5 things we need to do less

Don't be a MORE-On!

Monte Bottens, Farmer & Founder

Monte Bottens

5th Generation Farmer

- long term no-till
- advanced crop nutrition practices
- multi specie cover crops
- integrated livestock to improve soil health
- d2c marketing

California Ag Solutions
Ag Solutions Network
Grateful Graze

Ag Tech Investor & Consultant

ADVOCATE AND LEADER

in the Regenerative Agriculture movement

Our Farm Journey with the Soil Health Principles

1. Minimize Disturbance - 1996
2. Keep the Soil Covered - 1996
3. Keep something growing all the time - 2016
4. Maximize diversity - 2017
5. Integrate Livestock - 2017

#5 is twice the effect of 1-4

Spring 2019 Rain on Covers

POWER2GRO to enable ALL Soil Health Principles

At Planting
Foliar at V-8 to V-12
Sidedress
Foliar at VT to R2

135 - 8 - 23 - 21 S + Micros, Bios

1st nutrients are with planter

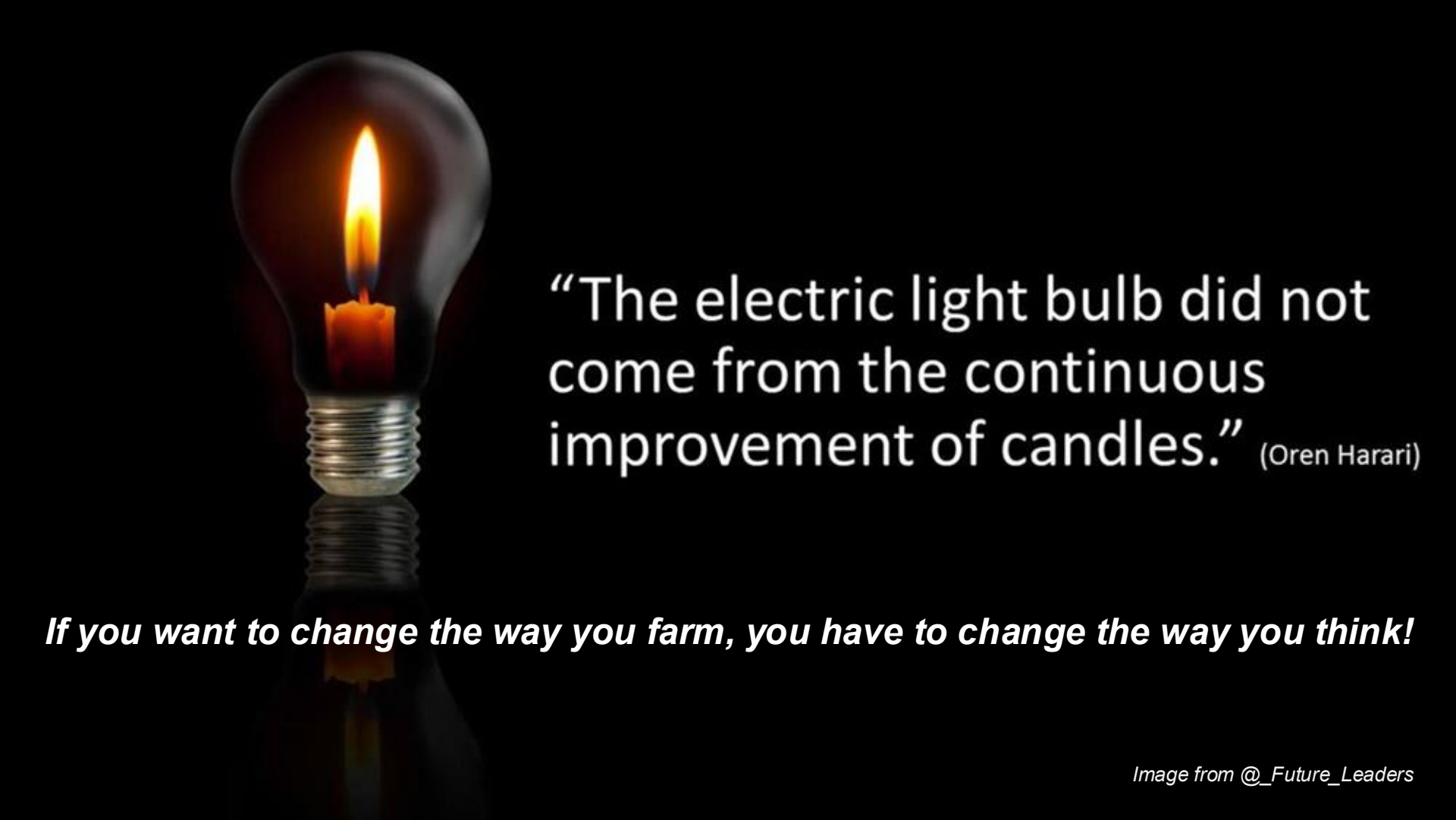
Moving to 120 N in 2025

Your soil health journey.

Where are you?
Where are you going?
How will you get there?

What's your next right step?

