# AFT-NRCS Economic and Environmental Case Studies: Providing Evidence for Soil Health Investment

The second second

#### Speakers

- 1. Dr. Michelle Perez AFT Water Initiative Director & Project Leader
- 2. Florence Swartz Consulting Economist & former NRCS-NY Economist for Brian Brant, AFT Ag Conservation Innovations Director & Author, Ohio Case Studies
- 3. Aaron Ristow AFT NY Stewardship Program Manager & Author, New York Case Studies
- 4. Ben Wiercinski AFT Agricultural Economist & Author, Pennsylvania Case Study
- 5. Sarah Blount AFT Midwest Conservation Technician & Author, of an Illinois Predictive Assessment

Soil Health Stewardship Session #4 Soil Health: Basics, Practices, Benefits, & Barriers – Part 2 September 8, 2021 1 to 2:45 pm Eastern



# **Session Objectives**

- Familiarize participants with AFT-NRCS Soil Health Economic and Environmental Case Studies, which provide calculated estimates of the
  - costs,
  - benefits, and
  - return on investment (ROI) experienced by "soil health successful farmers," and
  - estimates of water quality and
  - climate benefits
- Discuss ways these materials can be used with landowners and producers to encourage soil health practice adoption





	1 – 1:15 pm	Objectives, Findings, Options for Use – Michelle Perez (15 min)
	1:15 – 1:25	Ohio Case Studies – Florence Swartz for Brian Brandt (10 min)
	1:25 – 1:35	New York Case Studies – Aaron Ristow (10 min)
	1:35 – 1:45	Illinois Predictive Assessment – Sarah Blount (10 min)
Agonda	1:45 – 1:55	Pennsylvania Case Study – Ben Wiercinski (10 min)
Agenda	1:55 – 2:05	Farmer Guest: Morgan Bond, B & R Farms, PA (10 min)
中國黨黨的同時代的	2:05 to 2:25	Q&A + Discussion (20 min)
	2:25 to 2:30	R-SHEC & P-SHEC Tool Kits – Michelle (5 min)
	2:30 to 2:40	Online Economic Tool Demo – Flo (10 min)

# **PROJECT BACKGROUND**



**American Farmland Trust** 

# Why quantify soil health outcomes?

- Scientific evidence exists that no-till or reduced tillage, cover crops, nutrient management, & conservation crop rotations improve soil health, reduce runoff, lower climate emissions, & sequester carbon
- Not enough information about economic benefits associated with better soil health
- Ag community (growers, landowners, ag retailers, bankers, corporations with sustainability goals, etc.) want to know the "bottom line"





# AFT's 2018 USDA Conservation Innovation Grant (CIG) Project Goals



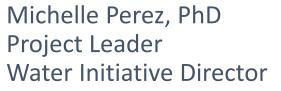
#### Drive adoption of soil health practices by:

- Estimating the net economic & environmental benefits associated with adoption of soil health practices by developing two new economic tools (R-SHEC & P-SHEC) & using available water quality & climate tools (NTT & COMET)
- ✓ Packaging results in 2-page compelling **case studies**
- Empowering fellow conservationists to produce their own <u>case</u> <u>studies</u> featuring local, "soil health successful" producers or <u>predictive assessments</u> featuring "soil health curious" producers
- ✓ Theory of change: The more local evidence there is, the "faster" we get more farmers to "yes" on more acres



### **Meet the AFT CIG Project Team**







Florence Swartz Project Economist Retired NRCS NY Economist



Sat Darshan Khalsa, PhD AFT Almond Consultant Assistant Project Scientist UC Davis



### Terrific economic case studies that preceded those by AFT



ECONOMIC CASE STUDY

#### Introduction

year cereal rye was flown on by helicopter in August. They were very happy with the results from this first attempt. However in the second Angel Rose Dairy is situated in the hills above New York. In just over two miles from the bank of the Susquehanna River to John Kemmeren's farm, the land gains 500 feet in elevation and continues its rise behind the farm house and barns. The farm's topograpi is perhaps John's single most influential farm management factor. The Kemmerens' 350 acres of cropland contains mostly Lordstown Mardin, and Volusia soils. The majority of the cropland has 3 to 15 percent slopes with some ranging to 25%. When John's father bought the farm in 1968 it was pretty obvious that keeping the ground covered at all times would be important for preventing the soil from simply washing away. They hoped that strip cropping would allow them to farm their steeper land, but decided not to try it after seeing their hav

seedings erode out during moderate rainfall As a result, in 1975 prior to development and availability of Glyphosate, the Kemmerens were among the first farmers in the area to start experimenting with no-till. They borrowe a no-till drill and tried seeding hay into sod using 2,4-D six months beforehand and Gramoxone just prior to the seeding with good results. Ten years later, they began no-tilling their corn using a borrowed planter and then ought their own no-till planter the following

While this change significantly reduced erosion on their steepest ground during the growing season, continued erosion problem after corn harvest prompted the Kernmerens after corn harvest prompted the Kernmerens to become early cover crop adopters, first trying it in 1980 through a cover crop seeding rogram offered by the Chenango Count oil and Water Con

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deer activity. Heavy deer activity on the field actually worked the ground. Even so, the feld vielded an "amazing amount of straw" the

2 NRCS-NY

2 pages each

Partial Budget Analysis

year nothing grew and they gave it up until 1986 when they decided to try disking in ry

eed after their corn silage harvest. Suc

to purchase a used no-till drill in 2007. They

decided to try it out on a field surrounded by

our years. After brush hogging the field, they

been farmed for three I

with this method con







Present Day

**Cropping Practices** 

years of hay consisting of

either alfaifa or a sudangrass

on hay after the second an

the spring when it's dry

such to allow it. As a resu

d cuttings and on their or

d clover mix. They spread



Utilizing cover crops provides many benefits to soil and water resources. However, some farmers av question the affordability of incorporating cover crops into their operations. Partial budgeting is a In a partial budget analysis the focus is on changes in the operation. To keep the analysis relevant to the operation, the focus of this assessment is on the on-farm cover crop costs and benefits. Additionally, only benefits that can be easily expressed in dollar terms are assessed. When assessing the economics of cover crops, time horizon matters. The short term (typically less than 10 years) assesses the immediate economic impact of adding cover crops. The long term assesses the continued long term utilization of cover crops which may lead to additional economics

Adding Cover Crops to a Corn-Soybean

USDA

A farmer raises 1,300 acres of soybeans and corn, and has been no-tilling for 40 years. He is adding winter cover crops into the rotation to reduce erosion and improve soil health. His ocal is to have all acres in winter cover crops each year. The farm is terraced with average slopes of 6 percent. Before adding cover crops even with no-fill and terraces, the farmer experienced an annual erosion rate of 5 tons per acre on this farm. The cover crops utilized are as follows **Cover Crop Species** Seeding Rate Cash Crop Following Cover Crop

Winter Cereal Rye 30 lb/acre Sovbeans and Corn When cover crops can be planted before October 1, an air seeder is used. For fields where the cover crops cannot be seeded until after October 1 a no-till drill is utilized to improve germination and establishment. Over the past few years, the farmer has tried different cover crops and seeding rates, He has found that Cereal Rye at the 30/blac rate is the most reliable for achieving a good stand and the most cost effective for meeting his goals.

Where cover crops are planted, the farmer has achieved excellent control of water hemp in the soybean crop. As a result, he has reduced herbicide use by 25 percent. In addition, he has experienced a sovbean vield increase of 10 percent. With cover crops, he saves five days of field work each spring because he no longer has to address erosion collection points and ephemeral

