WISCONSIN
UNIVERSITY OF WISCONSIN–MADISON

AGRICULTURAL SUSTAINABILITY

AAE 320: Farming Systems Management

Paul D. Mitchell

Agricultural and Applied Economics

AGRICULTURAL & APPLIED ECONOMICS
College of Agricultural & Life Sciences

Learning Goals

1. What most people mean by sustainability in an agricultural context
2. What I have learned from my own research and business ventures
3. What to expect if you work on sustainability in a corporation or organization

The Nature Conservancy

A Roadmap to a Sustainable Beef System

A collaborative approach to achieve economic and environmental benefits for people and nature

CORTEVA™ agriscience

syngenta foundation for sustainable agriculture

SPECIALTY GROWER SUSTAINABILITY AWARD 2021

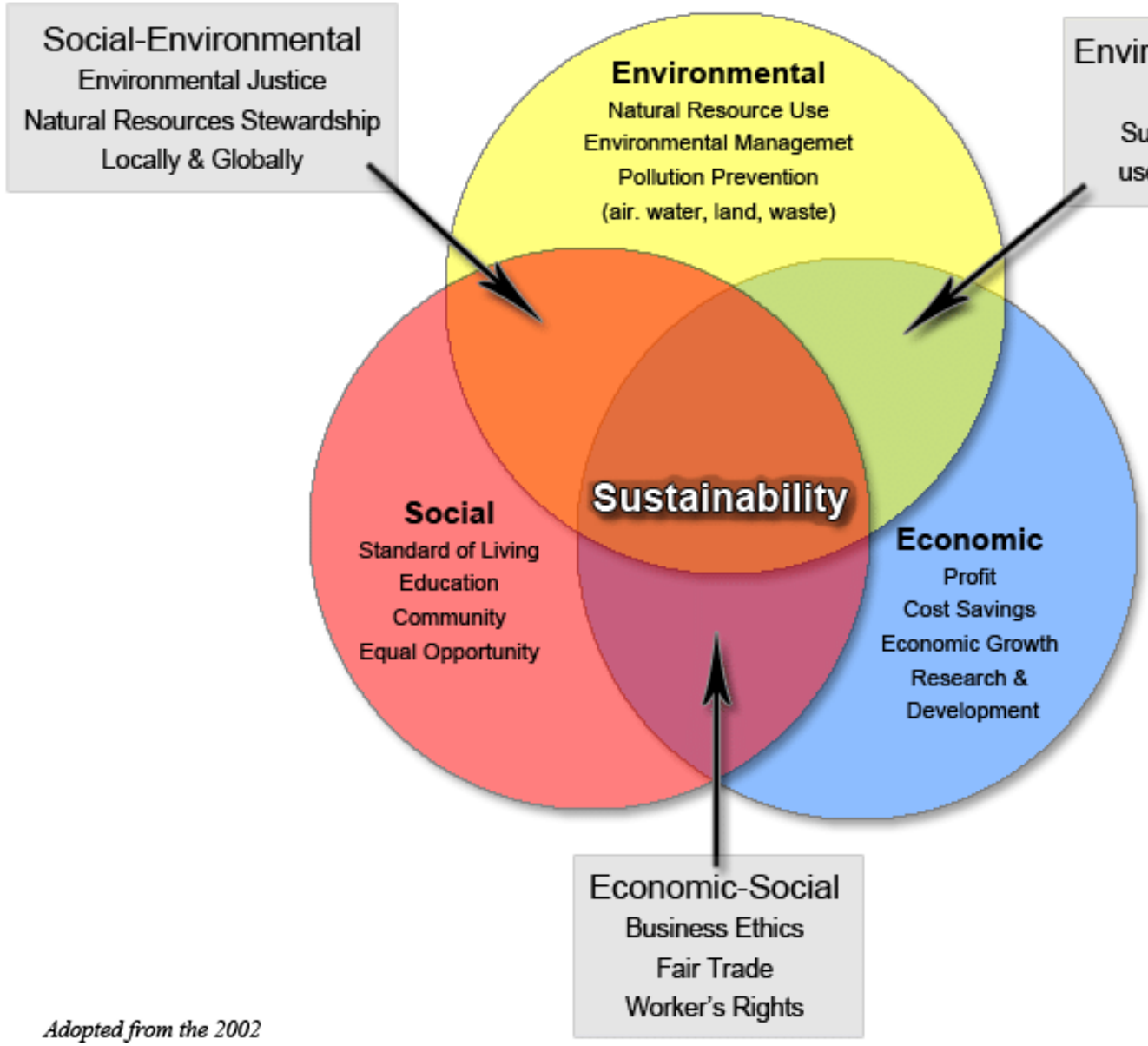
ASA American Soybean Association®

U.S. SOY SUSTAINABILITY ASSURANCE PROTOCOL SSAP

NATIONAL CORN GROWERS ASSOCIATION

YARA

Latest Sustainability Report



Adopted from the 2002 University of Michigan Sustainability Assessment

People, Profit, Planet
People, Planet, Prosperity
Economy, Ecology, Equity

Zhang et al. 2021

Agricultural Sustainability

- Sustainable agriculture integrates three main goals – environmental health, economic profitability, and social equity – to meet the needs of the present without compromising the ability of future generations to meet their needs.
  - Stewardship of both natural and human resources
  - Systems-based, interdisciplinary research and education
  - Responsibility of all participants in the system
  - **Strategy for dealing with the future, not something you accomplish**
- From a practical perspective, sustainable agriculture usually boils down to several “good farming practices” focused on the three pillars
  - Many focus on environment and social pillars, often ignoring farmer profit

How we got here

- **Healthy Grown Potato began mid-1990s**

- **National Initiative for Sustainable Agriculture (NISA) began November 2010**

The National Sustainable Soybean Initiative:

A Grower-driven Sustainability Program to Enhance US Soybean Production and Markets

Illinois/Wisconsin Soybean Sustainability Survey Results

- **FieldRise, LLC in 2015**

  A Practical Agricultural Sustainability Program

FieldRise
growing healthier together

FieldRise Stewardship
FRONTIER

Measuring Sustainability: *"You need to measure to manage"*

- Use a practice-based approach as the foundation for a Practical Agricultural Sustainability Program
  - Direct outcome measurement too costly
  - Model predictions too inaccurate for farm decisions or payments