Write it down NOW! Do at least one thing different next year.



If you want to change the way you farm, you have to change the way you think!

Image from @_Future_Leaders

I believe we can improve health and wealth of

Soils

Plants

Animals

Humans

Planet

The Soil Health Principles

1. Minimize Soil Disturbance
2. Maximize Soil Cover
3. Continual Living Roots
4. Increase Biodiversity
5. Integrate Livestock

Fun way to remember the Principles

Fun way to remember the Principles

1. **Minimize Soil Distubance**
    a. **Don't be a More-On**

Fun way to remember the Principles

1. Don't be a More-On
2. Maximize Soil Cover
    a. Don't farm Naked

Fun way to remember the Principles

1. Don't be a More-On
2. Don't farm Naked
3. Continual Living Roots
    a. Staying Alive

Fun way to remember the Principles

1. Don't be a More-On
2. Don't farm Naked
3. Staying Alive
4. Increase Biodiversity
    a. Don't be Boring

Fun way to remember the Principles

1. Don't be a More-On
2. Don't farm Naked
3. Staying Alive
4. Don't be Boring
5. Integrate Livestock
    a. Don't forget the Meat

What did me in was not what I did not know.

It was the things I knew which were not so.

#1 Thing we can do less: NITROGEN

If some is good…

What do we tell ourselves?

- It's cheap
- It's easy
- I don't want to run out

What does the industry tell us?

What do universities tell us?

The 4 Fates of Excess Nitrogen

#1. To the Atmosphere

- Volatilization (Gassing Off): Loss as NHx
- Denitrification: Loss as NOx

#2 To the Soil

- Decreases soil carbon levels

#3 To the Stream

- Nitrates in surface waters cause algae blooms and dead zones

#4 To the Ground water

- Blue Baby Syndrome, Birth Defects
- Kidney, Spleen and Thyroid Damage
- Respiratory and Reproductive System Damage
- Cancer