5 NRCS-MO 2 pages each Partial Budget Analysis

4 NACD-Datu 16 pages each Partial Budget Analysis

#### 3 EDF-K-Coe ISOM 4 pages each Farm Enterprise Analysis

Farm finance and

How stewardship generates value for

armers, lenders, insurers and landow

conservation







## Tailored our case studies after Flo's NRCS-NY case studies



#### ECONOMIC C

#### Introduction

USDA Department of Apriculture	Angel Rese	Dai	v Pa	artia	I Budgeting	An	lysi	S	rvation Service
ECONOMIC C	Increases in	Net Inc	ome		Decreases i	in Net Ind	come		losing houghts
Farmer Profile: John Kemn	Increase	in Income			Decreas	e in Incom	9		e Kemmerens' focus on soll aith and forage production
	ltem	Value	Acres <sup>1</sup>	Total	ltem	Value	Acres	Total	s paid off in many ways. In dition to realizing a 100%
Introduction	Yield Increase, Corn	\$61	100	\$6,100	None ic entified				urn on Investment by opting soil health practices,
Angel Rose Dairy is situated in the hills the town of Bainbridge in Chenango Co New York. In just over two miles from the	Total Inc. eased Income			\$6,100	Total Decreased Income			\$0	y have won multiple awards high quality forage and John s become a sought after
bank of the Susquehanna River to John Kemmeren's farm, the land gains 500 fe	Decreas	e in Cost			Increa	ise in Cost			eaker at various soll health ated events. In addition, John
elevation and continues its rise behind the farm house and barns. The farm's topolities to the farm's topolities and barns. The farm's topolities and the second se	ltem	Valu	Acres	Total	ltem	Valu	Acres	Total	s one of only three recipients be given the Responsible trient Management Award at
management factor. The Kemmerens' 3 acres of cropland contains mostly Lords	Nitrogen Reduction	\$23	100	\$2,300	Cover before Corn	\$95	100	\$9,500	National No-till Conference s past January. While all of
Mardin, and Volusia soils. The majority cropland has 3 to 15 percent slopes with ranging to 25%. When John's father bo	Planting Cost Savings,								s recognition is appreciated John and his family, their
the farm in 1968 it was pretty obvious th keeping the ground covered at all times	Corn	\$29	100	\$2,900	Cover before Hay	\$50	50	\$2,500	in goal has always been get as much from the land y farm as possible by
be important for preventing the soil from washing away. They hoped that strip or would allow them to farm their steeper la but decided not to try it after seeing their	Planting Cost Savings, Hay	\$74	50	\$3,700					Ing care of soil under their t. This focus has allowed im to increase their soil's iductivity while cutting costs,
seedings erode out during moderate rain As a result, in 1975 prior to developmen	Reduced Erosion, Corn &								iding to more sustainable ming both economically and
availability of Glyphosate, the Kemmere were among the first farmers in the area	Hay <sup>2</sup>	\$21	150	\$3,150					vironmentally.
start experimenting with no-till. They bo a no-till drill and tried seeding hay into s	Reduced Nurse Crop Cost,								
using 2,4-D six months beforehand and Gramoxone just prior to the seeding with results. Ten years later, they began no-	Нау	\$40	50	\$2,000					
their corn using a borrowed planter and bought their own no-till planter the follow	Total Decreased Cost			\$14,050	Total Increased Cost			\$12,000	
year. While this change significantly reduced	Total Increased Net Income			\$20,150	Total Decreased Net Incom	ne		\$12,000	Pushing Ve-Till
erosion on their steepest ground during growing season, continued erosion prob	Total Acres Farmed			350	Total Acres Farmed			350	
after corn harvest prompted the Kemme to become early cover crop adopters, fir trying it in 1980 through a cover crop se	Per Acre Increased Net Inco	me		\$58	Per Acre Decreed Net Inc	come		\$34	w York
program offered by the Chenango Coun Soil and Water Conservation District. TI			Tota	Net Ber	nefit = \$8,150				atural esources
0			Per A	cre Net	Benefit = \$24				onservation
USDA is an equal opportunity provider, en.,	лиува или написа. Стерину с корте стер иле са				USDA is an equal of the provider, employed	er and lender.	October	2016	nrcs.usda.gov/



# ECONOMIC METHODS



# To teach a partial budget analysis, Flo developed a calculator based on the NRCS Cover Crops Tool

#### Level III T-Chart

Name: Sandy Clayton		Resource Concerns/Benchmark Condition:
Location: Columbia Basin, O:	regon	600 acres of cropland producing 70 bushels wheat ar
Date: 2008		50 bushels barley per acre in a two year rotation.
		Conventional tillage, nutrient and pest management.
		Resource concerns include: Sheet & Rill Soil
		Erosion, Organic Matter Depletion, Compaction,
		Surface Water Contaminants, Plant Productivity, and Wildlife.
Conservation Treatment:		
Conservation Crop Rotation (W	inter Wheat/Canola/	Spring Barley)
Residue Management (Direct Se	ed/No-Till)	
Pest Management (Annual Gras	ses and Aphids)	
Nutrient Management (Fertilizer	Management)	
Positive Effe	ets	Negative Effects
Reduced Costs		Increased Costs
<ul> <li>Change in Crop Rotation =</li> </ul>	\$25/ac/yr	<ul> <li>No-Till Drill = \$25,000, amortized at 5 Yr. loan</li> </ul>
2-year Conventional Rotati		6% interest, 600 Acres = \$9.90/Ac/Yr.
Winter Wheat	\$100/ac/yr	(not included in crop budgets, amortization
Spring Barley	\$50/ac/yr	explained below)
	\$75/ac/yr	<ul> <li>Pest Management \$10.10/Ac/Yr.</li> </ul>
3-year No-Till Rotation		<ul> <li>Nutrient/Fertilizer Management = \$2/ac/yr</li> </ul>
Winter Wheat	\$130/ac/yr	
Canola	\$100/ac/yr	<u>Reduced Revenue</u> Possible lost grazing opportunities
Spring Barley	<u>\$70/</u> ac/yr	<ul> <li>Possible lost grazing opportunities</li> </ul>
B 16.07 17.10	\$100/ac/yr	
Decreased fertilizer applied 2		
20 Lbs/Ac * \$.75/Lb / 3 Yr		
Reduce six tillage passes over \$10/Pass * 6 Passes / 3 Yrs		1
Reduce fuel and labor	- \$20/aC/yi	1
(included in the reduced til	age passes)	
To an and Damage		
<ul> <li>Increased Revenue</li> <li>Wheat yield increase (no es</li> </ul>	timate quailable)	1
<ul> <li>Wheat yield increase (no es</li> <li>Financial Assistance Payme</li> </ul>		1
- Induction resistance Payme	a orone yr	
Other		
<ul> <li>Improved soil and water quality</li> </ul>		1
<ul> <li>Upland bird habitat improve</li> </ul>	ement	
Total Dollar Benefits = \$35/ac/	VT	Total Dollar Costs = \$22/ac/yr

#### **NRCS Cover Crops Decision Support Tool**

Developed by Lauren Cartwright, NRCS-MO & Bryon Kirwan, NRCS-IL

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A	B C D E H K N Q R	S		т		
	Version 3.1 Released 01/16/2018					
_	Cover Crop Economics - Short Term Analysis					
	The Short Term analysis assesses the immediate cost and benefits. After					
	completing of the short term analysis, an option is available to expand that					
_	information to a long term analysis.					
	Please refer to the "Instructions" worksheet for more detailed guidance on using					
	the tool and entering data.					
)	To get started with a new model, select the current rotation length and then select the "Start Model" button. Enter/edit information in the white boxes. To open an existing default scenario, select the "Defaults" button and follow the instructions provided.					
	Select the length of the current rotation (1-5):					
	Example: for continuous corn select 1 Year, corn/beans select 2 Years,					
2	corr/wheat/double crop beans select 2 Years, corr, beans, wheat select 3 Years, etc.					
3	Start Model					
5						
5						
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#### Soil Health | NRCS Missouri (usda.gov)

(Keywords: NRCS MO cover crop tool)



# **Partial Budget Analysis Overview**

- Partial budget analysis:
  - Estimates the economic effect (benefits and costs) of variables affected by a change in a farming operation
  - For this study, PBA compares costs & benefits "before" & "after" soil health practice implementation
  - Developed a 21-page Questionnaire (Word) & an 11-tab Economic Calculator (Excel) to conduct the PBA
  - Uses national datasets for crop, machinery, fertilizer, etc. prices rather than farmer-specific prices

- Primary effects evaluated:
  - 1. Machinery
  - 2. Fertilizer
  - 3. Pesticide
  - 4. Yield
  - 5. Erosion repair
  - 6. Learning costs
  - 7. Other



# Meet the Authors of the AFT Case Studies



Justin Bodell CA Stewardship Manager



Paul Lum

CA Project Manager



Aaron Ristow NY Ag Stewardship Program Manager



**Brian Brandt** Ag Innovations Director, OH



**Emily Bruner, PhD** Midwest Science Director, IL



### Newest additions to the AFT Case Studies and Predictive Assessment Team



Ellen Yeatman Reviewing Economist Water Resources Specialist



Ben Wiercinski Author of FRPP Case Studies & Predictive Assessments Ag Economist

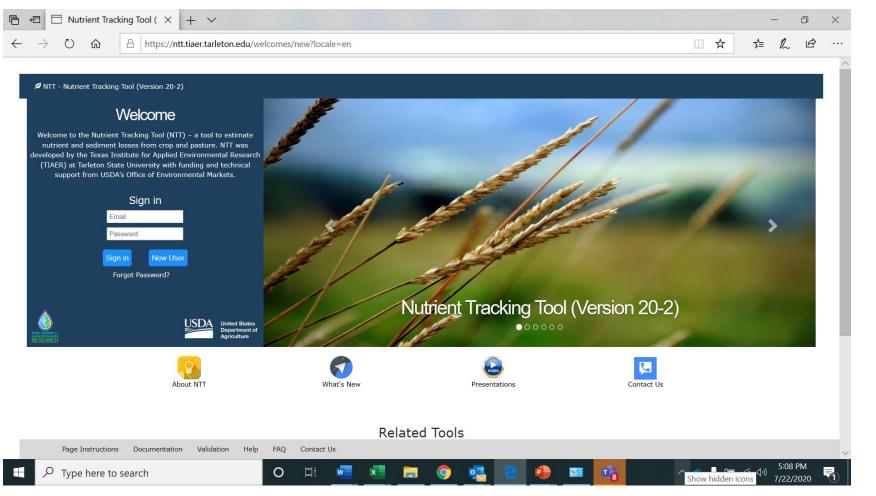


Sarah Blount Author of Illinois Predictive Assessment Midwest Conservation Technician