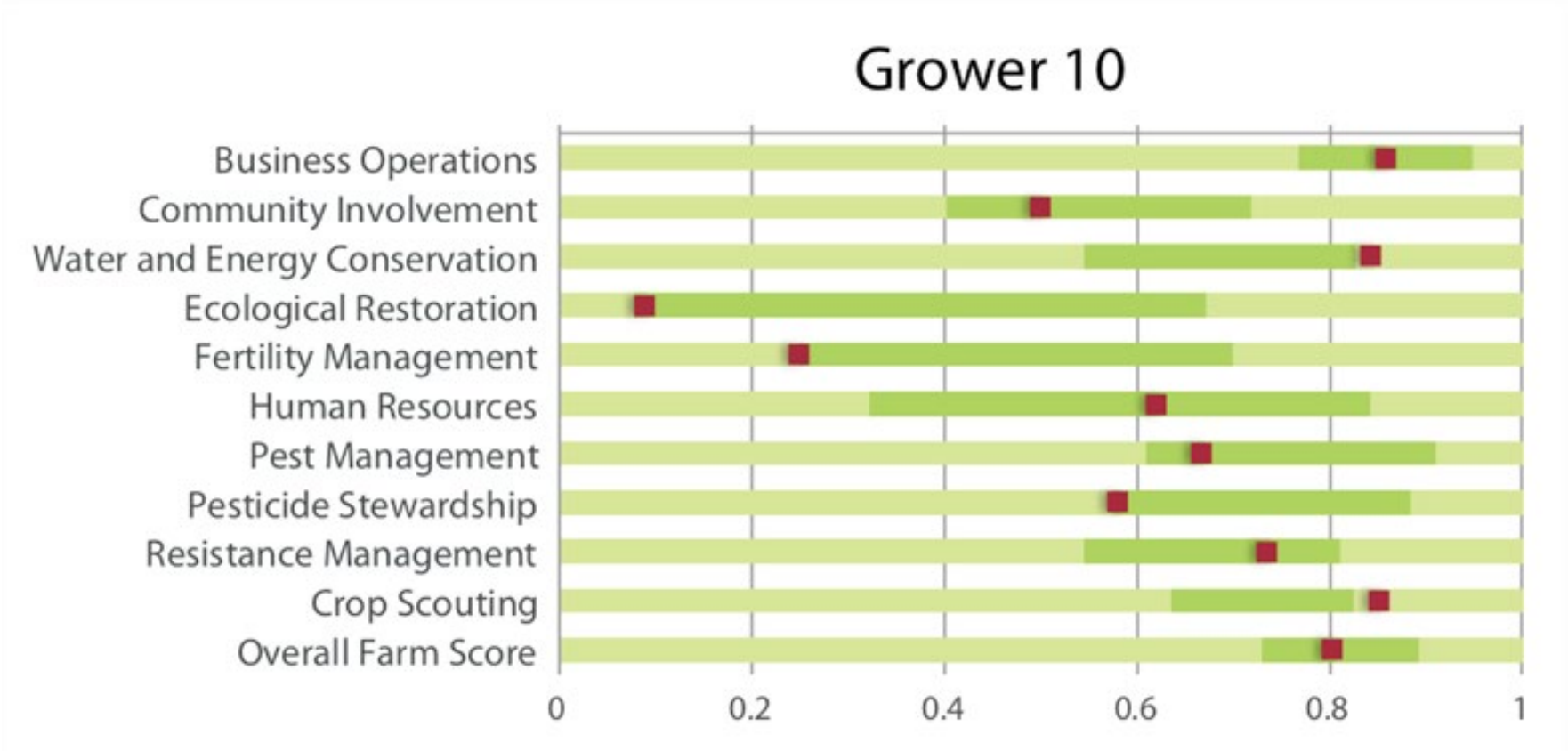
FieldRise Sustainability Assessment: Operationalizing Continuous Improvement

1. Work with farmers and regional experts to develop extensive list of sustainable practices
2. Conduct farmer practice adoption survey, working with an association, taking farmers about the time to drink a slow cup of coffee
3. Analyze data and give individual farmer feedback
4. Farmers and industry plan and implement changes

Sustainability Measurement Problem:
Data Envelope Analysis with Principal Components

- First Principal Component Analysis (PCA) to reduce the number of variables, remove correlation among variables, convert discrete variables to continuous
- Next Data Envelope Analysis (DEA) to calculate a composite index to measure how intensely each farmer adopts sustainable practices relative to his/her peer group
- Final Output:
  - Score between 0 and 100 for each farmer measuring the intensity of sustainable practice adoption relative to peer group with endogenous weights for each practice – “grading on the curve”
  - Document adoption intensity of farmer population and identify practices for each farmer to most improve their score

Individualized Grower Reports



- Darker green band = middle 50% of farmers = “Average”
- Red square the farmer’s score