Excessive N Creates

Excessive Vegetative Growth

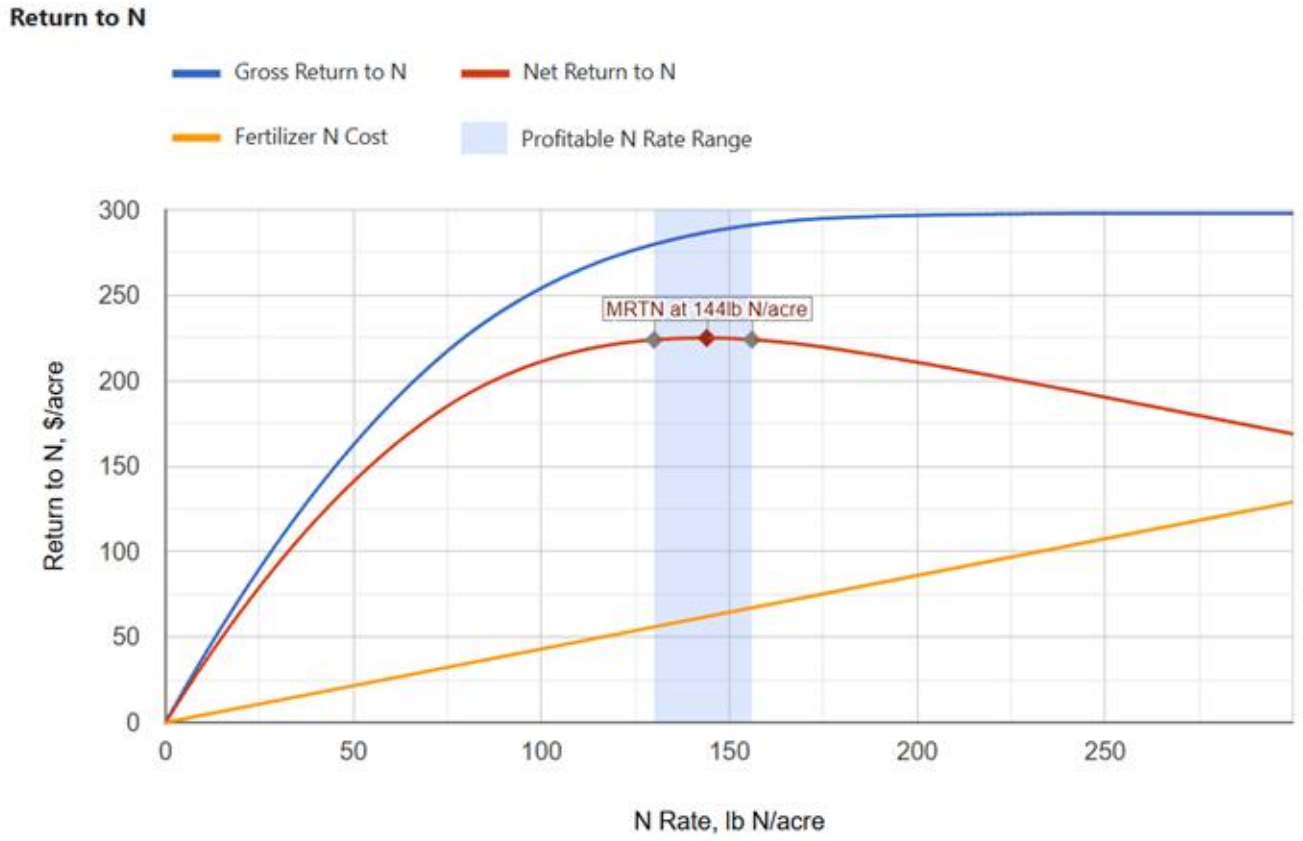
Lower Carbon (Brix, Sugar) Status

- Plant Tissue Disease
- Insect Pressure

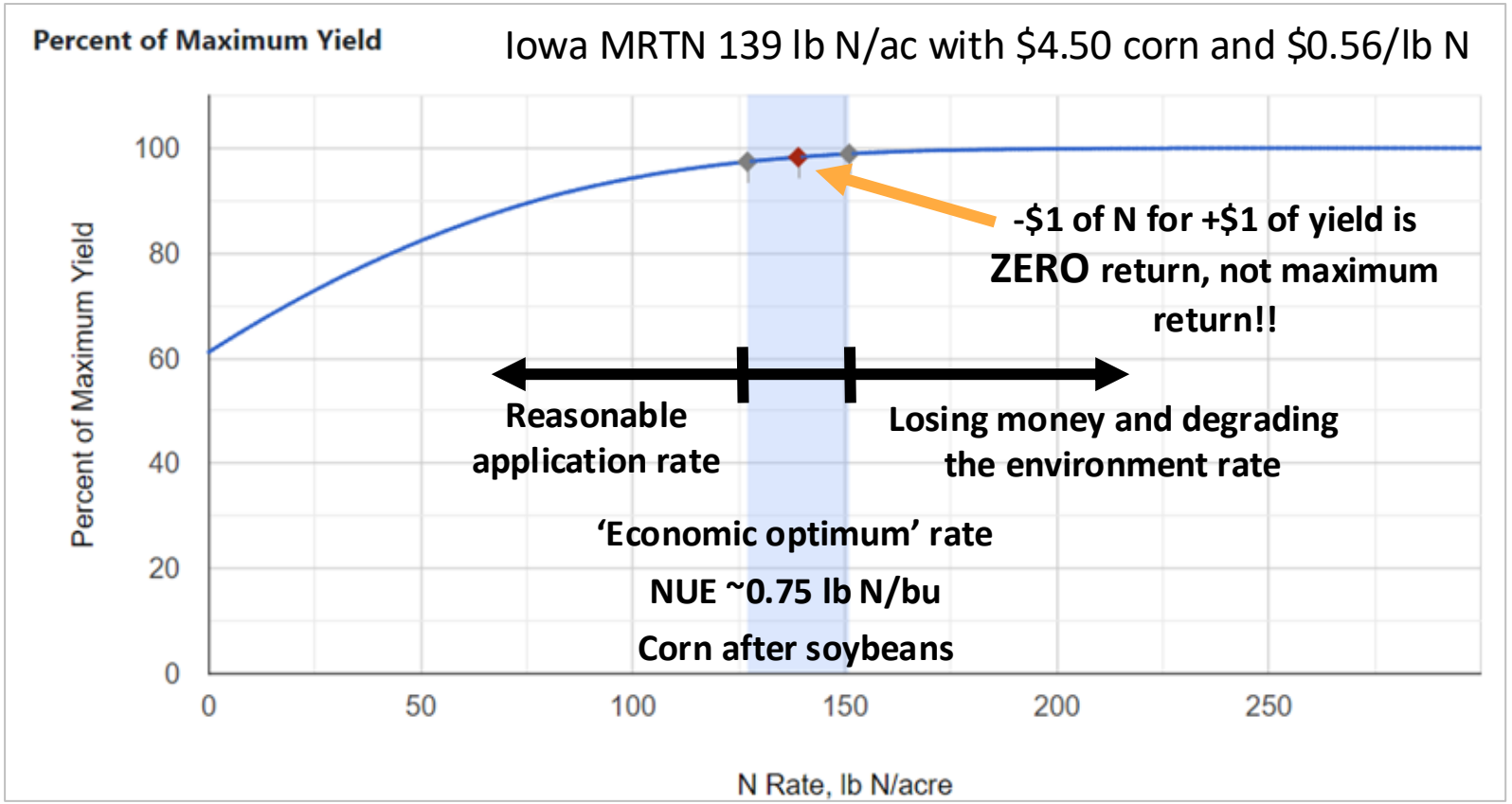
Want to decrease disease and insects? Increase Brix

