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Soil Health Initiative: Research at Noble

David McSweeney, Product Owner
Nikki Charlton, PhD
Lauren Jones, PhD

Regenerative agriculture

- Building soil organic matter and biodiversity
- Healthier and more productive soil that is drought- and flood-resilient
- Decreased use of chemical inputs and subsequent pollution
- Cleaner air and water
- Enhanced wildlife habitat

Soil Health Principles

- Know Your Context
- Minimize Soil Disturbance
- Increase Diversity
- Maintain Continuous Living Plants/Roots
- Cover The Soil
- Integrate Livestock

Ecosystem Processes

- Water Cycle
- Energy Cycle
- Nutrient Cycle
- Community Dynamics

Increase biodiversity above and below ground with cover crops

- Improves soil structure and biology
- Reduces cost of inputs that plants and microorganisms can naturally supply
- Increases soil organic matter
- Increases water infiltration rates
- Builds soil water holding capacity

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Diseases and pests


Poor water infiltration


Lack of biodiversity

Common Problems in Pecan Orchards

Regenerative Silvopasture

- Increase functional community groups through plant diversity and animal impact
- Beneficial insects, wildlife, and microbes
- Balanced nutrient cycle

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Research:
The Enterprise Team

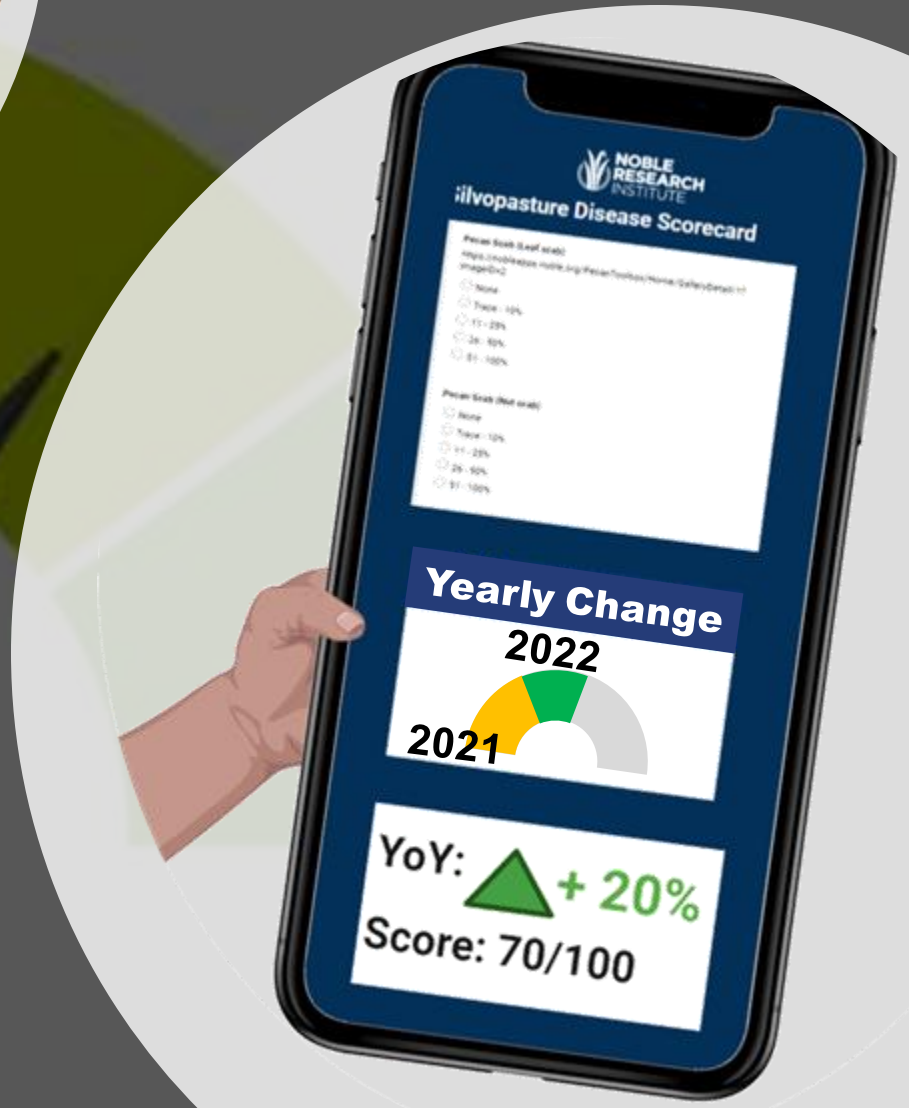
Silvopasture and Wildlife

Amy Bridges
Will Chaney
Nikki Charlton
Charlie Graham
Lauren Jones
Will Moseley
Mike Proctor
Charles Rohla
Alan Sparks