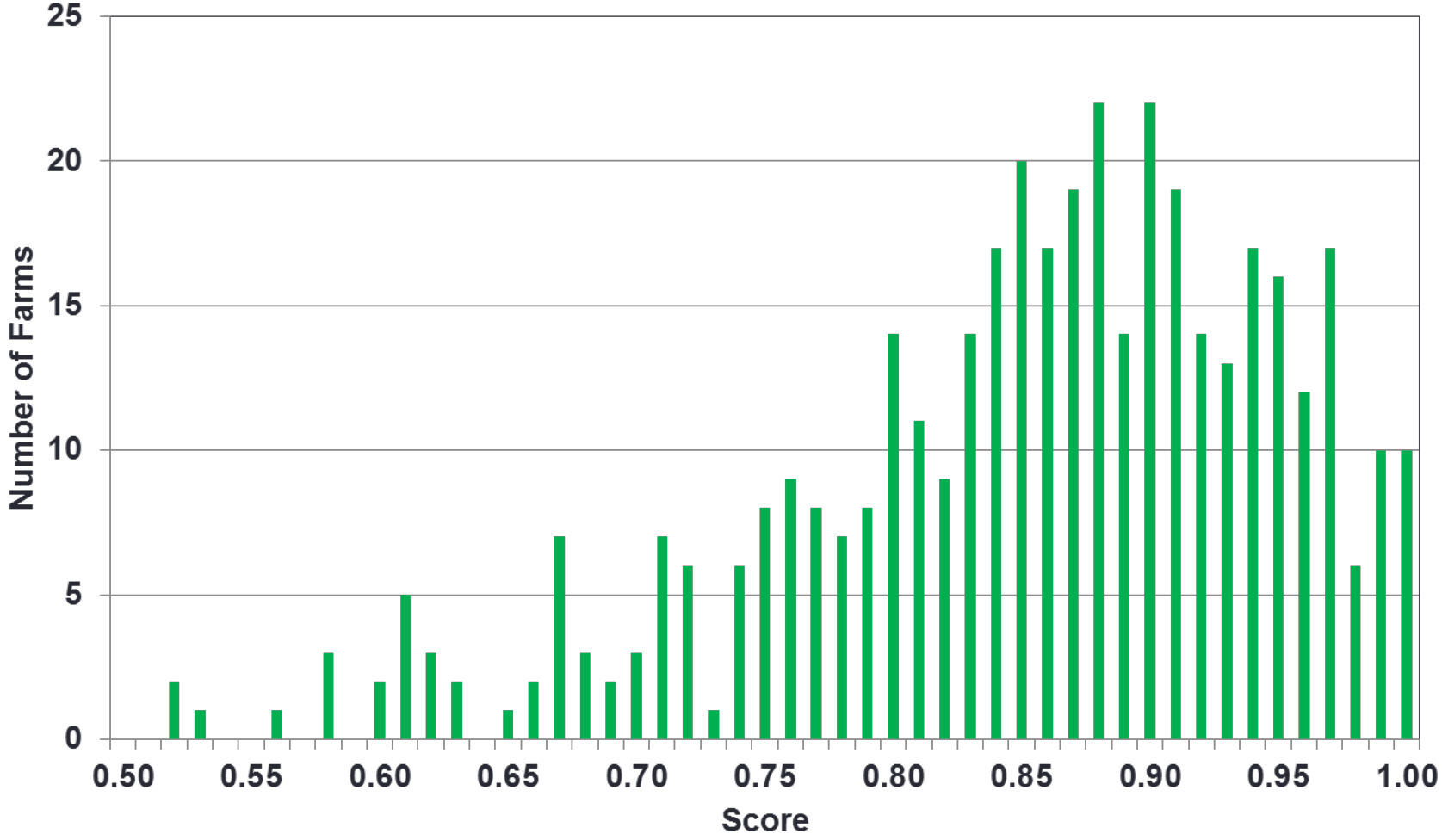
- Farmer-Specific Practice Recommendations
- How to most improve your score in each category