Excess N is a great way to Decrease Brix because of C:N Ratio

What do Universities tell us? MRTN EONR



Improving nitrogen management

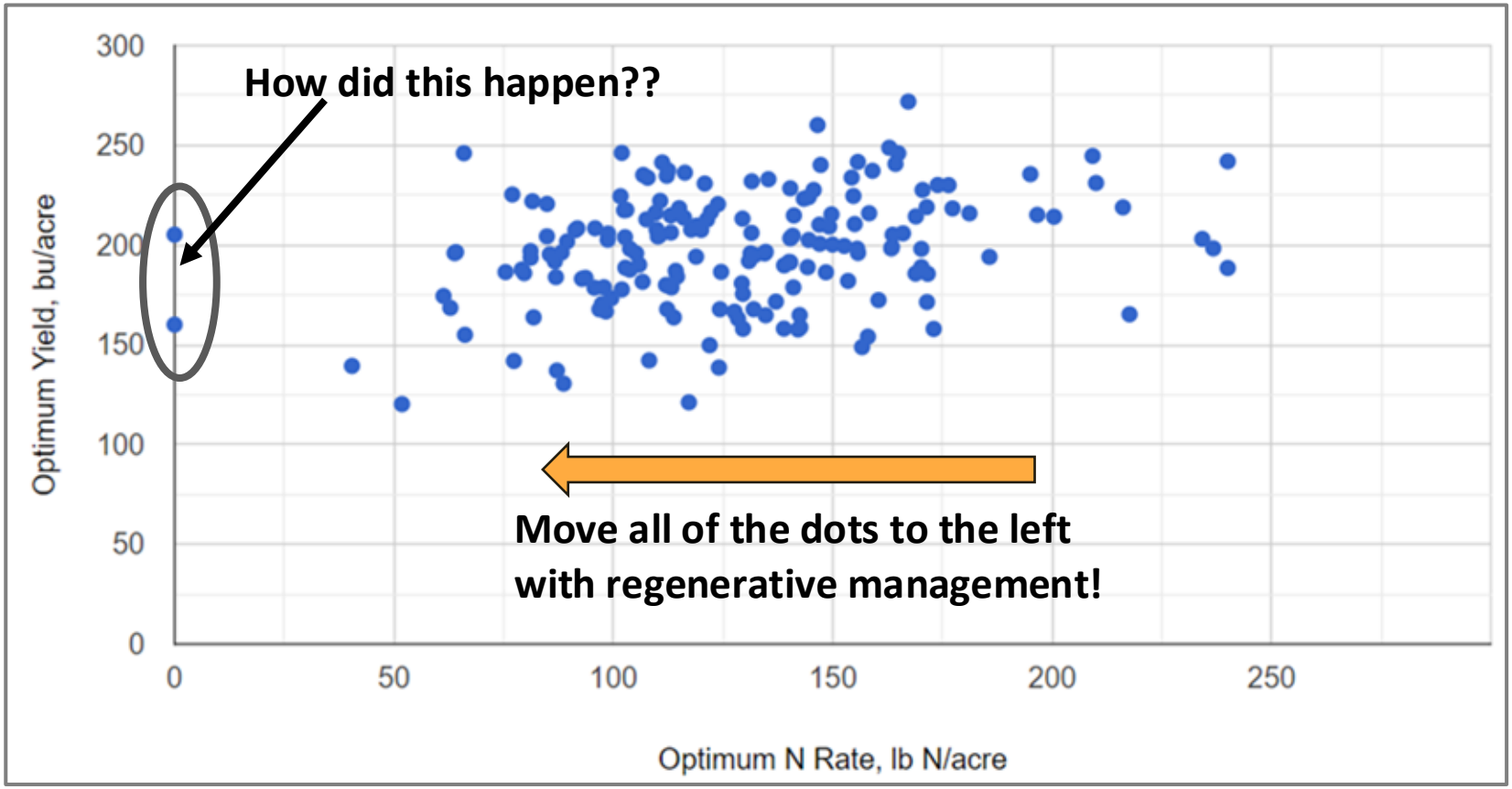


Improving nitrogen management - Marginal NUE

N rate	% maximum yield achieved	Yield	Additional yield	Additional N	Marginal NUE (lb N/bu of additional yield)	N cost/bu at $0.56/lb	Additional Revenue/ac after N cost
0	62%	124.0					
25	73%	146.0					
50	82%	164.0	18.0	25	1.39	$0.78	$67.00
75	90%	180.0	16.0	25	1.56	$0.88	$58.00
100	95%	190.0	10.0	25	2.50	$1.40	$31.00
125	98%	196.0	6.0	25	4.17	$2.33	$13.00
139	98.9%	197.8	1.8	14	7.78	$4.36	$0.25
150	99.5%	199.0	1.2	11	9.17	$5.13	($0.76)
175	100%	200.0	1.0	25	25.00	$14.00	($9.50)

Need rate trials with zero N check strip

Relationship?? between Economic Optimum N and Yield



Don’t be a MORE-On: Optimum is Optimum

There is nothing good about excess application

Excess creates costs through the rest of the production system.

Your Loss is someone else’s pollution.

-It has taken me several years to realize this.

All truth passes through three stages. First, it is ridiculed. Second, it is violently opposed. Third, it is accepted as being self-evident.

