

Fitting Cover Crops into Vegetable Production Systems

November 8, 2018

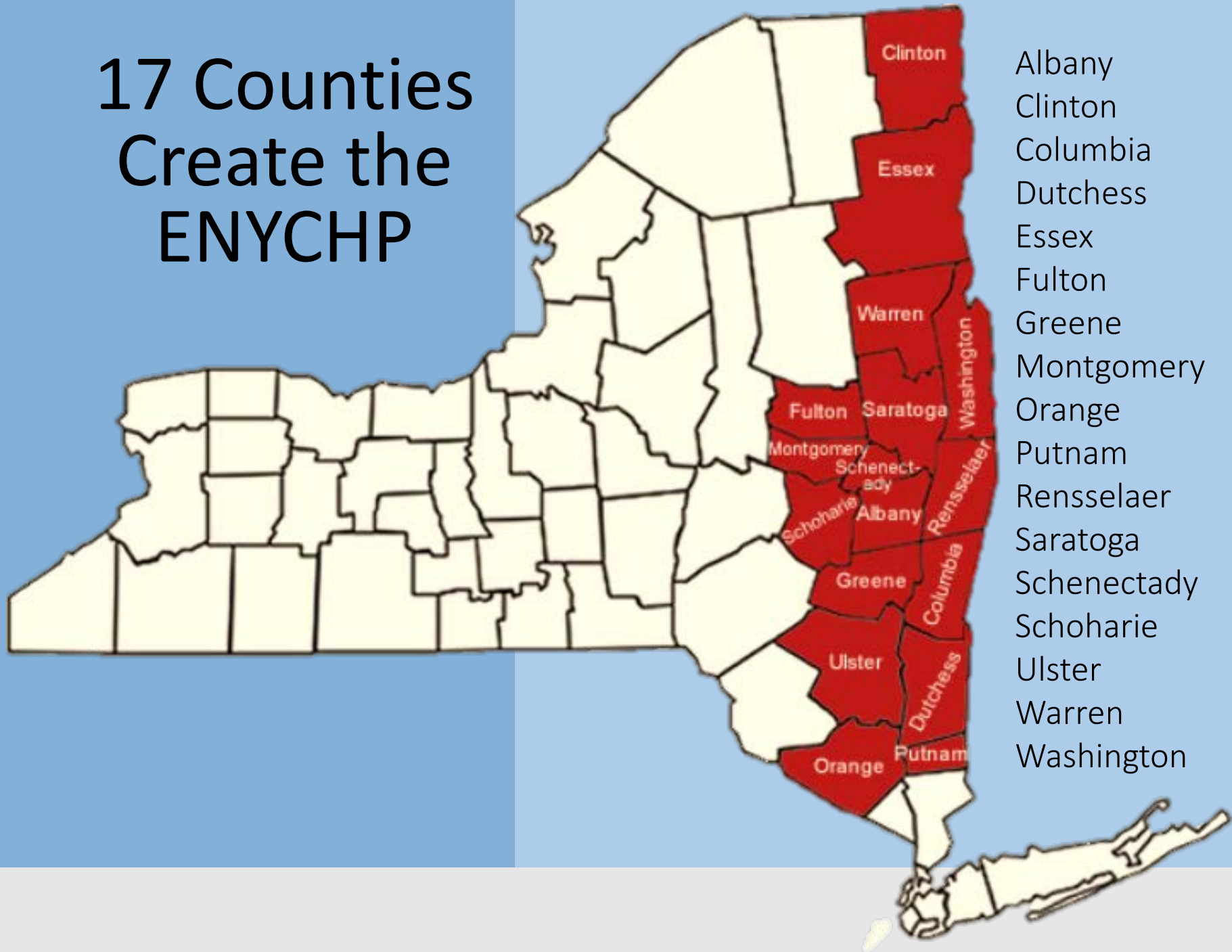
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17 Counties Create the ENYCHP



What are some reasons you would use cover crops?