Green Bean Example

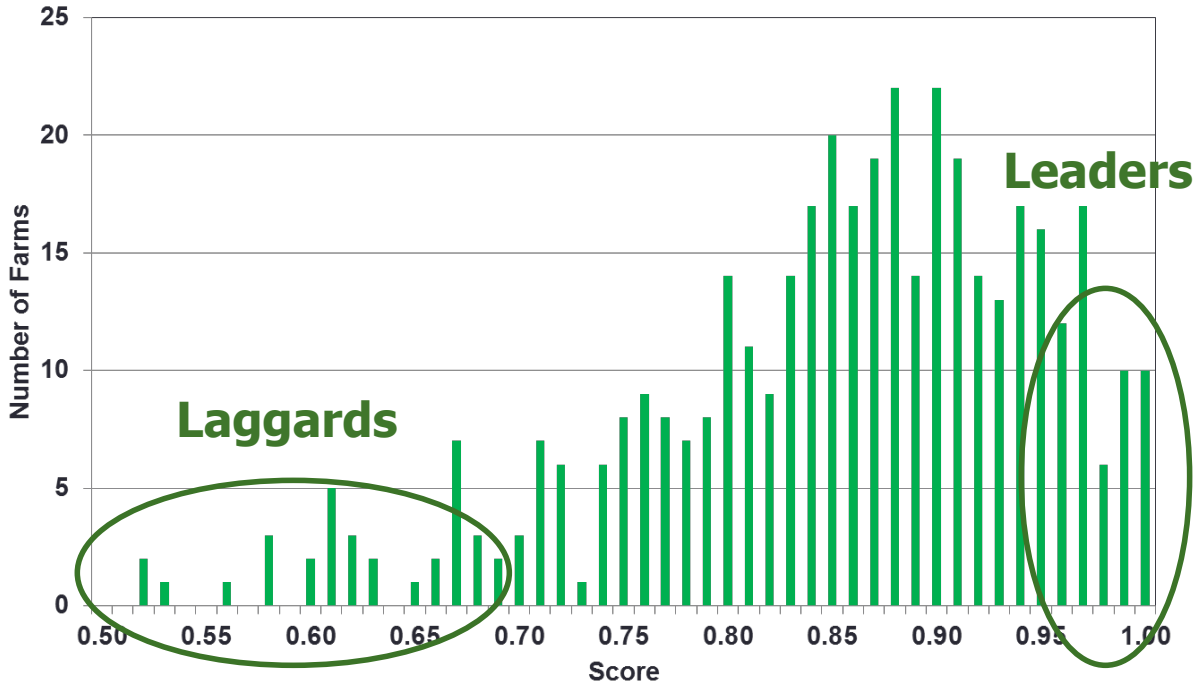
Community	Provide local community leadership
	Gather input from local stakeholders
Disease Management	Evaluate root health at harvest during the previous growing season
	Avoid planting vegetable crops in fields adjacent to field planted to potatoes in previous year
Ecosystem Restoration	Develop a sustainability mission statement for operation that contains information on my sustainable farming/operations philosophy
	Attend ecological, conservation or restoration education or training events
Economics	Purchase federal crop insurance for my major crops annually
	Develop a risk management and disaster plan for operation
Farm Operations and Sustainability	Use weather data for scheduling green bean planting and harvest dates
	Develop pest management plans to lower the risk for resistance development
Insect Management	Scout green beans for insect pests weekly throughout the growing season
	Use seed treatments for early potato leafhopper and seed corn maggot control
Nutrient Management	Apply nitrogen in multiple applications according to university recommendations with additional justified by foliar or petiole nitrate samples and/or varietal needs
	Apply calcium, magnesium and sulfur based on soil test results
Production Management	Plant potatoes and/or carrots in rotation with green beans
	Plant crops when soils are at 85% field moisture capacity
Soil and Water Management	Select crop varieties with shorter growing season
	Plant a new windbreak
Weed Management	Plan herbicides across the rotation to vary mode of action and prevent or delay herbicide resistance
	Plan crop rotations to include those with multiple tools to control weeds problematic in green beans during the present growing season
Practices to keep doing	Plan herbicides across the rotation to vary mode of action and prevent or delay herbicide resistance
	Plan crop rotations to include those with multiple tools to control weeds problematic in green beans during the present growing season
	Buy production inputs from a local (e.g. state) source
	Apply potassium based on soil test results