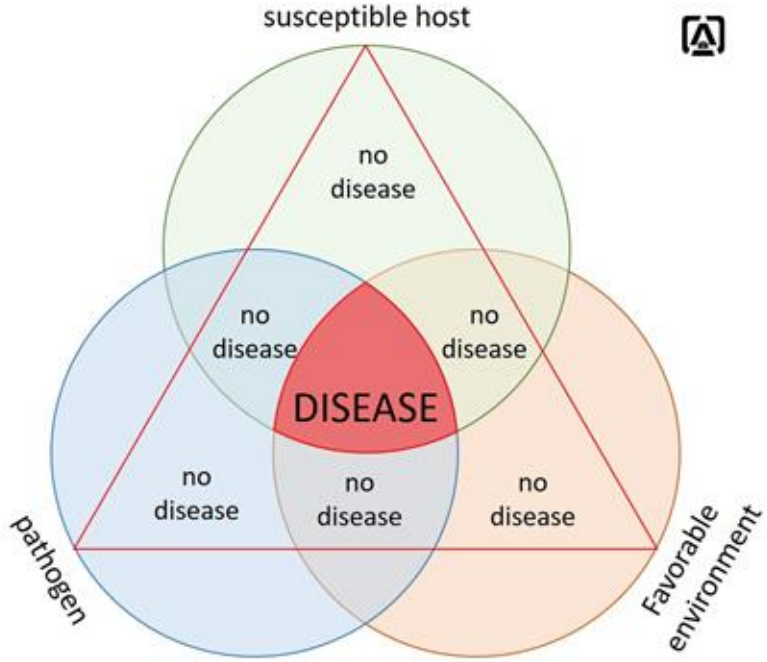
— *Arthur Schopenhauer*

AZ QUOTES

#2 Thing we can do less: FUNGICIDES & INSECTICIDES

Understanding the
Pathogen/Pest Triangle

Host
Pathogen/Pest
Environment

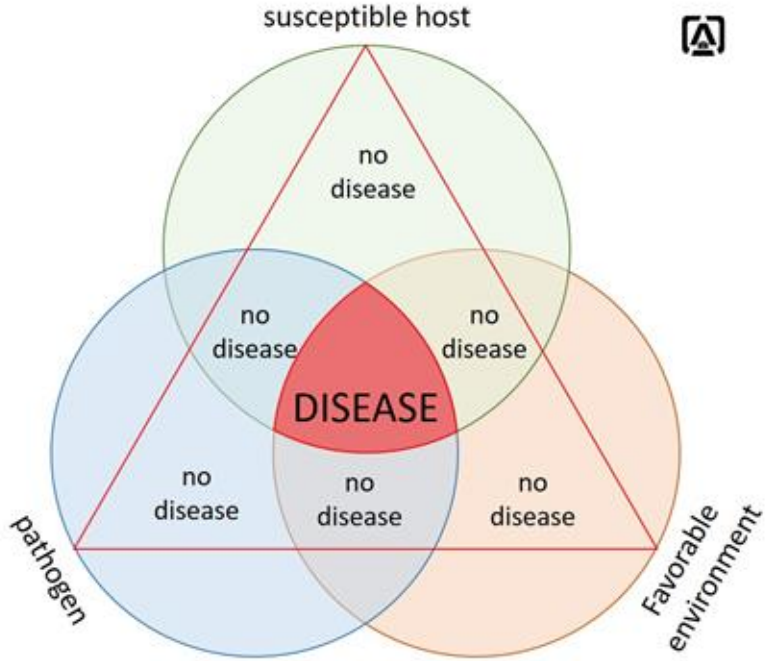


What are some things we change about the host?