- Suppressing weeds
- Protecting soil from rain or runoff
- Improving soil aggregate stability
- Reducing surface crusting
- Adding active organic matter to soil
- Breaking hardpan
- Fixing nitrogen
- Scavenging soil nitrogen
- Suppressing soil diseases and pests



What are some concerns using cover crops?

- Selecting the right cover crops for:
 - Your management goal
 - Fitting into your overall production plan
- Establishment
 - Broadcasting, drilling, overseeding etc.
- Terminating the cover crop
 - Mowing, crimping, plowing, herbicide
- Managing cover crop residue
- Planning cover crops within your cropping plan
- Costs vs. Returns – can we see what we're getting out of it
 - Can we use it for forage, straw etc.?



Establishment is Critical!!



Drills are really my preferred way for seeding cover crops. But they can be expensive, take longer and can be cumbersome for smaller scale growers!



Spinners also work but you should adjust your rates by 10-15%. And cultipacking or rolling afterwards helps!



Seed/Soil contact helps speed up germination.

This whole field was planted to a cover crop, but look where the seeds germinated first!

Cover Crop Mixes Are the Rage!

- Multiple species makes the most out of the which season they are suited for
- Many cool season species will germinate in the undergrowth of warm season species and then explode once the warm seasons start to shutdown!
- Mixes of different families is also a big benefit – mixing grasses with legumes and brassica's for example!



Cover Crop Mixes Are the Rage!



Early Spring Plantings before a Crop (April/May)

Cover crop	Recommended Seeding rate Drilled (lbs)	Recommended Seeding rate Broadcast (lbs)	Seeding Depth (inches)	Planting Window	Best Uses
Field Peas + oats	120 + 20	NR	3/4 - 1.0	early spring/late summer	cover crop, green manure, forage, lower rates in mixes
Barkant Turnip or Purple Top	4-5		1/8	early spring/late summer	cover crop, grazing
Yellow Mustard	10-12	NR	1/4-1/2	spring thru mid Sept.	cover crop, smother crop, biofumigant (15-20 lbs/acre)
Dwarf Essex Rape	4-5 (1-3 in in mixture)		1/8	early spring thru summer	cover crop, forage
Forage Oats	80-100	100-120	1.0 -1.5	early spring	forage, cover crop. Use lower rates with mixes
Medium Red Clover	6-10	10-15	1/2	early spring	frost seeded, cover crop, forage, nitrogen fixer
T-Raptor	4-5 (1-3 in in mixture)		1/8	early spring	cover crop, forage

Summer Plantings – After early sweet corn, snap beans, summer squash, brassicas, greens, garlic (Late July/early August)

Cover crop	Recommended Seeding rate Drilled (lbs)	Recommended Seeding rate Broadcast (lbs)	Seeding Depth (inches)	Planting Window	Best Uses
3 Way Clover Mix	10-15	15-20	1/4 - 1/2	late summer	cover crop, interseeding
Dwarf Sorghum or Sudan	4-9	7-11	1.0 - 1.5	mid June	cover crop and mixes, forage
AS9302 sudan	4-9	7-11	1	mid June	cover crop and mixes, forage
Barkant/Purple Top Turnip	4-5		1/8	early spring/late summer	cover crop, grazing
White Mustard	8-10	NR (10-15)	1/4-1/2	spring thru mid Sept.	cover crop, smother crop, biofumigant (15-20 lbs/acre)
Broadcaster Mix	18-25	25-30	½	late summer	cover crop, forage, interseeding
Crimson Clover	15-25	15-25	1/4 - ½	spring or summer	may not overwinter, cover crop, nitrogen fixer, forage
Dwarf Essex Rape	4-5 (1-3 in in mixture)		1/8	early spring thru summer	cover crop, forage
Forage Maker Oats	80-100	100-120	1.0 -1.5	August - September, spring	forage, cover crop. Use lower rates with mixes
Japanese Millet	12 - 15	17 - 25	1/4-1/2	after soils reach 65° F	cover crop, forage(higher adaptation than sorghum
Medium Red Clover	6-10	10-15	½	early spring/late summer	frost seeded, cover crop, forage, nitrogen fixer
Summer Feast	10-20	NR	1/2-3/4	after soils reach 65° F	grazing, cover crop
Tifleaf III Millet	10-20	NR	1/2-3/4	after soils reach 65° F	cover crop, forage
T-Raptor	4-5 (1-3 in in mixture)		1/8	early spring thru summer	cover crop, forage
Triticale	60-100	100-200	1/2 - ¾	late Aug. thru Sept.	cover crop, forage
Annual rye grass	10 - 20	20 - 30	1/2	Late spring thru Sept.	Interseeding, cover crop, nurse crop, soil health