Histogram of Farmer Scores

Soybean Assessment
70 Practices
410 Farmers



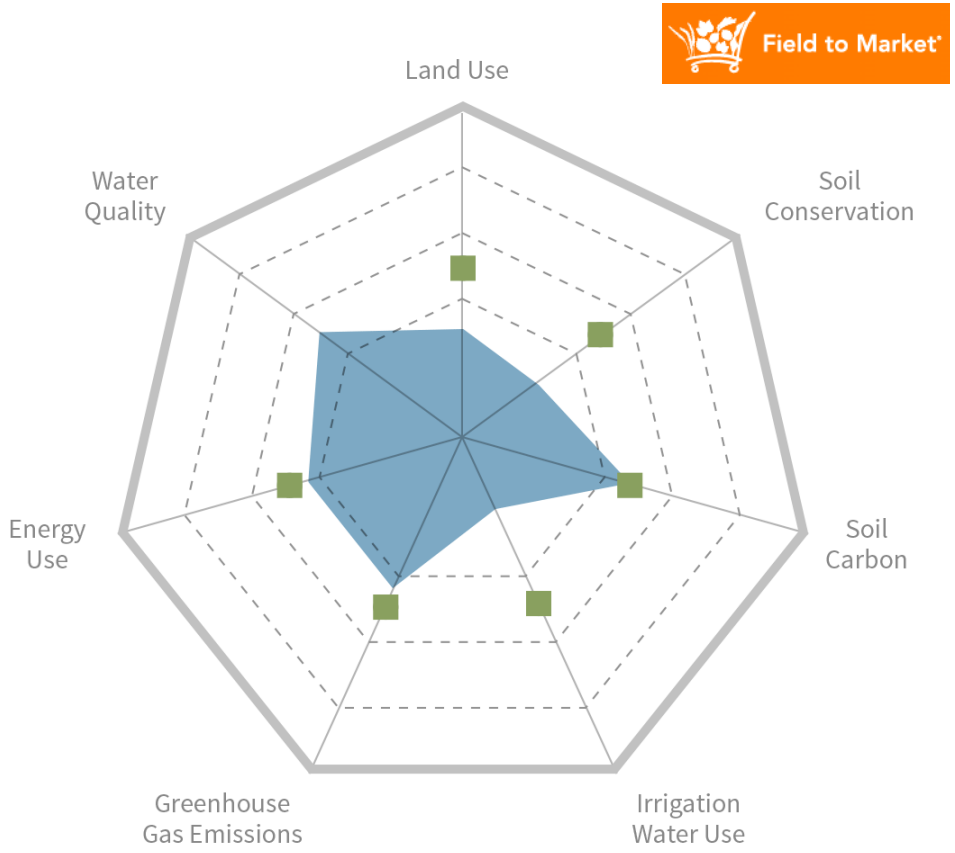
- **Leaders** on the frontier pulling the industry forward
- **Laggards** in the tail pulling industry average down



Operationalizing Continuous Improvement

- How do we help the **Leaders** keep getting better?
- How do we help the **Laggards** improve?
- Identify practices that would most improve grower scores for the industry as a whole or at individual level
- Help set Research and Outreach priorities for the association