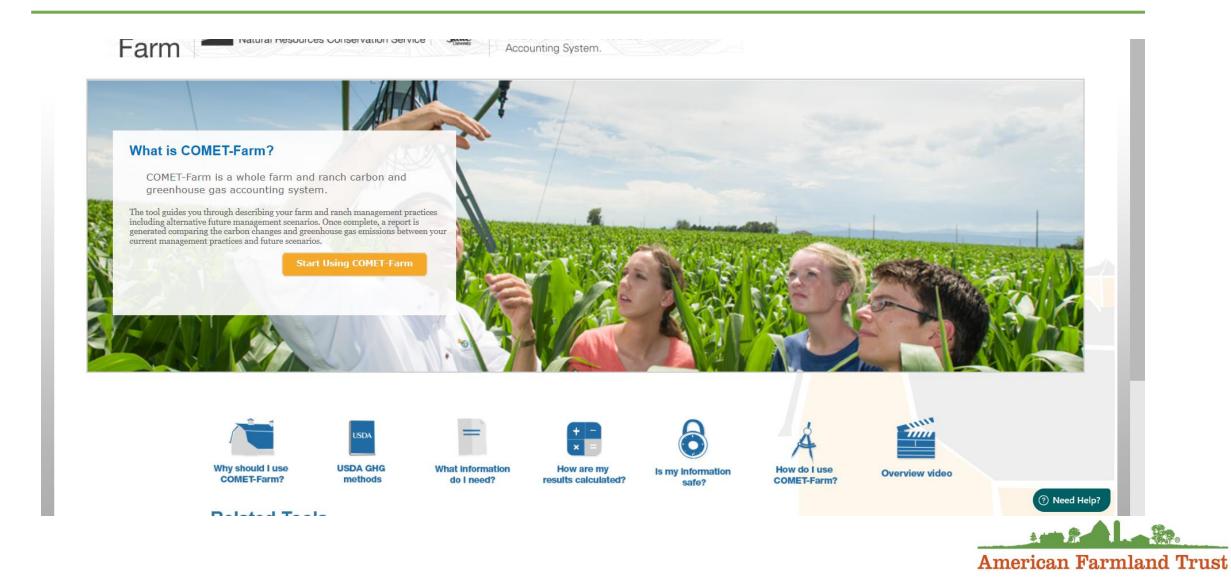
# METHODS FOR ENVIRONMENTAL ANALYSIS

# **Nutrient Tracking Tool – Water Quality**





## **COMET-Farm Tool – GHGs**



## Thank you to the External Reviewers of the Case Studies!

- NRCS Economists
  - Lynn Knight, Economist, East Region
  - Bryon Kirwan, Illinois State Economist
  - Lakeitha Ruffin, Oregon State Economist
  - **Richard Iovanna**, FPAC Economist
  - Sophia Glenn, FPAC Economist
  - Sarah Cline, FPAC Economist
- NRCS Soil Health Specialists
  - Zahangir Kabir, West Regional SH Specialist
  - James Hoorman, NE Regional SH Specialist
  - Candy Thomas, NRCS SH Specialist
  - Justin Morris, NRCS SH Specialist
  - Barry Fisher, NRCS SH Specialist

- University Economists
  - John Hanchar, Cornell Cooperative Extension
  - Gary Schnitkey, University of Illinois
  - Brent Sohngen, Ohio State University
- NTT Reviewer
  - Mindy Selman, USDA Office of Ecosystem Markets
- COMET-Farm Reviewers
  - Matthew Stermer, Mark Easter, & Haley Nagle, Colorado State University

Thank you to Bianca Moebius-Clune, NRCS Soil Health Division Director, for putting NRCS' logo on the case studies to increase their use by conservationists with farmers!





#### Soil Health Case Study

#### Eric Niemeyer, MadMax Farms, OH

#### Introduction

Eric Niemeyer's MadMax Farms lies in the middle of the Upper Scioto Watershed in Ohio. Eric is a first-generation farmer in his 15th farming season producing corn and soybeans. He has learned many lessons the hard way by trying different ideas and learning what practices work best on his 1,250acre operation.

His soils are mainly silt and clay loams. Although many of his

fields have flat or slightly rolling terrain, Eric saw the impact of erosion when gullies formed in low areas or where soil washed away in areas of concentrated water flow. More importantly, he recognized that using conventional tillage practices made it difficult to consistently grow a profitable crop.

Consequently, Eric spent time educating himself at workshops, field days, and conferences, and by reading about soil health practices. When Eric decided he needed to change how he farmed, he sought the help of Charlie Walker, his right-hand man and a longtime no-till innovator. Following Charlie's advice, Eric converted his cropland to notill and adopted variable rate fertilizer application technology (VRT) in 2011. To address surface or sub-surface drainage iissues, Eric repaired subsurface drainage tile, gullies, and eroded areas. He also began taking soil tests every two years instead of every four.

In 2014, he started planting cover crops on his entire farm. Eric prefers using multi-species mixes and customizes them based on whether he is planting corn or soybeans. In addition, he fine-tunes him on the properties based on what the melth outcomes he is try. It to achieve the include breaking up compaction lay us, increasing

ISD/

ited States Department of Agriculture tural Resources Conservation Service water infiltration, increasing organic matter, and improving nutrient availability. Eric became such a believer in cover crops that he started a cover crop consulting business in 2014. He also seeds cover crops for other farmers using his customized, high clearance seeder during the growing season. Eric continues educating himself about soil health practices for his farm and for his consulting businesses. Half **JULY 2019** 

Farm at a Glance COUNTY: Marion & Delaware Counties, OH

WATERSHED: Upper

Scioto Watershed

CROPS: Com & soybeans

FARM SIZE: 1,250 acres

SOILS: Silt loam & clay

loam soils, flat to

slightly rolling terrain with slopes from

OIL HEALTH PRACTICES

No-till, cover crops,

nutrient management

of Eric's significant learning costs have been attributed to his farm operation and included in this study.

#### Soil Health, Economic, Water Quality, and Climate Benefits

Combining cover cropping, no-till, and VRT has produced many benefits. Eric can see and *smell* the improvements in soil health, which he believes have led in part to increased yields. Since 2014, his per acre yields have gone from 165 to 195 bushels for corn and from 45 to 65 bushels for soybeans. He estimates at least half of these improvements are the result of his soil health management system and attributes the rest to good weather and better varieties.

Better soil health has also led to better nutrient cycling, improved weed management, and less disease and insect pressure. These changes, along with more precise nitrogen (N) applications allowed Eric to cut N for corn by over 5%. More importantly, he has been able to cut there neves (P) and potassium application of obto corn and soybeaned be result, he is saving almost \$18 per the each year on fertilizer. Better soil tenth has allowed Eric to reduce his soybean seeding rate, saving \$5 per acre. Similarly, he has nearly eliminated the need for residual herbicides

American Farmland Trust

NRCS agreed to co-brand the case studies!

USDA

**United States Department of Agriculture** 

**Natural Resources Conservation Service** 



# 9 AFT-NRCS SOIL HEALTH ECONOMIC & ENVIRONMENTAL CASE STUDIES



### **9 Soil Health Case Studies (front)**

2 CA almond Soil Health Case Study Ralf Sauter, Okuye Farms, CA

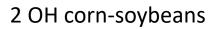
conservation memorant. Fourteen years ago, Baif took over the operations from his mother-in-leas Joan Okuye, when he and his wife moved their family from Germany to the Ean Joaquin Valley.	increased soil organic matter by transitioning from burning to ohipping pranings within the second alloyway. Finally, Balf credits part of the increase in yield to compost application, which	
Josn is the president of the East Merced Resource Cataorratics District, she pioneered the use of cover crops, compost, and micro-sprinkler	he bolieves improves microbial activity and water holding capacity.	
trigation at Okuyo Farma, as well as owl beam, hedgerows, and solar energy. Since taking over in 2005, Italf has grown their farm from 80 to 118	Soil Health, Economic, Water Quality, and Climate Benefits	
sorres and extended these efforts throughout the centum. Bail contin increased adoption of will health practizes to the impiration he pained form attanting process suchalogs. He immediately the dual apportunity to cut out and increase yield by implementing nurrient management, conservation rover, multilang, and rompast application.	In the kg years since Raif took over the occhards, he experimented a 100% increases in systel, which he satirilates to a combination of matrixed management and improved soil bookh from the use of occeptor as a surfarm toomore. Bull's aitrogen management plan, a requirement of the static tragend Lands Bugatory Program.	
Ralf has realized multiple financial benefits from soil builth, including higher yield and lower cost.	Includes an armud nitrogen budget. Half uses leaf sampling (slovel 85 per arm) to determine true mutrient status. He then estimates his compost refe and supplements with synthetic fertilizer through his lerigation fertigation system.	;
N. Sale	Balf applies compart at a train of 1 tons parame. Phaling compares in the two mers and disorganic matter to find null intervelves and provider matter to find null intervelves and provider half of this yield increase to compare tax. Itsi three benefits rame at a not. Delivered comparts outs RE per terms and an additional Rape from to apress Ad § tons par new, compart costs Raff RE(0) per new.	
	Fortigation facilitates delivery of the right fortiliser rate in the right location at the right time. Increased yield from fortigation as a nutrient management strategy more than offsets	