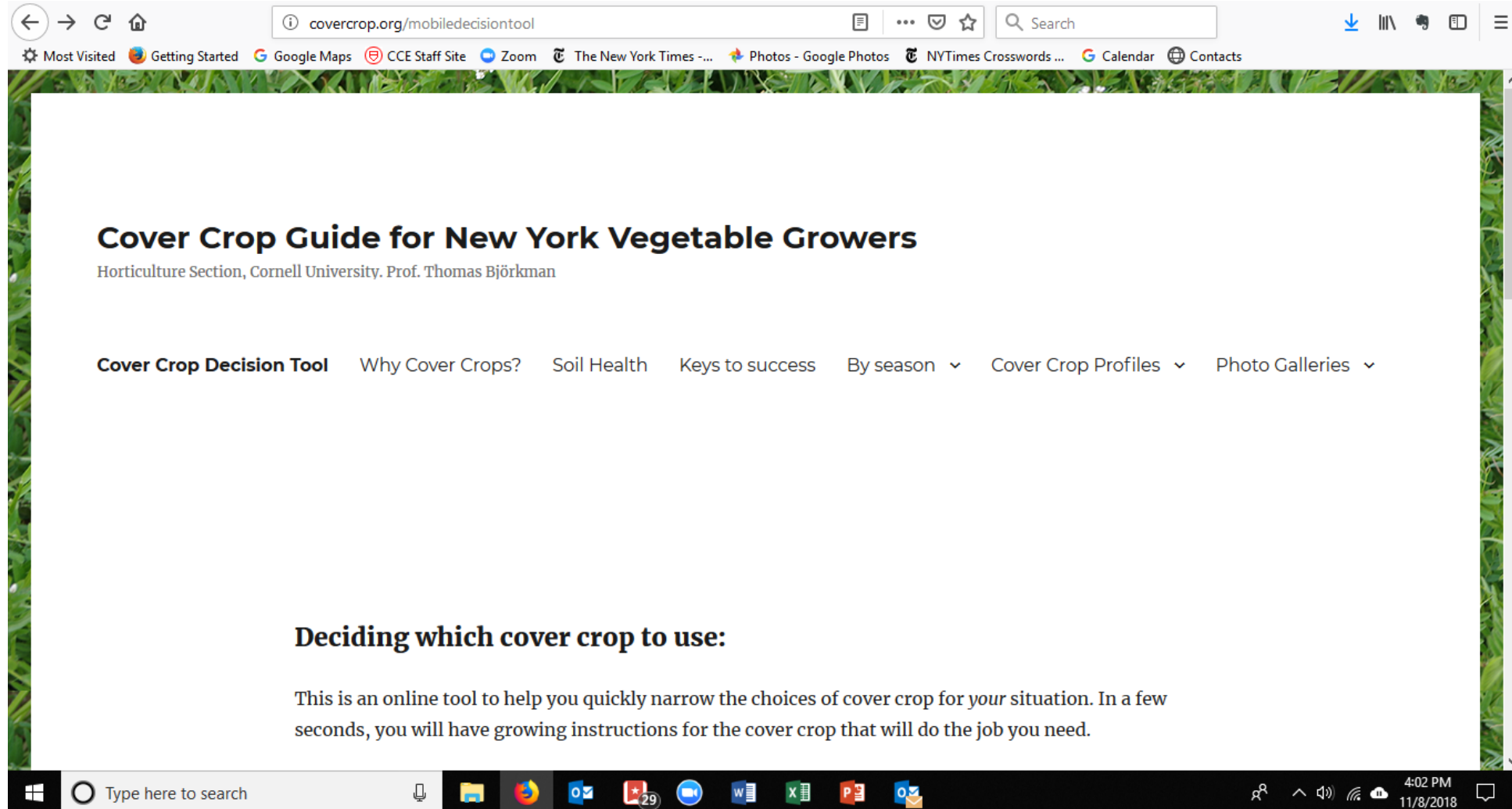
Late Summer/Early Fall Plantings

Cover crop	Recommended Seeding rate Drilled (lbs)	Recommended Seeding rate Broadcast (lbs)	Seeding Depth (inches)	Planting Window	Best Uses
3 Way Clover Mix	10-15	15-20	1/4 - 1/2	late summer	cover crop, interseeding
Austrian Winter Pea	60-100	NR	3/4 - 1.0	early spring/late summer	cover crop, green manure, forage, lower rates in mixes
Field Peas + oats	120 + 20	NR	3/4 - 1.0	early spring/late summer	cover crop, green manure, forage, lower rates in mixes
Barkant/Purple Top Turnip	4-5		1/8	early spring/late summer	cover crop, grazing
Mustards	8-10	10-15	1/4-1/2	spring thru mid Sept.	cover crop, smother crop, biofumigant (15-20 lbs/acre)
Broadcaster Mix	18-25	25-30	1/2	late summer	cover crop, forage, interseeding
Daikon Radish	6-14 (use 1 -2 lbs in mixes)		1/4	mid Aug.-mid Sept.	cover crop, green manure, grazing
Dwarf Essex Rape	4-5 (1-3 in in mixture)		1/8	early spring thru summer	cover crop, forage
Oats	80-100	100-120	1.0 -1.5	August - September, spring	forage, cover crop. Use lower rates with mixes
Rye Grass	25-35	NR	1/4	fall or early spring	forage, cover crop
Hairy Vetch	20-30	NR	1/4-3/4	fall or early spring	cover crop, forage, nitrogen fixer
King's Soil Builder Plus	50-60	NR	1/2 - 3/4	early fall or early spring	forage(use 120-140 lbs/acre), cover crop
T-Raptor	4-5 (1-3 in in mixture)		1/8	early spring thru summer	cover crop, forage
Triticale	60-100	100-200	1/2 - 3/4	late Aug. thru Sept.	cover crop, forage