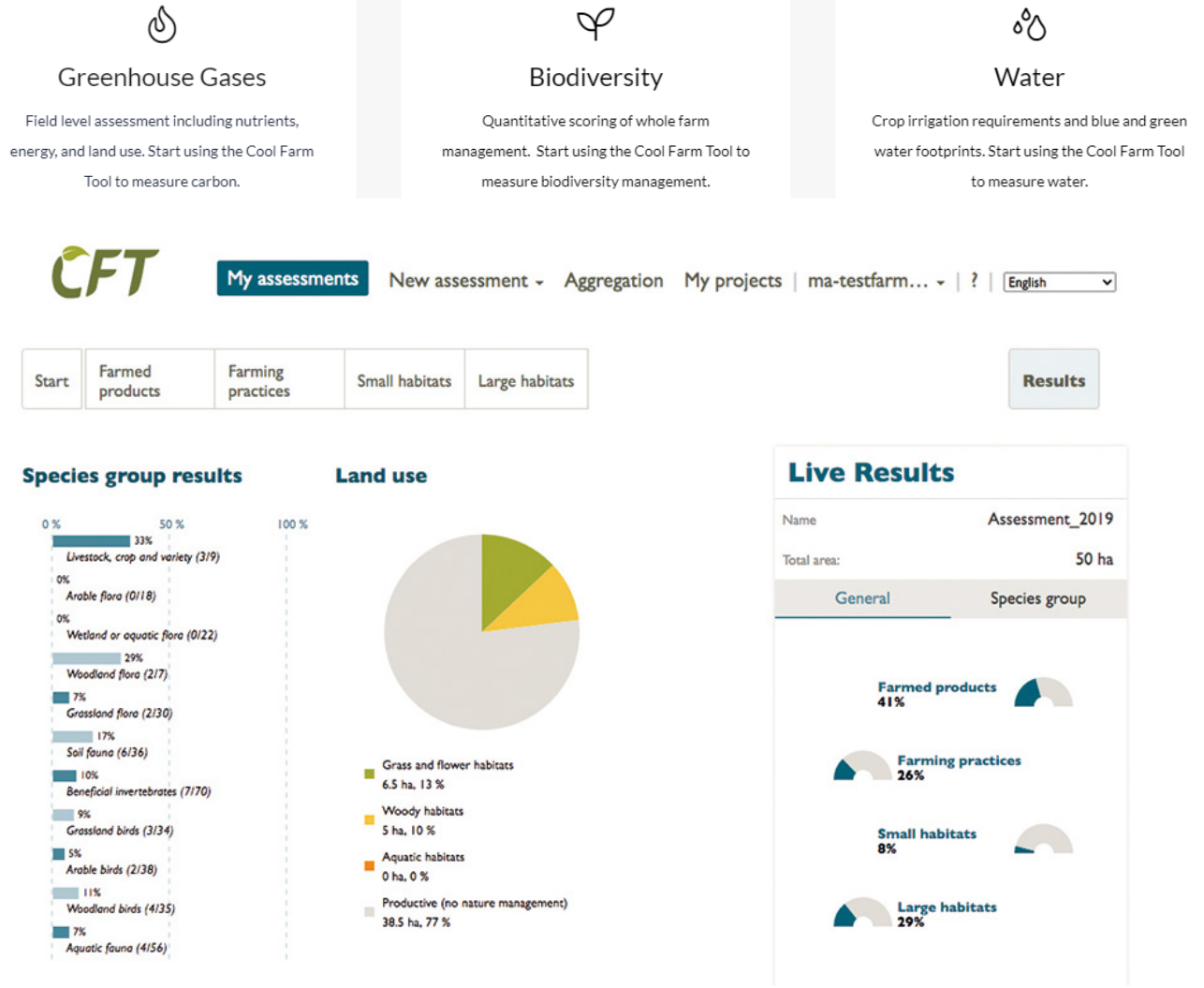
Field to Market



https://fieldtomarket.org/our-programs/fieldprint-platform/

Cool Farm Tool

https://coolfarmtool.org/



https://www.fwi.co.uk/news/environment/how-do-three-main-farm-carbon-calculators-compare

What have we learned?

- Most farmers for most crops are doing a good job on traditional BMPs
  - Agronomics: nutrients, pest management, scouting, water/irrigation, and soil management, etc.
  - Business management: finances, insurance, plans, etc.
  - Each industry has specific areas of low & high scores
- Common low scoring areas for most crops
  - Ecosystem restoration, wildlife habitat, biodiversity, management of non-cropped lands
  - Community involvement, engagement, and leadership
  - Human resources

Ecosystem Restoration Handbook

- Alison Duff
- Deana Knuteson
- Mimi Broeske

- Extremely practical guide for Wisconsin landowners

- Hard copies available

Consumer Survey (Yue et al. 2020)

- What consumers want for a sustainability program:
  - Focus on the Sustainability Program Characteristics, not the practices used by farmers
  - Plenty of research looks at consumer willingness to pay for products made using “green” production practices, generally they find little value among consumers

What do Consumers value?