Mineral Status

Nutrient Balance

Brix Levels

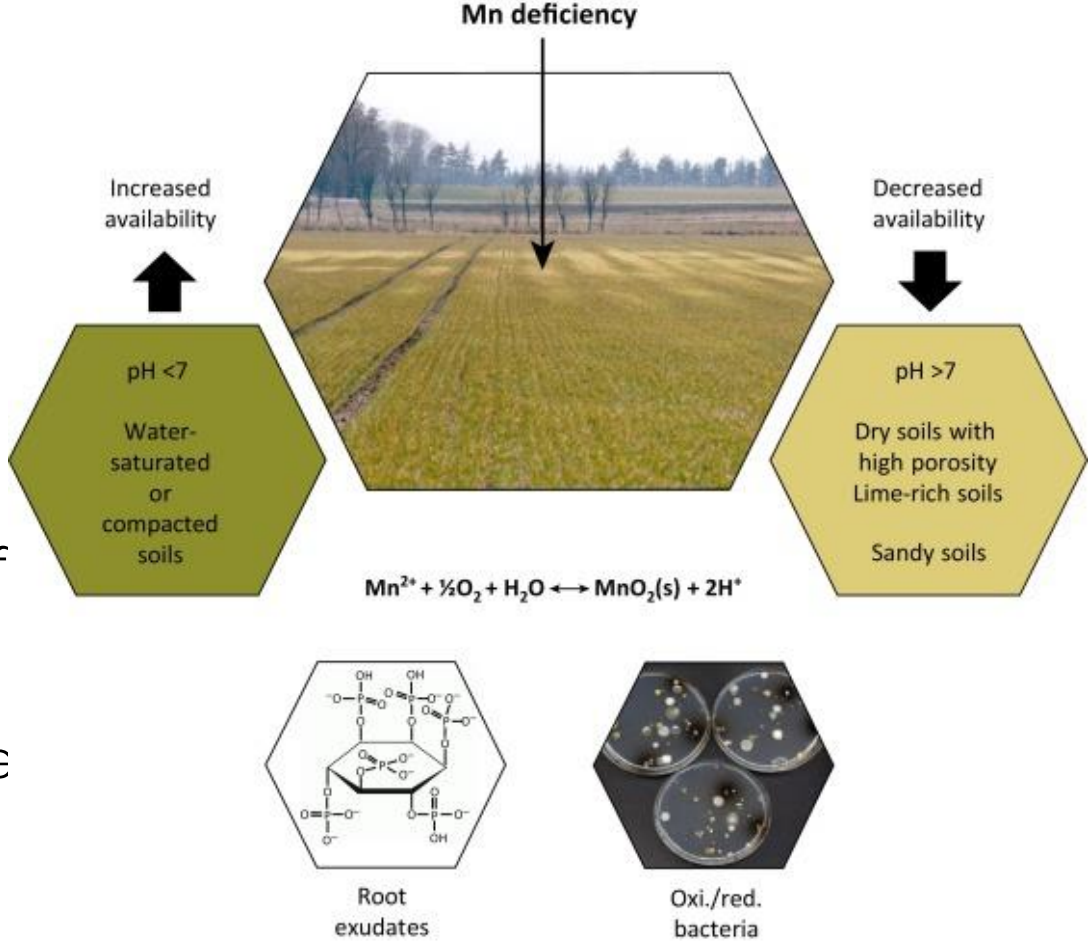


Mineral Status Example

Manganese:
Plant Disease Response

REMEMBER the plant form of Mn is reduced

Glyphosate ties up Zn, Mn, Fe



Trends in Plant Science

Residual Soil Glyphosate – PA 2024*

Field	Glyphosate	AMPA	TEG
	ng/g		
2 Control[1]	13.21	14.24	34.57
3	292.62	702.4	1346.21
4 Control[1]	8.63	11.5	25.87
5	199.78	837.08	1455.40
6	189.57	574.01	1050.57

*King's AgriSeeds fields, Williamsport, PA

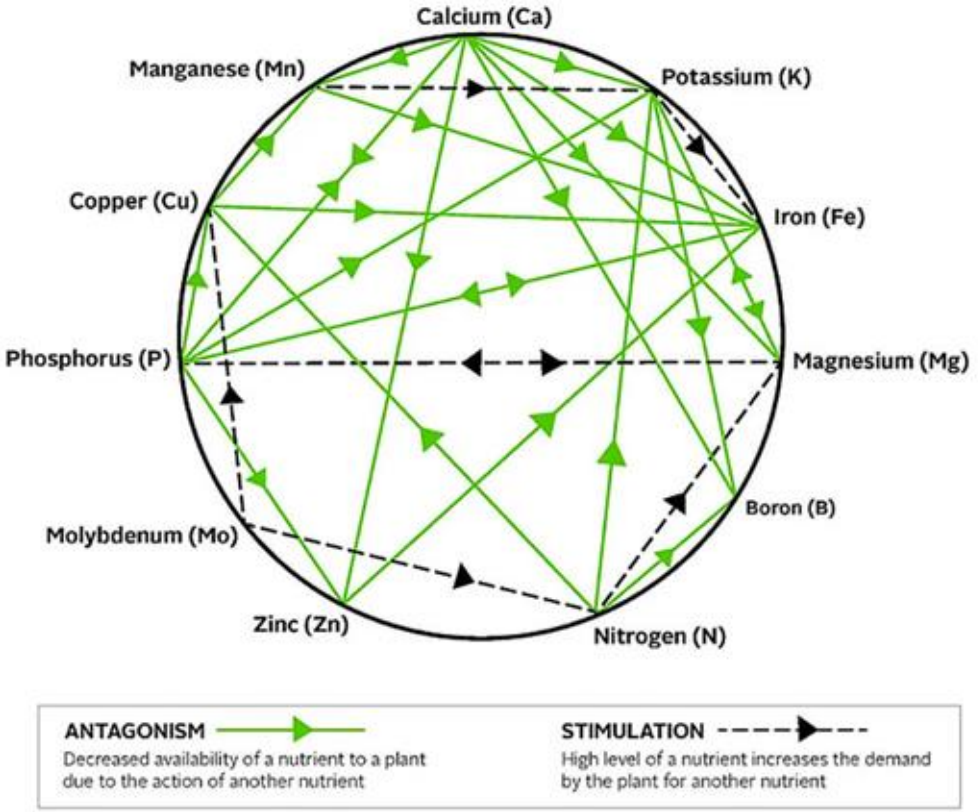
[1]Last application was 9 years previous

Nutrient Balance

Most nutrient excesses cause Antagonism.
N - K
N - B

Look at the Stimulation
Mn + K

Balance is the Key
MORE-On is not gooder



Brix Levels

Nutrient management has a large impact.