Winter Rye	60-200	100-200	1/2-3/4	September	cover crop, overwintering, forage, straw
Wheat	100 – 150		1.0 -1.5	October	forage, straw, cover crop. Overwinters
Wichita Winter Canola	3.5-5.0	NR	0.75-1.0	Mid Sept - October	cover crop, soil health
Winter barley	90 - 100		1.0 -1.5	Sept. - early Oct.	cover crop, straw, forage, grain
Buckwheat	50	70	1/8 – 1/4	June - July	cover crop, soil health, seed production

Last Resort Plantings – Mid – Late October

Cover crop	Recommended Seeding rate Drilled (lbs)	Recommended Seeding rate Broadcast (lbs)	Seeding Depth (inches)	Planting Window	Best Uses
Oats?	80-100	100-120	1.0 -1.5	August - September, spring	forage, cover crop. Use lower rates with mixes
Winter Rye	60-200	100-200	1/2-3/4	September	cover crop, overwintering, forage, straw
Wheat?	100 - 150 (grain yield rates)		1.0 -1.5	October	forage, straw, cover crop. Overwinters
Wichita Winter Canola	3.5-5.0	NR	0.75-1.0	Mid Sept - October	cover crop, soil helath
Winter barley?	90 - 100 (grain yield rates)		1.0 -1.5	Sept. - early Oct.	cover crop, straw, forage, grain

Cover Crop Decision Tool



The screenshot shows a web browser window with the address bar displaying `covercrop.org/mobiledecisiontool`. The browser's address bar includes navigation icons (back, forward, refresh, home) and a search bar. Below the address bar, a row of bookmarks is visible, including "Most Visited", "Getting Started", "Google Maps", "CCE Staff Site", "Zoom", "The New York Times - ...", "Photos - Google Photos", "NYTimes Crosswords ...", "Calendar", and "Contacts".