#### 2 IL corn-soybeans

Soil Health, Economic, Water Guality, and Climate Benefits

Soil Health Case Study

Larry, Adam, and Beth Thorndyke. Thorndyke Farms





	A Contraction	
Soil Health Case		
Jay Swede, Gary Swede I	Farm LLC, NY	Farm at
ntroduction the production of the production of orbupant on the production of the production are an end of the production of the production of the production of the production of the production of the production of the production of the production of the production of the production of the production of the production of the production of the production	A series of the	CBUNKTON Geo Country, N WATERANSIA State & Link Lakes Ban CBOPD Corre gasin carr carn, while regard and restal Link BOALS Class BOALS Class rolling hill BBOALS Class rolling hill Restate All rolling hill rolling hill rolling rolling hill rolling hill r
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It LOD arrays that the decay version. It LOD arrays that the likes of the decay version. It is a set of the decay of the likes of the decay of the decay of the decay of the decay of the decay of the decay of the performance of the decay o	Quality, and Climate Benefits Table, Javes were likely, sover regime, and marrier hamagement cells to do some of event on and our sillage to have user indexed tillige because the staffich is in for through source. It makes the mension group owns in the data year, it makes the mension group owns in the staffich of the staffich is in for through source. The advecting to farm neutral, addy means com- pared and the staffich is in the staffich of the staffich are staff own set. The staffich of the staffich of the staffich of the staffich of the balance shaff of these increases or advect Table precision where the staffich and the staff had the precision. The Bender staffichted these paramety by rif- ling there exercises the staffichted to the staff had the staffic the staffichted to the staff had the staffichted to the staffic the staffichted to the staff had the staffichted to the staffic the staffichted to the staff had the staff had the staffichted to the staffic the staffichted to the staff had the staffichted to the staffic the staffichted to the staff had the staffichted to the staffic the staffichted to the staffichted to the staffichted to the staffic the staffichted to the staffichted to the staffichted to the staffic the staffichted to the staffichted to the staffichted to the staffickt the staffichted to the staffichted to the staffichted to the staffickt the staffichted to the staffichted t	
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#### 3 NY diversified row crop systems





•	Soil Health Case	Study	FEBRUARY 2020
ю	Jim, Julie, and Josh Ifft, I		Farm at a Gland
eda,	Introduction		COUNTY, Livingston, IL
nguin	Jun 10B started farming in 1973 and surveysly farms with his wife, Jalls, and sun, Jada. The family gives core and asybeaus on 1,800 across in northeoutent Elizatio, lossing over J000 them. They use will health practices on all the acros, restud and waved.		MATERIALS, Varmilian Headbefort EBOPS: Corro & sophese PARM bitle: 1,000 acres complexed
v Baat Baat Level, K	Jan Jou alongs had an instruct in conservation and englops an adaptive management aggrounds. Jan watch of deversify his array-suppose metation as part of this aggrounds and hower he was on the right track when buildcovered down coups. He started by planting coveral year after his core horverst in 60 series in 2014, and now downs or on	IN	EditAL: 2011 town & offy chay town write out it to utgetily reflect the SOL MEALTH PRACTICE Cover cruzy & tuttle management
	REE across. Jan and Josh wave as planand with the traver crops, they started their own error crop asset douberhip providing content asset defiling services for sucrounding farmers. Jan croadite cover crops for helping them tay no-	N program to include a starter application at photog in addition to a subsequent side-dress application, thus ensuring the N is available when the plant needs it.	
	till curst. Althenigh the lifts transitioned to mo-till on their suphoan fields in the early 1000a, they	Soil Health, Economic, Water Quality, and Climate Benefits	
	restriction of with a vertical village passe much field and optimations that one can be into the source of the source much lines around first theory from a lines and $\frac{1}{2}$ . We this is again that is again the source of the source of the source of the source of neuron results. This much that the source of neuron much source results around the source of the source of the restriction of these barries of the source of the source of the model of the source of the source of the source of the source of the model of the source of the source of the source of the source restriction of the source of the source of the source of the model of the source of the source of the source of the source of the source of the source of the source of the source of the source of the source of the source of the source of the source of the prediction using correst mesoneous figures are not source of the source of the source of the source of the source	Pertulal Magning was used to disturb the ensurement of the second second second second range and matched management in the dB Farm. The study was ablend by only these inscrete and not vanishes affected by the adaption of these granities. The shale on applie two presents a anomary of these moments affects, resulting the second second by the second sec	
	The IIBs have also applied their solution approach to matrice management, having estimated to vertible rate technology (VRC) applications of phospheres (V) and patasains OQ in 2020. The URL haven't applied and patasains in the full for discuster, but they have meaning adapted their	The study zero is restricted to where Jim has photod covers the Jongier, thereby providing an ensurance picture of the and baselik prestrices he has reasonability integrated into his operation. Additionally, Minough Jorits use of covers has allowed has to each he no fill over, we did not	alt.
	USDA state from Department of Spinstern	American Parmiand Trust	and the

Soil Health Case	Study	FEBRUARY 2020
Dan Lane, Homewood Fa		Farm at a Glance
Introduction Dan Lande Homawood Femus hos in the Upper Solos watershed in central Ohlo. Dan and his wife, Jennife, have been ferming for a jowere end own 606 of the 3,830 server of own and supberen thay gow. The testion in fat to Singlivelling with all and der lower nois. Den streted ferming with his finder. Jihn prible and/tack own 2000.	the spring between the rows of cover crope in a concretent seedhed.	COUNTY: Outseasu County, Ohio WATHERSHID: Upper Sease Prev Watershad CROPS: Corr & soyteens FARM SEE: 1/500 scree
initia, sing, in provide the second s	strip-till sutrisent management, and ovver copp on the Lass Pears. The study awailumized to only those income and cost warables affected by the adoption of these predictors. The table on page 2 gressifier a surmary of these scores end effects revealing that, due to the three not betch proting. Takin use income increased by 456 per survey eyes or by \$302,526 kmmally on the	10115-182 a subjectores kolis on rist to subjects rolling fields kojt, with critical kojt, with restrictions kojt, w
To eliminate rand field predict his tota, fino loss array sitting and bonding thy firstituze on all his corm in 60% by mjostrang bonding with serue-01 allows bonding with serue-01 allows Duo to supply deritized where and toking trivanelial Pie allow Duots multi deritize Arbeiter bonding with the serue of the serue bonding with the serue of the serue bonding with the serue of the serue bonding with the serue of the serue deficient way to marcian fortility and perimidulity.	a fill o accessible reading terms at helpering as the feature on interventional terms and the feature on intervention of the end form units of the helpering terms and form units of the local term self-and the prestare hard one areas by store per same per just the store intervention of the term specific terms and the one set of the per same per just the store intervention of the terms person error the held, in the store of the person of the terms of the set of the same store the same set of the same set of the terms of the same set of the same set of the terms of the same set of the same set of the terms of the same set of the same set of the terms of the terms of the terms of the terms of the terms of the terms of the terms of the terms of the terms of the terms of the terms of the terms of terms of the terms of the terms of terms o	(Lap
In 2014, Due to the attract to the automatical time and accoss shade of a cobsena by using a non-pass operation with this dropsed weak time in the probability of the planting cover corresponds the based constraints or each pre-send interproteining at weak weak with an animation of based on the send of the analysis of the send the send of the analysis of the send of the send of the analysis of based on the send of the send of the send of the analysis of based on the send of the send of the send of the send of the send of the send of the send of the	in nucleisery and labor costs program to conversion (Hagas Strep thi disp provides an optimal extrement for com beause also obligations upsoors and the seable doffers constitutes teed depth with cough untratent to grow quickly and early. The cost saving iffram article processing and early, the cost saving iffram article processing and early interesting of the grow particle and early the theorem in planter size, which also halos achieves earlier glowing.	
Dan has achieved a synergy between strip-tilling and covar cropping because he can plant corn in	Dam believes that multiple handed nutrient applications (during the strip-till pass in the	and the second second
Solution Department of Agelections Restored Research Concernibles Research	American Farmland Trust	

<text><text><text><text><text><text><text><text><text><text></text></text></text></text></text></text></text></text></text></text>	oil Health Case		FEBRUARY 2
For both the fourth of the grade of of the gr	odaction Manufact Melling has and has trades the second se	et discussion in dealers, there expected and the set of lange deal. But has been the set of the set of the set of the deal. But has been the set of the set of the set of the deal. But has been the set of th	Control at a Gli Control Linkingson Markenson Control Linkingson Control Linkingson Contr
Are and Add Preserve		Proce to dough the Meessleeve way participal takes mustances how parks and hongwarks on these douks a glastrian. John is happy with its comment and seven, will applychistics of N as 204 ensets of cores and shearts to complement the seven of the presents. Proceedings, John Jappe to have no enset of the present seven the seven of the presents. Proceedings of the present cover crosp max. Solid Health, Economic, Water Quality, and Climited Benefits Partial Independs was used to maken the magnata baseling accounts of dolograps on 60.	