FastTracK and Draft Foliar significantly increase Brix

Higher Brix levels can reduce or eliminate the need for fungicides and insecticides

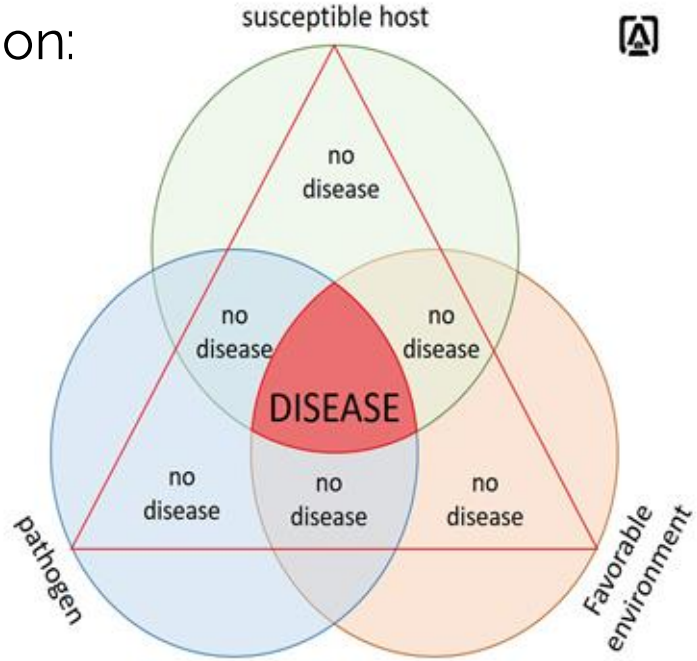
What can we change about the Pathogen?

We can lower the load and create competition:

- Residue decomposition
- Soil Covered for soil splash

Everything is a meal for something else

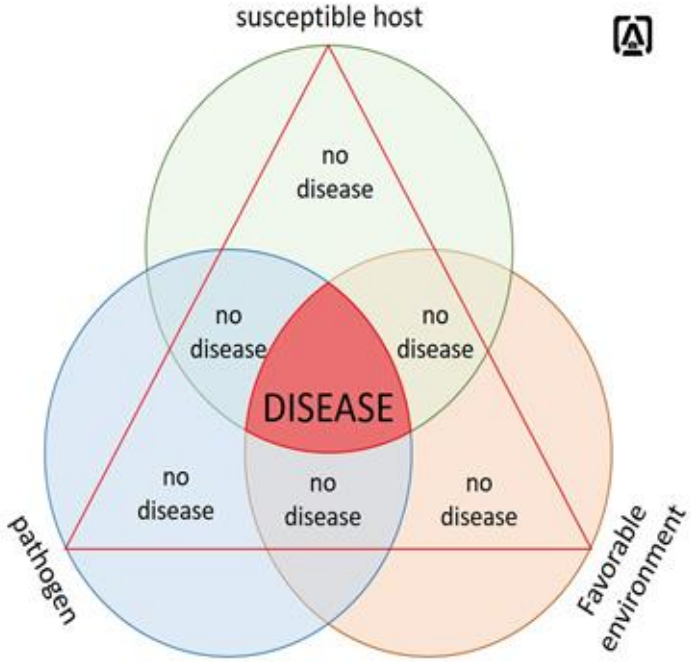
Competition in the environment driven by diversity



What can we change about the Environment?

Moderate Soil & Canopy Temperatures

- Cover Crops, residues on surface
- FastTracK and Draft to Reduce Stress and improve ET Efficiency



If you have to apply fungicides or insecticides, make it count.

Sprayer setup right (future Lunch and Learn?)

- Coverage is key: fine droplets

Time it right: Check every field every week, not the calendar

Pre-Treat spray water with Burn-out ahead of loading sprayer.

- Fungicides and other contacts are very sensitive to water quality and are neutralized quickly by poor water quality.
- Why put out a 50% or 10% rate because your water quality or mixing methods waste it?

#3 Thing we can do less: Neonicotinoids.

Persistent, Water Soluble, Extremely Toxic Substances

Episode 129

Episode 119

The Problems with Neonics

Water soluble. Can easily move into and through soil to water courses and groundwater.

5 year half life. Much longer in higher pH's

Neonics have been documented to be taken up by a plant several years later and are toxic to beneficials insects and bees.

Remember, when you poke the insecticide button, you are dropping a bomb, the bad guys and the good guys get killed. 1700:1

So what do you do instead?

Use excellent IPM practices
(**Integrated** not **Insurance** pest management)

- If your CCA writes recs from the office by looking at the calendar, and changing the name and field on the recs, fire them.