- Price: dominates willingness to buy, as expected
- Measurement of Sustainability
  - Farmers in program must demonstrate use of sustainable practices
  - Measures of on-farm practices are used to measure sustainability
- Role of Science
  - Program communicates scientific information to farmers
  - Program funds science to increase the sustainability of farmer practices
- Farmers' active participation
  - Farmers advise program managers on program requirements and activities
  - Farmers learn what is required to meet consumer demands
- Communication
  - Do **not** create sustainability materials to distribute to consumers

Where are we now?

- We can refine analysis methods, write journal papers, do field research to improve practices, show we have created a program that consumers want, …
- Our struggle: Supply Chain Engagement
- We can get farmers: over 1,500 famers, 1.7 million acres
- **How do we get companies in the supply chain to adopt our program????**
- This has been Healthy Grown's and NISA's struggle and now FieldRise's: **It takes a lot of expertise and time that we do not have!**
- We are not marketers or businesspeople, but professors
- We do not know how to get supply chain engagement, nor do we have the time to travel around marketing this program or to do the networking needed

What to expect if you work on sustainability for a company: Within the company

- Sustainability as efficiency saves the company money, most of the easy things are already done
- Other types of sustainability are a cost center to be minimized
- How do you monetize sustainability?
- Company sustainability becomes marketing and communication
  - Selling the company to customers and shareholders
  - Managing company reputation
  - Maintaining access to key markets and customers
  - Reporting to downstream buyers how the company is sustainable
  - Perceptions are reality in marketing
  - Greenwashing?

What to expect if you work on sustainability for a company: Outside the company (up the supply chain)

- Procurement is where some ABM/ag majors work on Sustainable Sourcing
- Companies push a version of “sustainability” onto farms/raw product suppliers
  - Two-way engagement costly and they lose control of process, so avoid
  - Agricultural sustainability programs have failed, usually due to a clash between the perceptions and realities of modern agriculture
  - This is what FieldRise is trying to sell: a practical, unified sustainability solution for farmers to use with corporate buyers
- Expect asking farmers to do paperwork to certify sustainability: busy work
- Lack of farmer engagement due to burdensome or unrealistic program

Corporate Sustainability is Stuck

- Companies are struggling with sustainability, no real “answer” yet
- Trying many different things, a lot of churn and attempts at innovation
- Companies keep shifting priorities and activities as strategies change
- Job growth is there: Companies want to be more sustainable, but sustainability is still secondary to the company’s primary mission and activities
- If you work on sustainability for a company, expect to be frustrated and to switch priorities and activities frequently as leadership/strategies change
- Wide open opportunities for creative people, not easy clear-cut jobs, but high risk-high reward
- Good people can use sustainability to spring into leadership positions
- Companies are trying and things will improve as social transitions happen

Working on Sustainability for an Organization

- Industry Association: GMA, DBA, Dairy Edge, NCGA, …
  - Much of the previous applies, just several growers/companies
  - Add lobbying and legislative/regulatory advocacy, but good pay
- Non-Profits: Pheasants Forever, River Alliance of WI, Sand County Foundation, the Nature Conservancy, …
  - Scrambling for money, grant writing, donations, volunteers, expect low pay
  - Many have a positive impact, usually locally
- Public Sector: Land and Water Conservation District, City and County Government, University Extension, USDA NRCS,
  - Stable money, often lower pay, better benefits, more rules on what can do
  - Public servant to everyone, can make a difference, but often more diffuse

Summary

- Agricultural Sustainably is here to stay
  - Three Pillars: People, Profit, Planet or Economy, Ecology, Equity
  - Use of best management practices and working on continuous improvement as a strategy to try to prosper into the future
- Most farmers doing a good job on traditional practices, but low on ecosystem restoration, community involvement and human resources
- Food supply chains are struggling with agricultural sustainability
  - Farms and agriculture are different from other industries, serious disconnect between farms and business/consumers when it comes to sustainability
  - No unified system, lots of churn and shifting of priorities and activities
  - Job opportunities exist and are growing, but not clear cut jobs
  - Procurement and Marketing & Communications