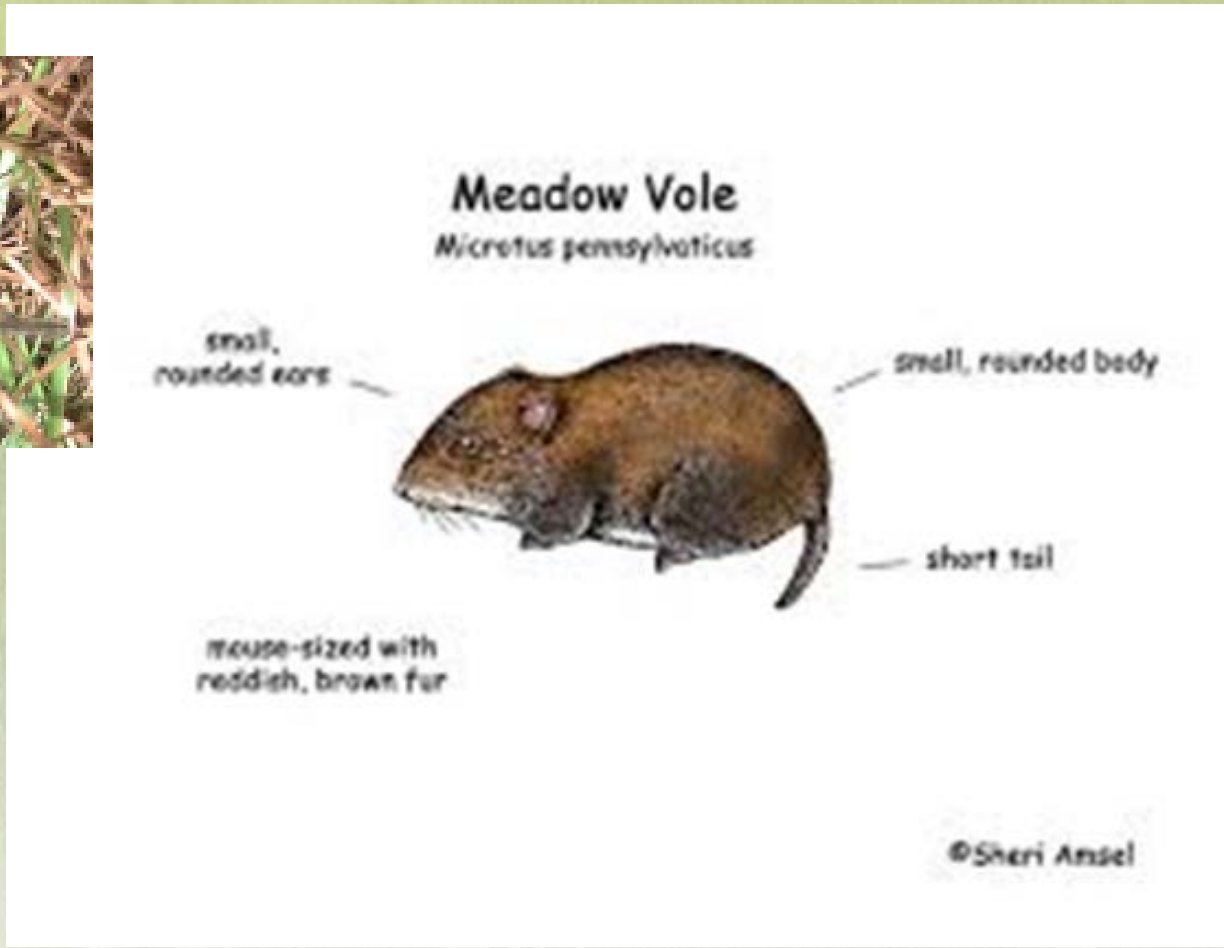
- **A root will likely stop growing once it enters a dry tile** … **The root will not proliferate to plug the tile if it does not encounter a water source.**

- Once running water or standing water become available inside a tile, tree roots that are present may proliferate and plug the tile

Soil Health System- Pest Management

- Most pests are opportunists
- Integrated and Adaptive Management-
  - Systems that utilize complementary strategies to manage pests and weeds
  - Not usually based on preventative chemistry
  - **Integrates beneficial biology and cultural practices**

Vole Control?