# 9 Soil Health Case Studies (back)

#### 2 CA almond

the cost of the micro-irrigation system the added \$10 cost per acre of switchis, potassium forms from granular to liquis	I be I sci (N	nefita en ro fielda TT) wa	perienced USEAN N 1 used, whi	r quality and climate on one of Ball's 11- utrient 'Fracking Tool ch frund that Ball's	of his orchard at health practices.		ting the	in and
Half allows native regetation to grow as conservation cover over winter and				compost application	Closing The			
moves the overhand floor in spring and summer. The over also provides habits for beneficial inserts, llines adopting th practices, Raff has reduced initiation over from floar times to one time overy five years, swring him 430 per acre per pear.	d and is To gra pro lati	baced ni mr 11-ac ol estim actices r al green rresponse	tropen loss re field, UI ates that P veulted in fourse gas	na by pHS. On the IDA's COMET-Form all's soil health a 10% reduction in emissions, which (%), of a car off	Ball's experience years has center health practices mother in law, a adoption and ex- practices inclusi- conservation or	end on imple in collabor Jean Okuye paraion of ing nutries	montin stion w Ralf's- toll host manue	g soil ith his early ith percent
Half also hires a breach strendents to cologo and multich the oriented prantings. This practice replaced burning that, required tracteristic to push paramings in the end of U orchand row where they waves pilled and burned outsing RE para series. The breach shurdednet costs RE 20,00 per series waves pul- bel and burned outsing RE para series awards phi- dity per across. RED follower their multith has held to increment out equation multith and indicate the increment out equation multitu- genetic multitud activity, and improves under holding equavity.		ittuato U trient re debing, asyo farr variable teo ecil 1 menta a isrta. Ita	se bonefita nanagemen and compo n. The stud or affected i wealth prac- naminary if improves	bytis war used to and costs of adopting costs of adopting conservation rows, at application for the by limited its flows or the adoption of times. The table below of these nonnanici this bottom lime by applicance all 100	and use of comp- cont and higher ; that these point and noils bealthing greandwater for Though many in more expensive conventional pro- lifermise in yield outweigh them in	stat resultse yield. He fir iron bases to ier, all the w en nitrate p sil houlth pr to impleme actices, Bal I and other	In red ruly hill alle hill hille pro offurtion acticos of than for for	ared lieves trees stecting are and the
Increases in Net 1		f Soil	Health	Practices on Ok	uye Farms (2			
Increase in Incor	ALL ALLAS	-	22180		Decrease is incom			1.11
Yeld Ingenta due la Nutrie II Management	5405.40	10	\$31,876	Newlandfad		PE1 4:25	ACHES	1
Vald Impacts due to Compare Application	3455.40	16	\$52,626			-	-	-
Total increased income		-	\$101.642	Total Decreased Income				
Decrease in Car			10000	particular in the second second	Increase in Cash			
158	PER #C84		10144	10		PER ACRE		
Particida Savings dua to Consensation Cover	\$33.00	195	\$1,480	Natricel Management Liker		\$2.8	16	\$24
Servings due to Switch Prore Burning to Malohing	\$48.00	116	\$5,564	Conservation Cover Learning		\$1.9	16	
				Multing Learning Activitie		\$2.9	16	114
				Composit Application Learn	ing Activities	11.1	14	\$34
				Lost Earsying		\$1.43	16	\$43 \$76.33
				Composit Application Cost Annualpart Cost of Inigation	E-Main .	\$130.00	14	\$5.00
				Increased Nutriani Cost du	a to Multimer Mat	\$40.00	- 14	HAN
Total Decreased Cost			\$5.048	Total Increased Cost	a a constant rept	1 20000		\$10.64
		_	\$34,700	Array Long Descent Sta	· Traperty			100.54
		-	14	Total Actor in this Table A.				
Annual funal Increased Net Income Tutue Acres in this Study Area			200.0	Annual Par Anna Chargement	Net Income			1.1
			Te. South	Distances in the second	Nel Istatu			
Annual with the product of the first the band Annue (196) Starts Annu (1960) Annual A	Annua sa (sa), area mga yata in	a Charl	ny Dec Dear Ny Dec Derman I A John presid	Area heat processes in 5 d. Yes coloritation along the information along 1000cm. Broking loss etc. / Yes union broking loss etc./ Yes union broking loss etc./	Second as Mp, farm	a labia, perence	O ANTIA DI	Not really

#### 2 IL corn-soybeans

# .arry, Adam, and Bath Thorndyke, Thorndyke Farms, IL con dish- and the source of the sourc



#### Jim, Ju

health. The shredded wood deposited on the soil surface by mulching tree prunings eventually decomposes into organic matter, and air quality has improved from no longer huming the prunings. Ton's use of a networking has a net increased	to minimize the risk of front damage to dovicing in flower buds. The cover also adds N to the soil and suppresses were growth, saving 8000 per area annually on herbicide applications.	practices resulted in a 10% reduction in total pseuhouse gas emissions, which corresponds to taking 80 ears off the road. Closing Thoughts
cost of fits par non-pay year over the	Tom believes that his improved will health	Tomis visionary approach toward farming
cost of burning. Adding over mature and	results in botter watch healing capacity. Ho	and hand stowardship stomes from being a
grown status compast to the suil costs	has vedued irrightion applications, soring	firm believer in the value of having the far-
#15B per acto armsails. Eich in primary	fog per nero early hear in decrement water,	bar of the value of having the store of the
and micementrisats, compose increases	and pumping casts. The drip irritation	management, mulciting, composing,
microfestal activity, adds to peuzole of N	gottem combined with a sound irritation	and the more recently added practice of
per acto overy year, and diamizate a K	and fletilization strategy also reduues addi-	concernation, oncer have resulted in greater
purchases. Improved two health from	nitrate leaching, improving water quality.	atmost pixels and reduced costs. Despite
compositing also helped classificate fungicide	To estimate the water quality benefits	the extra farming holes and greater costs
applications during the last three years,	of adopting nutrient numagement,	for some of the practices, Tom is realizing
saving 8100 per acre per year.	conservation cover, mulching, and compost	overall financial gain and improved soil
For connectation cover, Tom faced	application on all 270 configures or chard	health Tean's trees are more productive,
a learning curve and still works to	acros. USEDAN Nutrient Tracking Tool	the soil is healthier, and has orchard is
understand how to manage the cover	was used and absord a minimal loss of	providing environmental benefits like
differently from baw floor. Turn allows	nutrients and sediment, and also confirmed	batter level air and worker quality and
resident vogetation to generativate and	Tomb superiors that reducing N had no	lower elimate emission. There's farming
devidop with resident and then moves in	adverse impact to yield. USENK COMET-	philosophy is simple: "Thick environ the soil
mid-Folenary prior to the almoral bloom	Farm Tool estimates the four soil health	and it will take care of the trees."

om and Dan Rogers, CA



#### lim, Julie, and Josh Ifft, Ifft Yorkshires, IL

Boy were the implementation in some fination between a spectra of the serveral fination of the serveral fination of the serveral fination. The spectra of th