The website content features a green background image of cover crops. The main heading is "Cover Crop Guide for New York Vegetable Growers", followed by the text "Horticulture Section, Cornell University. Prof. Thomas Björkman". Below this, a horizontal navigation menu includes the following items: "Cover Crop Decision Tool" (highlighted), "Why Cover Crops?", "Soil Health", "Keys to success", "By season" (with a dropdown arrow), "Cover Crop Profiles" (with a dropdown arrow), and "Photo Galleries" (with a dropdown arrow).

The main content area contains the heading "Deciding which cover crop to use:" followed by a paragraph: "This is an online tool to help you quickly narrow the choices of cover crop for *your* situation. In a few seconds, you will have growing instructions for the cover crop that will do the job you need."

The Windows taskbar is visible at the bottom of the screen, showing the Start button, a search bar with the text "Type here to search", and a row of application icons including File Explorer, Google Chrome, Outlook, a calendar icon showing "29", a Microsoft Teams icon, Word, Excel, PowerPoint, and another Outlook icon. The system tray on the right shows the time "4:02 PM" and the date "11/8/2018".

Cover Crops demonstrations at Cornell Willsboro Research Farm

2018 – planting dates Aug 2 and Aug 20, on 2 soil types
2016 – one planting date – July 1, featuring warm season crops
on 2 soil types

Clay loam site
early planting left, late planting right, on Oct 30
L-R: oats, crimson clover, millet, daikon radish



Planting dates – Early: Aug 2, Late: Aug 20

Sandy loam site
early planting left, late planting right, on Oct 30
L-R: oats, crimson clover, millet, daikon radish



Planting dates – Early: Aug 2, Late: Aug 20

L: Sandy site *early* planting plots 1-7 on 10/30

R: Clay site, *late* planting plots 2-6 on 10/30

(soil builder, oats, crimson clover, millet, daikon, summer feast, barley)



Planting dates – Early: Aug 2, Late: Aug 20

Soil Builder Plus on sand left, on clay right

In sand, daikon dominates, in clay where deer have browsed back the radish, the other crops have filled in





Very thin stand of crimson
clover on sandy site, with
lots of weeds



clay, early planting - millet
Note no weeds starting
between plants despite
bare soil. Later clay millet
planting did have winter
weed seedlings coming in.

Tillage Radish



Pictures from our summer
crop planting of 2016

L-R: Sunhemp, Cowpea, Sorghum-sudangrass 9/2/16

Sandy loam site

Clay loam site



Both sites planted July 1, 2016 under hot, dry conditions



With the July 1, 2016 planting, some crops did NOT establish well under warm, dry summer conditions in sand (clovers and radish). In this 5-way mix only the Teff and millet did well.