Monitoring the Transition to Regenerative Agriculture on Noble Farms

- Monitor soil health using PLFA and Haney
- Adaptive multi-paddock grazing impacts on FSMA rules
- Scorecards to monitor progress over time
  - Diseases
  - Insect pests
  - Orchard/Tree Health
- Monitor insect pests and beneficial insects
- Economic evaluation of implementing regenerative principles
- Health benefits of regenerative pecans

Scorecard:
A progress report



Can bats reduce pesticide use in orchards?

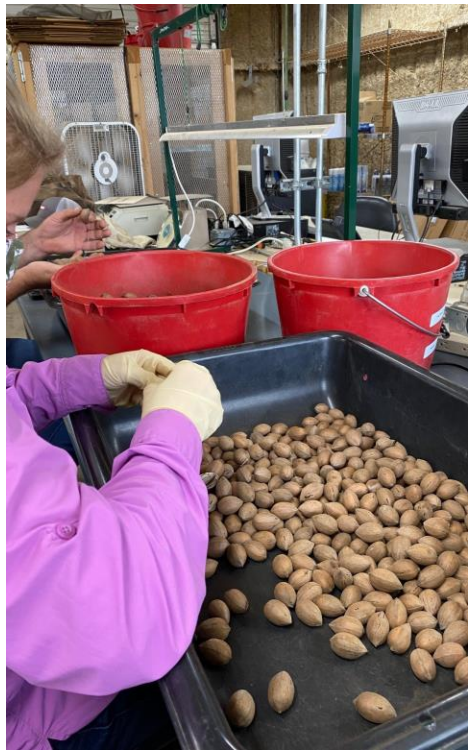
Troy Swift

Does improving the soil health help reduce risk of human pathogens?

Dr. Maria Ma

Economic Evaluation at McMillan Orchard

- Choctaw
- Kanza
- Maramec
- Nacono
- Oconee
- Pawnee



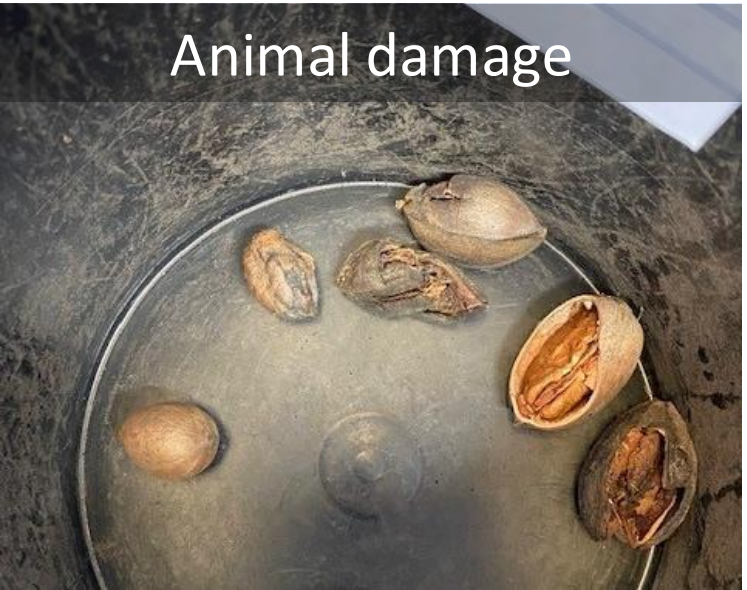
Sorting process

Pecan nut casebearer
Pecan weevil
Animal damage
Hickory shuckworm
Other damage (scab, vivipary, etc.)