Joins and Josh were dels to lower other to some the source of the so



#### 2 OH corn-soybeans

His fungicide costs have decreased as we reducing anyloan need trastment cost by 60 per arm. Eric helieves the use of hiological anardments have also contributed in his necess by enhancing soil health and matrient availability. The spends about by gar area for the hiological. Krich no-till spatem has leavend laker	To hat act was	softe su	the water					ed.
amendments have also contributed to his success by enhancing out headth and, matricet awardability. The presents about 200 per acros for the histogicals. Eric's to-till system has inwared labor.	-		perferred	r quality and climate on one of Eric's 110-	Closing Th	oughts		
and machinery openase by \$25 per scre. Cost savings from eliminating his tillage	58. Edi +4	n saved a ser crupp haced hit 94, and d, USDA 4 Krick 04% red institute	nd found 1 6, and vari- 8 N. P. and 88%, rosp Va COME acti Isealth faction in	utrient Tywking Totl Grit's use of so-till, able rate applications indicate the source of others, On the same of the source of the same of the s	Eric's motivation practices has be alive again." He of understandin meeded to be mu Eric lower fine - to achieve dealer field, twenking i voiver emp tors "plant green." a	een to "mak alise enjeps og matogen conntful. Fi tutling core nd concorts the planter tination to	in denial i the chi- nenit rou- or course on for ex- antup, 5 marcenni	anil alleng ances pis, rectpo scry insing fully
equipresent allowed Eric to upgrade and increase the size of his planter. This led to more timely planting and helped Eric increase his farming operation from 500 acres in 2011 to L2ED screen today. Rechared no-till expenses are offset	to e ado roti Far	utimate pting to e feetilie tots. The	the honed o All, cove or applica- otady lim	lpris was used its and costs of r crops, and variable tions on Matthas dust its forces to the adoption of these	"plant green," a chemilatries and negative impact health, Eric also "tooer crops an holding the soil three soil health	i other inpu ts on cover o milishes the like minut in phere," a	nte to les crops a le flact t le work sul he c	norm nd ave that were readily
by increased costs for one additional feetilizer pass and cover crop planting and termination costs. Nevertheless,		intitiary	of these a	The table presents commic effects. itom line by \$38 per	able to reliably marginal acits a always guarante	shere profil		
Economic Effec		Soil H	lealth P	Practices on Mad				
Increase in Fact State		_			Decrement in Met			
	158 ACRE.	+(10)	1154		Concession of Second	112 401	+(80)	
Taild Impact Due to Sol Health Practical	\$65.00.	1,350	\$46,250	Non-Lineddad				_
Total Increased Income			\$86,250	Total Decreased Incohe				
Decrease In Cost					INCOME IN CO.		-	
198	1014(101	#(185)	1114			218 4(01	A(81)	
Pps Nation Serings due to Sel Yealth Practices	\$7.9	UNIO	\$7,00	The Application C	at .	113 ACRE \$1.00	UND	\$1
Figs Nutrient Seeings due to Sol Health Practices Reduced Seeing Rele for Reykern				Period Versitie Rate Application C Increased Ref Sector Terry	int : Two Yaless	218 4(01		\$1. \$11.
Pps Nation Serings due to Sel Yealth Practices	\$7.9 \$1.00	UN0 625	\$7,000 \$1,000	Terration Flats Application C Terratement Terl Terring Force Terratement Terl Terring Force	int Two Yant arting Activitian	11000 ACRE	1,750	\$1. \$12. \$1.
1998 Nutrient Tenings skarts Sof Health Practices Rackward Seeling Rein for Soylwarn Publishic Seeings due to Soil Health Prestices	\$7.9 \$1.00 \$8.75	US6 675 US6	\$2,00 \$1,05 \$21,60	Period Versitie Rate Application C Increased Ref Sector Terry	int Two Years arring Activities Has	11.00 11.00 10.00 10.00	1,500 1,2500 1,550	11 112 11 11
000 Norwell Series da to Sel Ivadh Pactose Sekead Sading Ries to Soyteens Pactodo Soviega das to Sol Ivadh Pactose 109, Reductor in Toalest Sopteen Seet	17.5 E.00 18.75 36.00	US0 625 US0 625	\$2,68 \$1,25 \$21,68 \$1,50	THE Western Rate Application C Increased Rel Technology Mg Lo Court Crags Lawrence Arts Rations Management Law Using Released on Lawrence Using Released on Lawrence	lat 1960 Yunti anslog Activitian faat ing Activitian	10.00 10.00 10.00 10.00	USD USD USD USD	11 11 11 11
109 Nation Taking data to Sal Yuath Postsan Daharat Danitra Disk to Saytam Pathoda Saving data to Sal Patho Portone 10% Relactor in Taking Salari Santa Daharat Markey Zash Data to Salarah Hage	10.00 10.75 10.75 10.75 10.75	US6 625 US6 625 US6	\$7,000 \$1,000 \$71,600 \$1,700 \$44,377	1984 Versite Res Application C Increases fiel Daring Geory Bentle and Thing-Matic Court Court Court Learning Acto National Management Lear Oring Biological of Learning United Relations Courts Increases Mathematication	lat 1960 Yunti anslog Activitian faat ing Activitian	113 8(8) 1130 1100 1100 117 11.0 11.0 1500		11. 11. 11. 11. 11. 11. 11.
109 Nation Taking data to Sal Yuath Postsan Daharat Danitra Disk to Saytam Pathoda Saving data to Sal Patho Portone 10% Relactor in Taking Salari Santa Daharat Markey Zash Data to Salarah Hage	10.00 10.75 10.75 10.75 10.75	US6 625 US6 625 US6	17.00 51.25 52.00 51.70 54.27 11.70	File Venete Res Application Innerest Rel Terring Terry Reside and Tings Mg. In Concer Craps Learning Arts Mathem Merceptrent Learn Uning Biological of Factors Uning Biological of Factors Uning Biological	lat 1960 Yunti anslog Activitian faat ing Activitian	11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00	USE USE USE USE USE	10 10 10 10 10 10 10 10
109 Nation Taking data to Sal Yuath Postsan Daharat Danitra Disk to Saytam Pathoda Saving data to Sal Patho Portone 10% Relactor in Taking Salari Santa Daharat Markey Zash Data to Salarah Hage	10.00 10.75 10.75 10.75 10.75	US6 625 US6 625 US6	\$7,000 \$1,000 \$71,600 \$1,700 \$44,377	1984 Versite Res Application C Increases fiel Daring Geory Bentle and Thing-Matic Court Court Court Learning Acto National Management Lear Oring Biological of Learning United Relations Courts Increases Mathematication	lat 1960 Yunti anslog Activitian faat ing Activitian	144 scar (120) 1000 110 110 120 120 120 120 120 120 12	Use Use Use Use Use Use Use	11. 11. 11. 11. 11. 11. 11. 10.
The Server Line of a local fraction Provided Reduced Desirg a Ben for Institute Reduced Desirg a Ben for Institute Provided UNK Reduction in Transits Singlework Tool Theorem Strategy of the Statistical Theory Theory Theory Control and Statistical Theory Theory Theory Server desires of Theory Neural Institute Strategy Statistical Statistics Stat	10.00 10.75 10.75 10.75 10.75	US6 625 US6 625 US6	17.00 51.25 52.00 51.70 54.27 11.70	1990 Weinstein Flate Application C Immeasured Reif Testing Energy Benitike and Theory Mar. In Constr. Charge Learning Arthon Buildness Management Lear Ching Biological on Flatene Ummenned Machinery Const. Machiner Management Constr. Charge Const.	net Two Yunti arning Activition tion orig Activition two to Change in	144 scar (120) 1000 110 110 120 120 120 120 120 120 12	Use Use Use Use Use Use Use	11 11 11 11 11 11 11 10 10 10 10 10 10 1
The second secon	10.00 10.75 10.75 10.75 10.75	US6 625 US6 625 US6	17.00 51.05 57.00 54.07 1.050 10.00	Per Versitie Tate Application Increase fiel Tatility Exerci- Common Control of Tatility Relation Management Law Using Relations in Farms Water Management Haltwirk Management Common Common Water Increased Cost	net Two Yunti arning Activition tion orig Activition two to Change in	144 scar (120) 1000 110 110 120 120 120 120 120 120 12	Use Use Use Use Use Use Use	11. 11. 11. 11. 11. 11. 11. 10. 10.

full, with the planting pass, and then with a Y-drop-sidedness nitrogen application to the growing croup result in a more efficient use of matzients. As Dan's corn yields have increased, information from soil torting and matzient management	Darie soil health management system has come with learning costs and challenges. He estimates he spends two wesks is your reading publications from soil testing lake and private aground costs distants. His bigaset challongs us patimize reverything	by 35.84, and \$9% respectively. On the same field, USDA's COMET-Farm Tool estimates that his sail health practices resulted in a \$5% reduction in total prombuse gas emissions, which corresponds to taking 7.55 eres off the rec
planning led him to apply more P, K, and	done. Dan prefers to make his strips in the	
micronutrients, raising fortilizer costs by RIP per acre annually.	fall but also has to finish harvesting and planting cover crops, Furthermore, Dan's	Closing Thoughts
The 400 across of cover crops planted every year bifuts corn cost Dan fill per-acro- per-year in used and planting costs. By skowly integrating cover cores at a pace he can hundle, Dan believes he is protecting and building corasie matter in this work.	soutch from coreal rys to a barloy and hairy with mixture requires use of his twin rever planter, which takes more time and must be done-satisfier in the fall to ensure establishment. To estimate the water quality and	Dam is very focused on his bottom line a feels be have nerved in on a suite-of-out health practices that head or designed his-enops started right and early in the speing wh providing efficient fooding of nutricels thereughout the growing session. At the
leading to better infiltration and more	climate benefits experienced on	same time, reduced tillage practices an internation of cover crops have protected
moisture referition. Though Dan strip- tills and hands all his acres, he only plants	one of Dan's 140-acre fields, USEA's Nutrient Tracking Tool was used and	the soil, roduced the washruts, and
ture state eacher all me acros, se only panner cover crops on acros he owns, fearing loss of his investments to the high development pressure in his county.	found that Dark use of strip till, cover crops, and banding of Settliners reduced N. F. and sediment losses	improved inflituation and soil moisture the crop, all while generating increased roturns on his farm.