What do we know about voles?

- Voles may breed throughout the year, but most commonly in early spring - summer.
- Generally, they have 1 to 5 litters per year.
- Litter sizes range from 1 to 11 young, but usually average 3 to 6 young.

Penn State University

What do we know about voles?

- The gestation period is about 21 days.
- Young are weaned by the time they are 21 days old, and
- females are sexually mature in 35 to 40 days.
- **Good news-** Voles have short lifespans that generally range from 2 to 16 months.

Penn State University

They must be tasty- Everybody want to eat them!

What do we know about voles?

- A colony's range can be up to ¼ acre in many cases.
- Voles will significantly reduce corn or soybean stands during the first 21 to 28 days after planting
- voles will actually dig up newly planted seeds or eat succulent plant tips or cotyledons.
- 4 – 5 colonies in close proximity are usually of economic thresholds for control

…**multiple practices** and **strategies** …

- Cover Crops-
  - Grass and clovers seem to be the most attractive to voles.
  - Rotate mixes
  - Selecting a cover crop mix that contains 40-50% species that winter kill.

Predators are your friend:

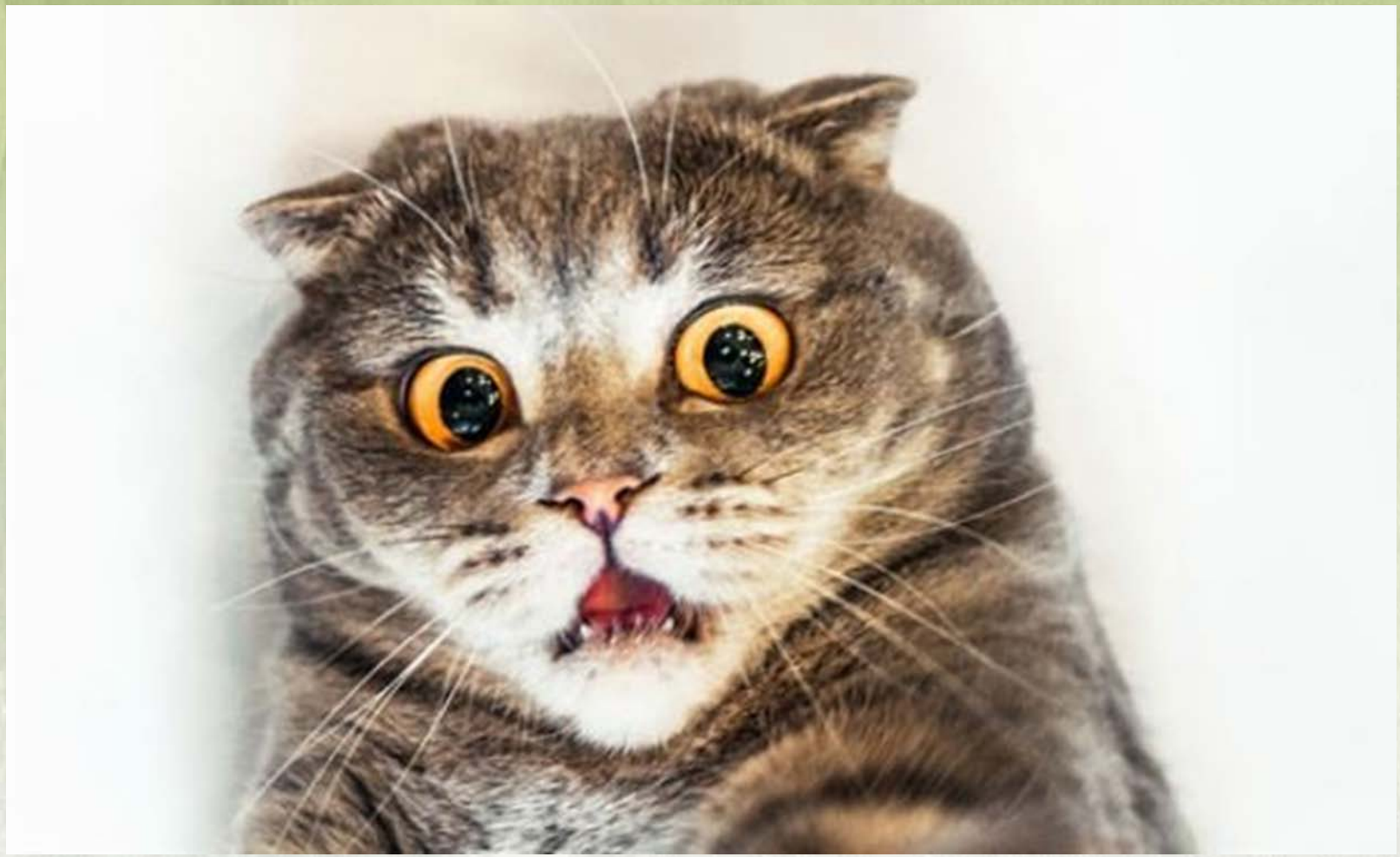
- Voles are a favored diet by predators such as owls, hawks, foxes, coyotes, and…