~~Crimson clover, teff, 3-way clover, Japanese millet/tillage radish~~

Adjusting Rates in Mixes



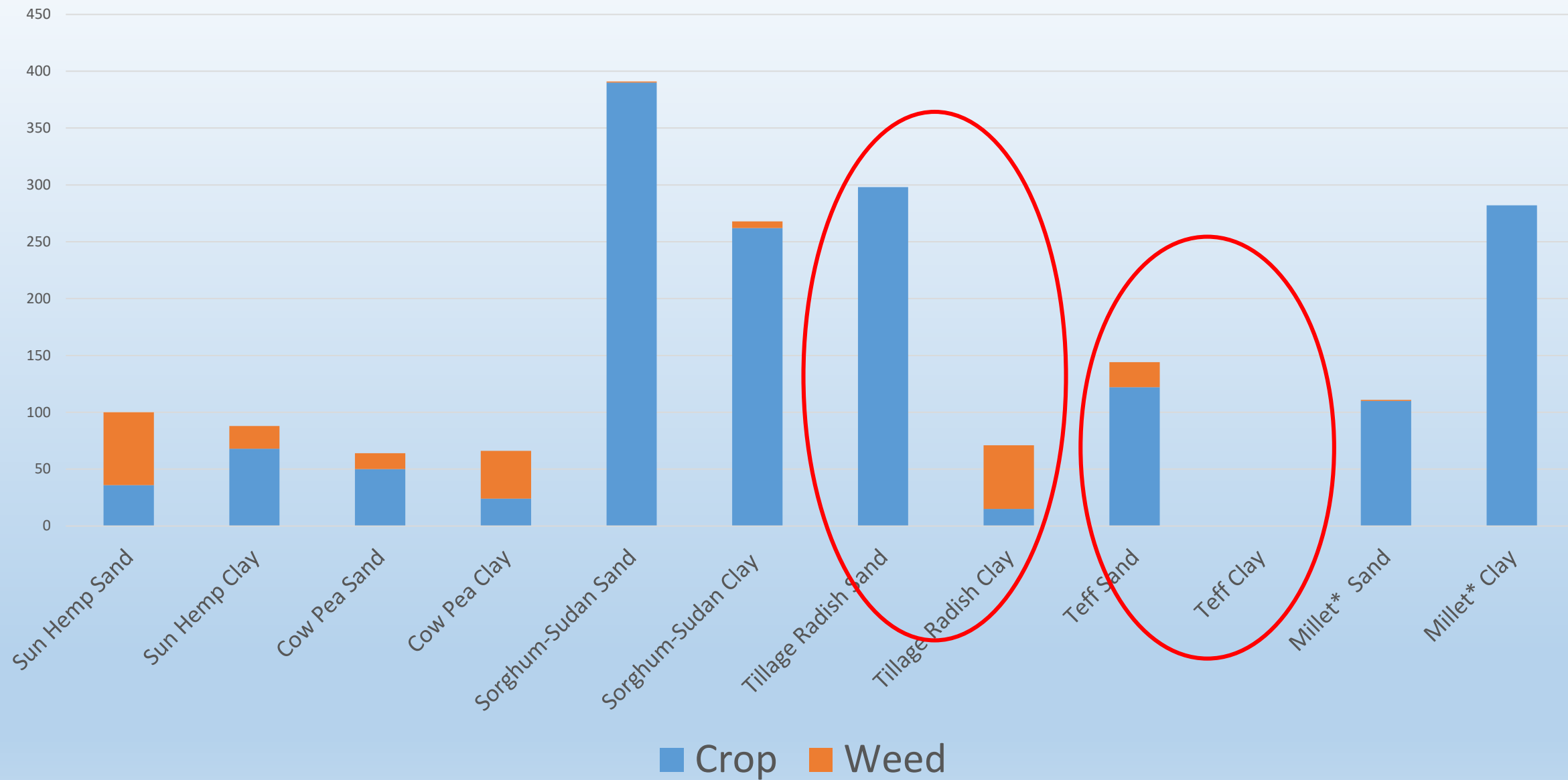
Tillage Radish at Full rate –
6 lbs per acre



Tillage Radish at Reduced rate (1 lb /
acre) mixed with
Hairy Vetch (20 lbs/acre)