Create an environment where beneficials can flourish

- High Diversity Cover Crops
- Insect Strips/areas: field edges, timber edges, corners

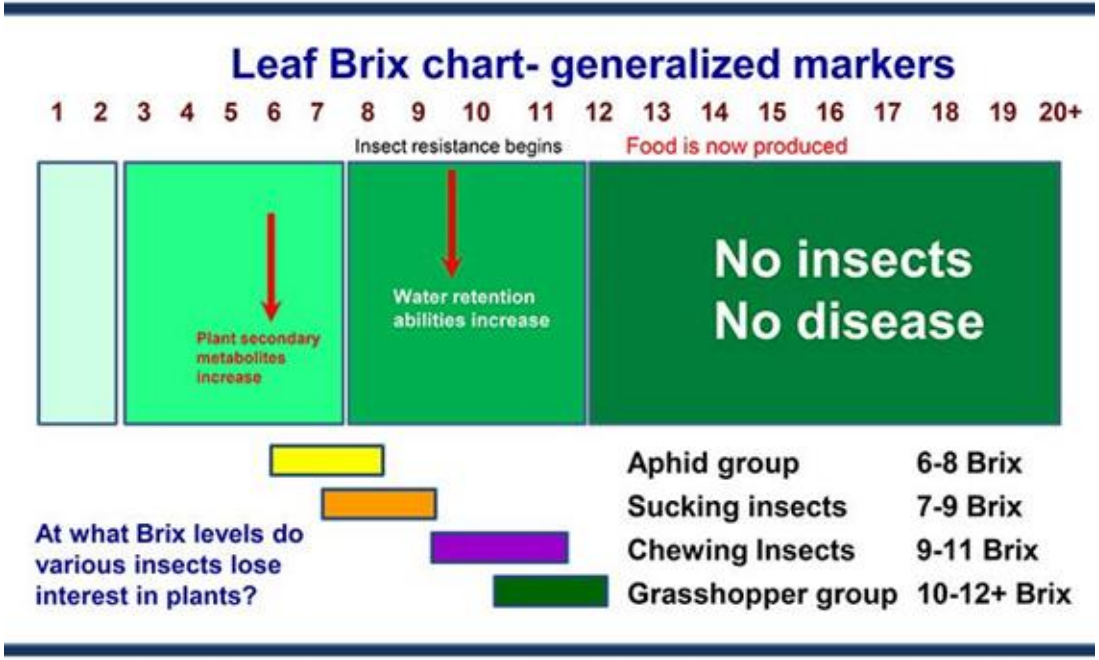
Equip the crop to defend itself

Brix levels and Insects

Increased Brix levels do lead to reduce pest pressure

Balanced Nutrition is the key to creating high Brix

We have observed in numerous locations and crops.



#4 Thing we can do less: GMO's

mRNA can be used for genetic modification of plants and animals, tailored antibiotics, and soil microbes.

Gene edited microbes for soil inoculation are available now

Bio-pesticides will be coming to market at a rapid rate in the near future. It still kills…Always think how to prosper life and competition.

When we change the genetic code, we change nutrient cycling/metabolic pathways in the plant

#5 Thing we can do less: Tillage

Disrupts fungal associations

Oxidizes soil carbon

Destroys soil aggregates and reducing infiltration rates, water holding capacity, and load bearing capacity.

Tillage can be deadly! Literally

Illinois dust storm causes 72-car pile-up crash on I-55, killing 6

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May 6, 2023

WE HAVE TO DO BETTER!

May 6, 2023 - Exact same time as above

Water Infiltration Tests

1” of water Infiltration

Long Term No-Till, Cover Crops, Diversity, and Grazing: 2:28

Long Term Deep Tillage: 15:36

What happens to water that doesn’t infiltrate?

Now What?

Have a Plan for the entire season ahead of time.

Plan to use less.

Reallocate budgets to areas to improve soil and plant health

EXECUTE, EXECUTE, EXECUTE. Timely, Decisive, Accurately

We Practice what we Preach

Everything we recommend to you, we do on our own farm

31 years No Tillage
28 years Low N
13 years no Fungicides and Insecticides
10 years Non GMO
8 years no Neonics

When is the best time to start? TODAY

Change is not easy

Every choice I make has an impact on the water cycle and environment.

Every choice you make can, too!

We are leading the change, we need you to be willing to change.

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Will you join us?

Have you heard about EpiYield?

Save your seed
Gain yield over time
Lower seed costs
Non-GMO Premiums possible

EpiYield™
NON-GMO SOYBEANS

Saving your seed has been demonstrated to improve yields over time as the variety adapts to your soils, weather and practices.

Plus all foundation seed is grown on our farm from No Till Cover Crop soils with no SDS, only RevUp seed treatment used.

Future Farming

Exploring Organic and Pasture Integration on HEL

- Stacked enterprise in pasture (Silvopasture)
- Small form factor autonomous units for weed control
- I would love your feedback

EpiYield Seed expansion

- I think this will be fun

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monte@bottens.com 559-694-1582

10 year SHP Cover Crop Study

4 reps.

Corn on Corn Non-GMO

Cover Crops

- 10.03 bpa increase
- .39% dryer

Last year 7 bpa increase

And last year was first year of yield increase for corn with covers.