Predators are your friend:

- Voles are a favored diet by predators such as owls, hawks, foxes, coyotes….. **and cats!**
- Still working out the **de*tails* of aerial application of feral cats**

…Maybe Use some High-Tech

…Not always reliable



…Feral Cat Problem?…
Adaptive management is key

…strategies that are implemented at **critical times**:

- Voles are most active at night so nocturnal predators like owls and coyotes are the most effective.
- Providing habitat (perch and den trees), and
- Protection (**reduced d** etc.) for these predato also part of the overall control program.

…practices and strategies that are implemented at critical times:

- Check fields in **late winter** for active vole colonies to determine the populations' potential.
- Runs will be very evident in area with heavy residue, particularly after a period of snow cover.
- Target application of Zinc phosphide baits (follow label).

…multiple practices and strategies that are implemented at critical times:

- Scout again for active vole colonies about 1 week before planting.
- If few to none are found, plant when soil conditions are ready for rapid emergence and growth.
- If more than 5 active colonies per acre are found, plan to apply alternative bait, such as corn, soybeans or wheat.

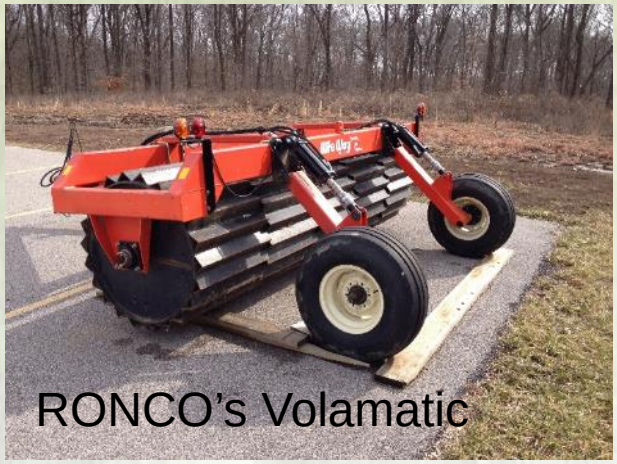
…at critical times **and location**:

- Most colonies originate in grass buffers and migrate into fields with good cover.
- Zinc phosphide may only be needed on the outside rows of high potential problem fields.(follow label)

- Some insecticide boxes can work

…**strategies** that are implemented at critical times and **locations**:

- For no-till soybeans,
- Drilling literally kills more voles by simply having additional knives in the ground (this also goes for drilling cover crops), and
- Makes me smile!