Biomass Dry Weight (grams) from mono-stands



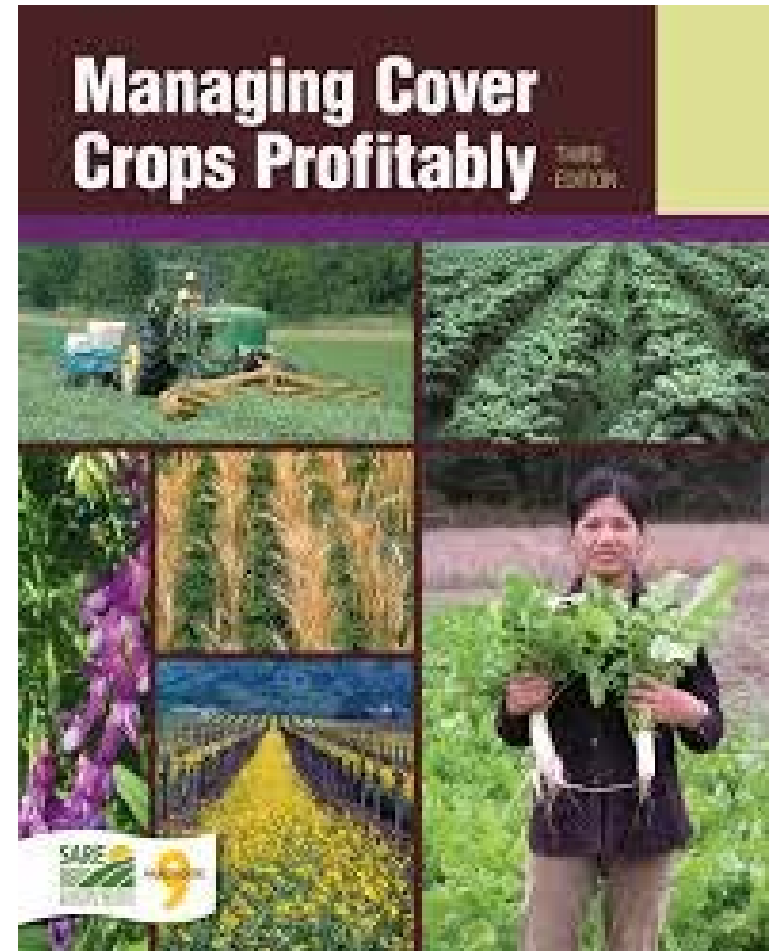
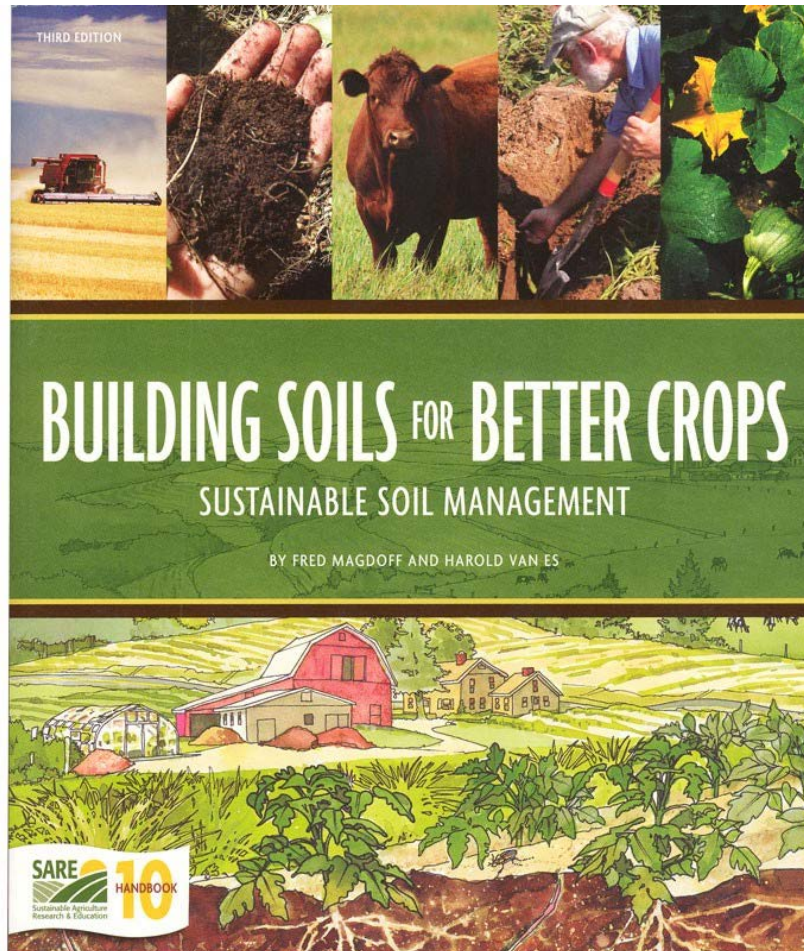
Planting date July 1, 2016 under hot, dry conditions



Inter-Seeding could be another option!
This is vetch in the spring 2018 after inter-seeding in corn crop early summer 2017.



Excellent Resource Books



Hard copies available for sale, or download pdf for free at <http://www.sare.org/Learning-Center/Books>

Questions?

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