#### 3 NY diversified row crop systems

steve Gould, HaR-Go Farms, NY

								1122.1	
increased water infiltration, and eaving in fiel, labor, and machinery maintenar When combined with roduced tillage fi	onformers (th ag cons	s and field days and ultants.	improved his bottom line by \$55 per acre and by \$61,257 on the 1,000 acres in this study by adopting the soil health practices.						
his hay crop, Jay's savings severage shout To estimat \$23 year acro. However, he mente about 10 benefits en				er quality and climate on one of Jup's 20-			and be	a contrata	
house each year entiting up his ours planters may be and year like our in the provision energy. The planter is the provision of the planter is the planter i			end found t	utrient Tracking Tool hat Jay's use of strip- notriont management	Closing Thoughts The arcent well year, the best cores was where the cover comparison," Jay seps. While still learning, Jay finds that he has the strifted with the oof baseling practices have adopted and is easing great results from relatively minor changes to his reporting. "The second year we did strip- lite even through the cores was one W "sall."				
			P, and and	intriont management imonit ineess by 40, refy. On the same					
			AS COMES will health	Parm Tool estimatos practicos resulted in					
				iotal groenthouse gas. reseponds to taking					
purchases of phosphorus and potassius Keeping the soil covered and minimizi	n n	ertial bod	tpoting and	lytiz was used to and costs of adopting	we had roots goin sage his ground it	more "we	riable,"	and	
tillage has also reduced evenion by near two tons per acre. The value of the nutricents in the soil second is over \$2 per	1	s-till and stricet in	strip-till, o	over crops, and t for the Swede Farm,	he base charged bastler infiltration and decreased rateoff and receives in his fields following heavy mins. He also believes he has improved his bottom line by reducing his operating routs, tightening up his				
acro (NBCS, 2009).	1	he study fected by	timited its the adopt	focus to variables ion of these soil					
Jup esthamous his knowledge of soll heat practices by specifing about 16 hours a				table below promets conomic offsets, Jay	management of a higher yields.	anagement of nutrients, and producing duer yields.			
Economic Effects		l Healt	th Pract				0		
International States in March In Microsome IN Decor	-			-	Contrasters in Mart In				
100	HIR ACR		10561	(1)	and the second	FEB ACRE	ACRES	TITAL	
Yant Import Due to Sul Hueth Precision Total Increased Income	10.8	600	\$43,968 \$43,968	Nona Identified Total Decreased Income				10	
Destreme in Car	168.4026	40401	10164	10	Womanie In Cost	FEB ACRE	+(91)	TUTAL	
		1300	18,252	Cost of Satting og Planter t				14.12	
Fight cold Machinery Cost due to Reduced Yolege					o Harda Patitika	\$0.72	000		
Reduced Machines Cost due to Reduced Vilege Nutrient Savings due to Nutrient Hingmon.	\$21.43	800	\$24,780	Come Grap Canto	u Handu Bolika	\$0.72	6000 45/0		
Reduced Nachines Cost due to Reduced Vilage Subtext Savings due to National Wegnet, When of December (Lenne due to Sol Health	\$11.4 \$40.0 \$2.0	800		Come Grap Canto		\$52.00	450		
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# **OVERARCHING FINDINGS**

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### Yield & Income Benefits of Soil Health Practices Across Seven "Soil Health Successful" Row Crop Farms

#### • Improved Yield:

- > 2 farms reported no yield change
- > 5 reported yield increases
- Range: 2% to 22% for at least one crop grown

### • Annual Change in Net Income:

- > 7 farms reported increases in income
- » Range: \$11 to \$56/ac/yr

#### • Return on Investment:

- > 7 farms reported positive ROI
- Range was 18% to 343%

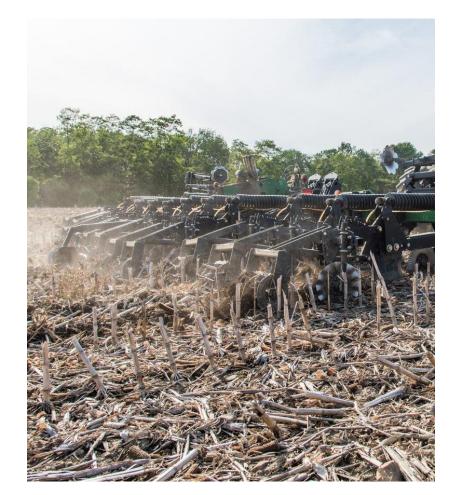




### Input Benefits & Costs of Soil Health Practices Across Seven Row Crop Farms

#### • Changes to Fertilizer Costs:

- > 1 farm increased costs
- > 4 farms reduced costs
- > 2 farms saw no change in costs
- > Range in savings: \$18 to \$66/ac/yr
- Changes to Machinery, Fuel, and Labor Costs due to Change in Tillage:
  - > 1 farm reported no change
  - > 6 farms reduced costs
  - Range: \$14 to \$72/ac/yr





### Input Benefits & Costs of Soil Health Practices Across Seven Row Crop Farms

- Pesticide Usage: (Herbicide, Insecticide, and Fungicide)
  - ➤ 3 farms reported no change
  - ➤ 4 reported changes
    - ➤ 2 farms increased; Range: \$5 to \$11/ac/yr
    - 2 farms decreased; Range: \$15 to \$19/ac/yr
- Learning Costs:

Ranged from \$415 to \$12,940/yr or
 44 cents to \$10.35/ac/yr





### Environmental Benefits of Soil Health Practices Across All Farms

#### • Water Quality Improvement:

All 7 row crop farmers observed reduced soil and water runoff

On selected fields for 7 row crop farms plus one almond grower, NTT estimated:

- Average reduction in N losses was 61% (range was 23 to 72%)
- Average reduction in P losses was 73% (range was 33 to 92%)
- Average reduction in sediment losses was 81% (range was 37 to 99%)
- Climate Improvement:

On selected fields of 7 row crop farmers and both almond growers, COMET-Farm estimated total GHG emissions were reduced an average of 158% (range was 16 to 560%)



# WAYS TO USE THE CASE STUDIES WITH YOUR FRPP LANDOWNERS & FARMERS

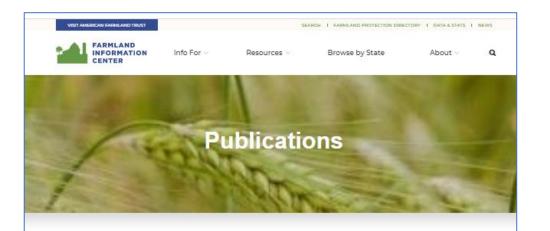
# **Options for Conversations & Handouts**

- Reach out & establish a working relationship with conservation professionals to:
  - 1. Share the case studies & materials
  - 2. Introduce your landowners/farmers to for assistance on the next step in their SH journey
- Print Case Studies & use as Handouts
- Print the 4 Slides with Summary Results for 7 Row Crop Farmers (IL, OH, NY) as a Handout
- Print the "Stories via Multiple Slides" for 2 OH, 3 NY, and 1 PA case studies (and 1 IL predictive assessment)
- Print the 1 Individual Slides for 2 OH, 3 NY, and 1 PA case studies (and 1 IL predictive assessment)





# **ACCESSING THE CASE STUDIES**



#### **Back to Publications**

#### **Soil Health Case Studies**

Nine compelling and easy-to-read two-page soil health economic case studies were developed by American Farmland Trust (AFT) through a 2018 USDA Natural Resources Conservation Service (NRCS) Conservation Innovation Crant (CIC). AFT's project is called, "Accelerating Soil Health Adoption by Quantifying Economic and Environmental Outcomes & Overcoming Barriers on Rented Lands." The case studies feature almond farmers in California, corn-soybean farmers in Illinois and Ohio, and diversified crop farmers in New York.

#### DOWNLOADABLE DOCUMENTS

California, Okuye Farms - Soil Health Case Study 0.55 Mb California, Rogers Farm - Soil Health Case Study 0.5 Mb Illinois, Ifft Yorkshires Farms - Soil Health Case Study 0.32 Mb Illinois, Thorndyke Farms - Soil Health Case Study 0.42 Mb New York, HaR-Go Farms - Soil Health Case Study 1.05 Mb New York, Macauley Farms - Soil Health Case Study 0.44 Mb New York, Swede Farm LLC - Soil Health Case Study 0.52 Mb Ohio, Homewood Farms - Soil Health Case Study 0.52 Mb Ohio, MadMax Farms - Soil Health Case Study 0.57 Mb







# Download the case studies from AFT's site

#### https://farmlandinfo.org/publications/ soil-health-case-studies/

Keyword search: "AFT soil health case studies" "AFT economic case studies"



### **Download the case studies from 2 NRCS sites**

NRCS / Home / Soils / Soil Health / Case Studies: Economic Benefits of Applying Soil Health Practices

USDA	Natural Resources	Conservation Service About NRCS   Carsers   National Centers   State Websites					
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		Case Studies: Economic Benefits of Applying Soil Health Practices					
Soils Soil He	ealth	Introduction With a health management, producers can increase profits and reduce costs and risk all while conserving our anison's resources for the benefit of all. However, the extent of these economic benefits has not been constanting quantified – a major constraint to soil health management adoption identified as a priority by NRCS and many of a costomers.					
		We hope that farmers who have been considering adding soil health practices to their operation will use these case studies to make better budiess decisions as they invest in healthy soils, and to start a dalog unb use these case studies to help answer customers' questions about the costs and benefits of adopting soil health practices.					
		Background					
		Funded by an NRCS Concension Innovation Grant (CIGI) availed in D104, American Familiand Thrus (APT) and NRCS have started to indexes a series of D1 Heaht Economics case tandeds. UDA and NRCS have invested in the people and tools that provide these quantitative assessments. AFT cullides this infrastructure to show the economic banefits across a broad sampling of familing operations and unived doelship with NRCS Economiss & Soil Heaht Specialists to review these case studies. In addition to the funding for the project. USDA and NRCS resources uneit funding leveraged.					
		Florence Swartz is AFT's Project Economist and served as the NRCS New York State Economist, where she developed two well-received soil health economic case studies that have since been used as the template for the AFT project.					
		USDA's Nutrient Tracking Tool $_{12}^{\rm o}$ was utilized to determine water quality benefits of the adopted soil health practices.					
		NRCS' COMET-Farm tool $_{\rm LF}$ was used to determine the greenhouse gas emissions reductions from the soil health practices.					
		Starse Gould Mark Work Network Hays, com grain, com loging, styphan; proj       Jim, Julia and Jash IFR Low Sockets					

https://www.nrcs.usda.gov/wps/por tal/nrcs/detail/national/soils/health /?cid=NRCSEPRD1470394; NRCS / Home / Technical Resources / Economics / Data & Analysis / Economic Case Studies