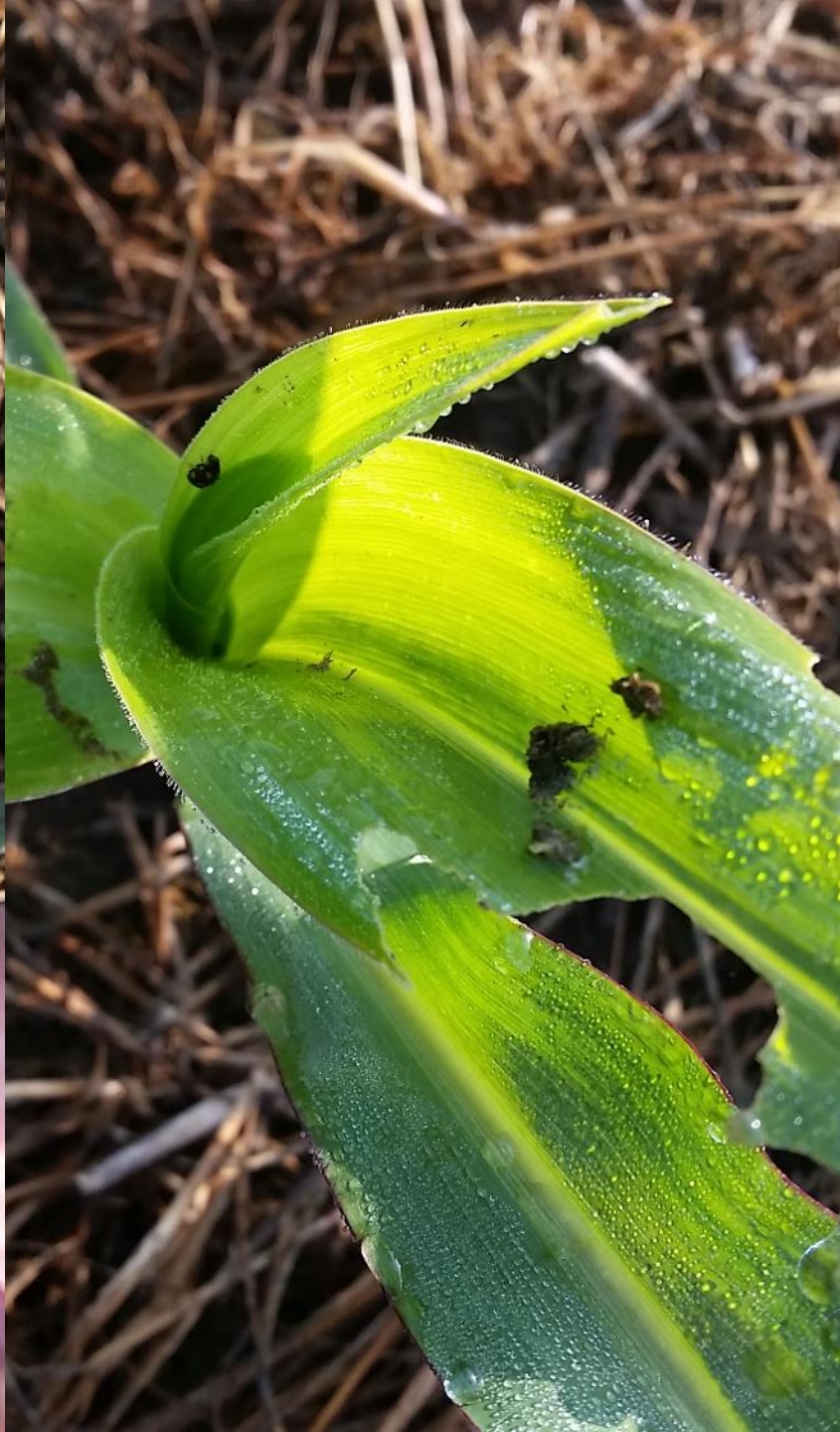


RONCO's Volamatic

What about Bugs?….

…always Scout for Pests

…always Scout for Good Guys!

Things don't always go the way you plan….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Planning Will Lead to Good Soil Health Decisions
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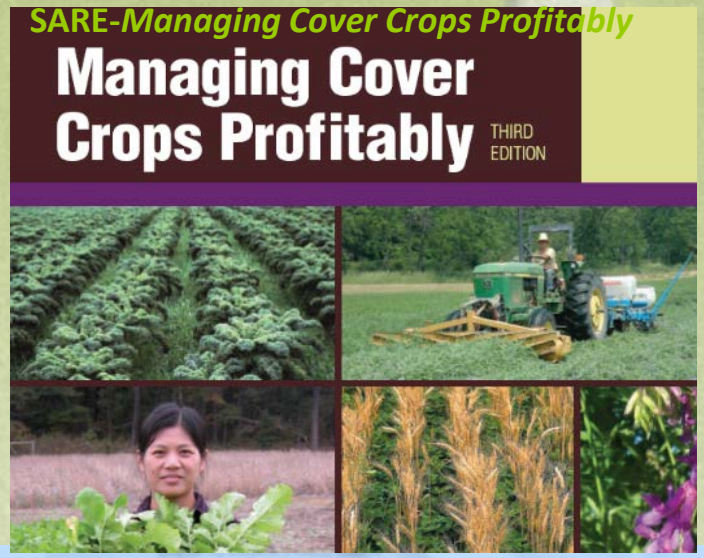
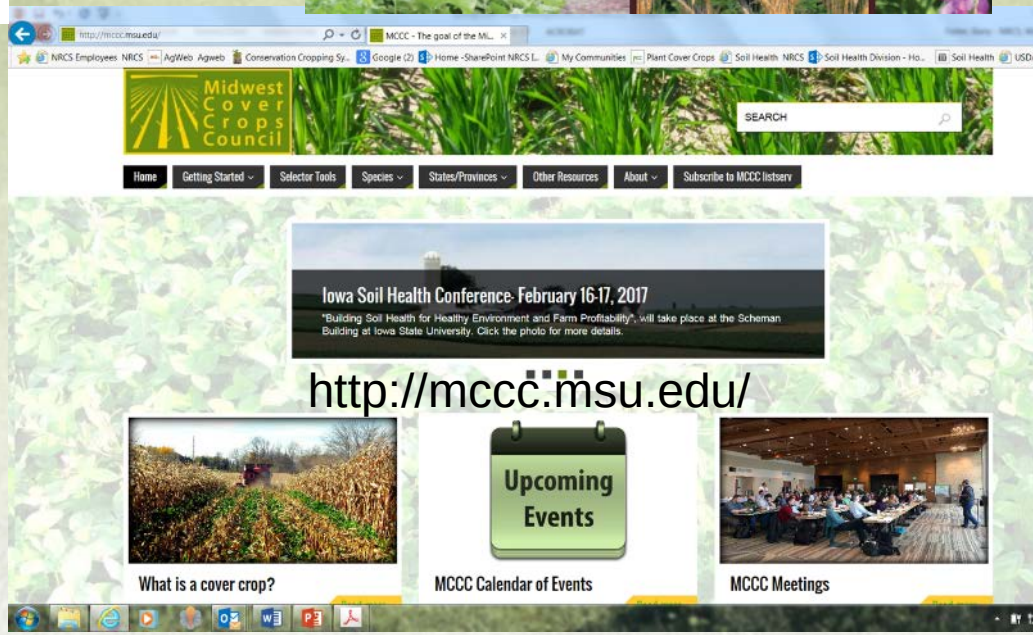
Tools to Help with Soil Health Decisions





Soil Health Campaign
Google: NRCS Soil Health

- Raised awareness
- Expanded demand for system adapted information
- Raising many good questions