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Conservation Pract	ce Standards			e, and reaching out to new agricultural producers. These experiences provide a practical							
Ecological Sciences	5	source	of information	that shows how a prescribed treatment can work.							
Natural Resources	Assessment	Case s	tudies or "Prod	lucer Experiences" are actual stories developed to present social, economic and							
Data, Maps & Analy	sis			nation on the conservation effects of implementing NRCS conservation practices. Typically,							
Tools & Application	s			will make observations of conservation treatments applied by one or more land user(s) ar ase study information may also be available from conservation field trials, Conservation							
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State Resources				that case studies should be stored in the Field Office Technical Guide (FOTG), Section V,							
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Environmental Mari		<ul> <li>NEW ECONOMICS TECHNICAL NOTE 200-ECN-4: Developing Conservation Case Studies for Decision-making.</li> <li>Additional training is available: Conservation Webinar. Using Case Studies to Facilitate Farmer Conservation</li> </ul>									
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https://www.nrcs.usda.gov/wps/portal/nrc s/detail/national/technical/econ/data/?cid= nrcseprd1298423.

### Keyword search: "NRCS economic case studies"



# ACCESSING THE RETROSPECTIVE SOIL HEALTH ECONOMIC TOOL KIT TO DEVELOP YOUR OWN CASE STUDIES

# Getting into the Retrospective Tool Kit

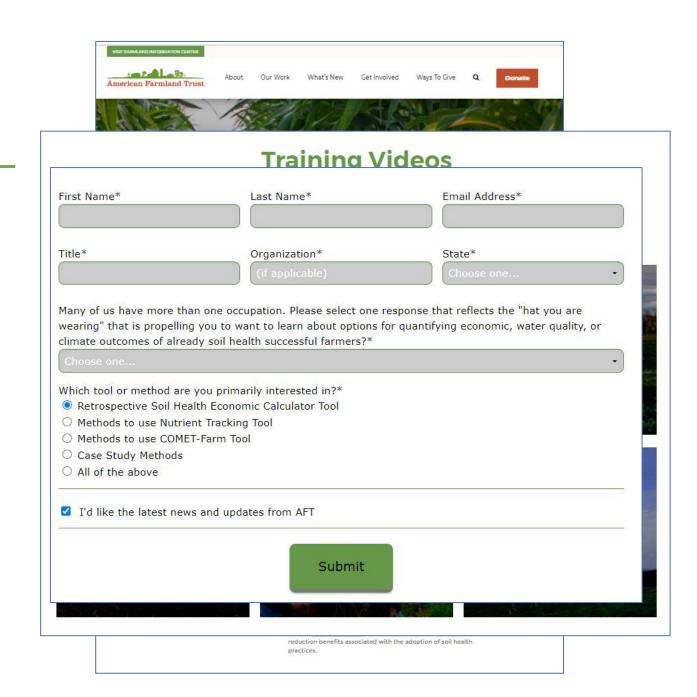
(just updated July 13, 2021!)

• For background, start here:

https://farmland.org/ soil-health-case-studies-methods/

- Watch training videos from 2020 SWCS
   workshop
- To gain access, fill out form here: <u>https://farmland.salsalabs.org/</u>
   <u>sh casestudies methods/index.html</u>

Keyword search: *"AFT soil health tool kit"* 



# **Access gained!**



#### Thank you for completing

Here is a link to the OneDrive folder where you can download any of the providing to assist others in interviewing farmers to quantify economic, associated with their already adopted soil health practices. You will also OneDrive folder with "Access Granted" subject line. Download all the To you do not have to re-submit the "Gain Access" form.

If you have questions about these resources, please contact AFT's Soil and Water Initiative Director, Dr. Michelle Perez at mperez@farmland.or with the R-SHEC Tool, please contact Ellen Yeatman, AFT's Water Resou Economist, at eyeatman@farmland.org.

AFT would appreciate an appropriate attribution should you use any of you use the methods or develop a case study! Thank you!

	Access Granted: Link AFT Soil Health Tool Kit	<ul> <li>Soil Health Tool Kit Terms of Use</li> </ul>
	AF       Michelle Perez, PhD from American Farmland Trust <info@farmland.org< td=""></info@farmland.org<>	<ul> <li>Soil Health Tool Kit Materials List</li> <li>UPDATED – Row Crop Case Study Tool Kit Training S</li> <li>Row Crop Training PowerPoint</li> <li>NEW – Almond Case Study Tool Kit Training Session</li> <li>NEW – Almond Training Session DAY 1 PowerPoint (c</li> </ul>
		NEW - Almond Training Session DAY 2 PowerPoint (e
		METHODS TO IDENTIFY A "SOIL HEALTH SUCCESSFUL"
	American Farmland Trust	Criteria for Selecting "Soil Health Successful" Product     UPDATED – Case Study Introduction & Consent Form
LC	Dear Michelle,	UPDATED – Row Crop Pre-Interview Form     NEW – Almond Pre-Interview Form     Tips for Conducting the Interviews
	Thank you for completing the form to access American Farmland Trust's	<ul> <li>Tips for Obtaining and Selecting Photos</li> </ul>
	Retrospective Soil Health Economic Calculator and accompanying resources,	ECONOMIC METHODS
	known as the Soil Health Case Study Tool Kit. We will contact you with any	
	updates to the resources.	<ul> <li>UPDATED – Row Crop R-SHEC Questionnaire (Word)</li> </ul>
:he c, i so Toc	Here is <u>a link to the OneDrive folder</u> where you can download any of the Tool Kit resources AFT is providing to assist others in interviewing "soil health successful" row-crop farmers and almond growers to quantify economic, water quality, and	UPDATED – Row Crop R-SHEC Tool (Excel)     NEW – Almond R-SHEC Questionnaire (Word)     NEW – Almond R-SHEC Tool (Excel)     NEW – Row Crop and Almond Machinery and Fertiliz     PBA Table Suggested Wording Edits for Row Crops an
1	climate outcomes associated with their already adopted soil health practices.	ENVIRONMENTAL METHODS
il H org our	If you have questions about these resources, please feel free to contact me, Michelle Perez, AFT's Soil Health Case Study Project Leader and Water Initiative Director, at <u>mperez@farmland.org</u> . For help troubleshooting problems/issues with the resources, please contact Ellen Yeatman, AFT's Water Resources Specialist and Agricultural Economist, at <u>eyeatman@farmland.org</u> .	UPDATED - Row Crop NTT-COMET Data Intake Form     NEW - Almond NTT-COMET Data Intake Form     Tips to Tweak Dropdown Menus in NTT-COMET Data     Tips for Analyzing COMET Results     Excel Demonstration of Analyzing COMET Results METHODS FOR WRITING AND PRODUCING A CASE STU
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Access Created Link AFT Soil Health Tool Kit

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8	1 - Training Materials	×	July 12	Michelle Perez	8 items	g <sup>q</sup> Shared
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	3 - Economic Methods	×	July 12	Michelle Perez	6 items	g <sup>q</sup> Shared
<b>8</b>	4 - Environmental Methods	×	July 12	Michelle Perez	5 items	g <sup>q</sup> Shared
<b>8</b>	5 - Methods for Writing & Producing a C	×	July 12	Michelle Perez	4 items	۶ <sup>۹</sup> Shared

#### TRAINING MATERIALS

- Published AFT Soil Health Case Studies
- Session Syllabus: 2020 SWCS Workshop
- on Syllabus: 2021 AFT-ABC Webinar
- t (economic methods)
- (environmental analysis)

#### JL" PRODUCER

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**Contact Us** 

American Farmland Trust 1150 Connecticut Avenue, NW, Suite 600 Washington, DC 20036 (202) 331-7300 info@farmland.org

# **NEW TOOLS UNDERWAY**



# **AFT's Economic Tools**

#### Retrospective Soil Health Economic Tool

- For use with "soil health successful" producers
- To conduct a retrospective partial budget analysis
- To produce 2-page case studies
- Updated July 2021

#### Predictive Soil Health Economic Tool

- For use with "soil health curious" producers
- To conduct a predictive short-term partial budget analysis & a long-term benefits analysis
- To produce 7-page predictive assessments
- Public release this Fall

#### Online Soil Health Economic Tool

- A simpler, easier-to-use version of both retrospective and predictive tools
- We hope to:
  - Test the new tool with Illinois & Ohio farmers
  - Launch the new tool in 2022



# DEMO OF ONLINE ÉCONOMIC TOOLS





# Thank you

Please give us feedback!

Over time, please let us know if you're using the case studies to encourage FRPP landowners or farmers to adopt soil health practices. Contact: <a href="mailto:mperez@farmland.org">mperez@farmland.org</a>

We look forward to your feedback on this Case Study Session #4! Find link in end-of-day email from Pathable. Thank you for your feedback!