Pecan nut casebearer


Pecan weevil


Other damage (scab, vivipary, etc)


Animal damage


Hickory shuckworm

Kernel Ratings

Fancy

Standard

Amber

Inedible

Stink bug

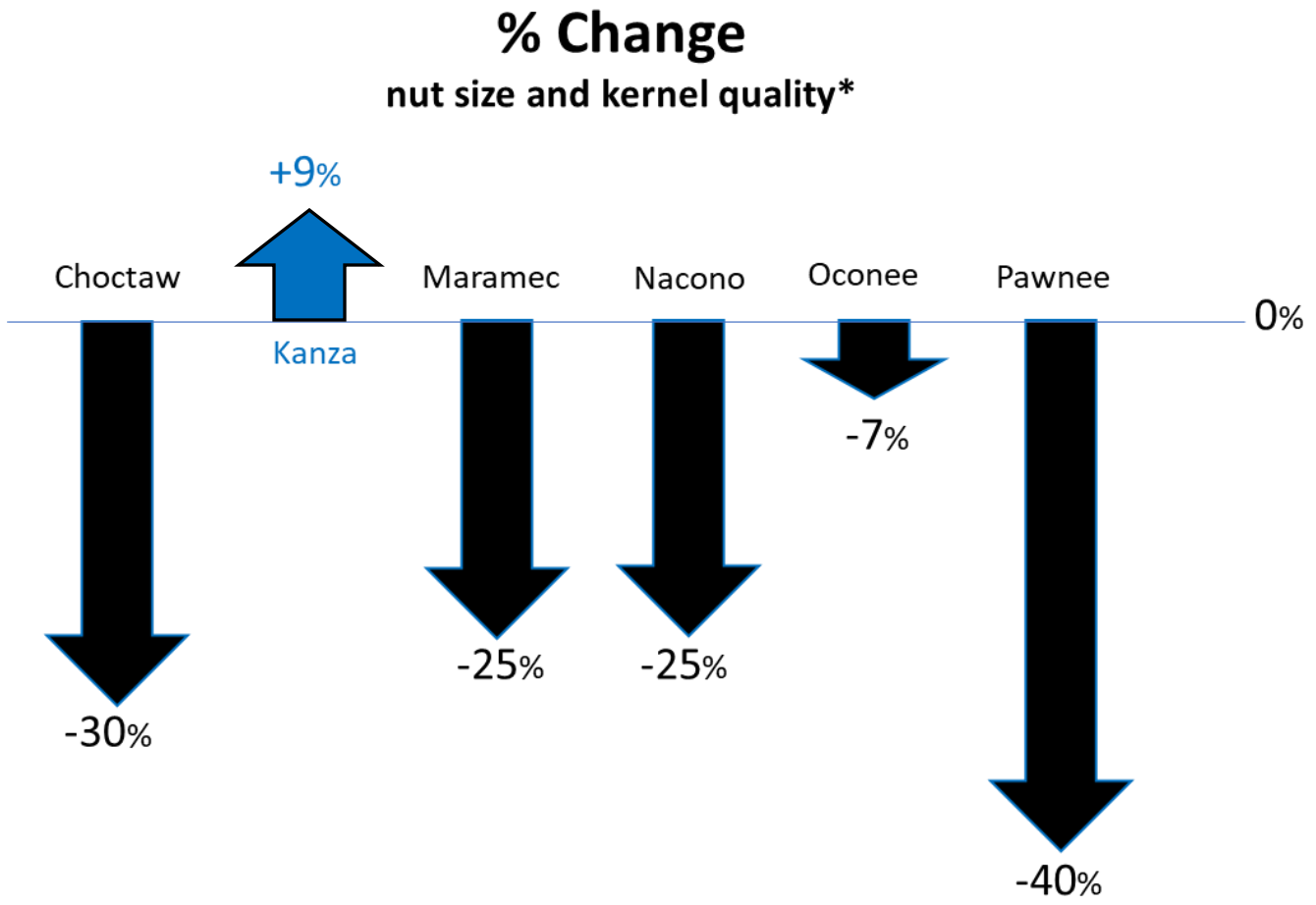
Necrosis

Embryo rot

Brown spot

Weevil

Kanza – The Sole Survivor



* 2021 values compared to standard

Does improving the soil health increase health benefits in pecans?

Pecans – Healthy Snack?

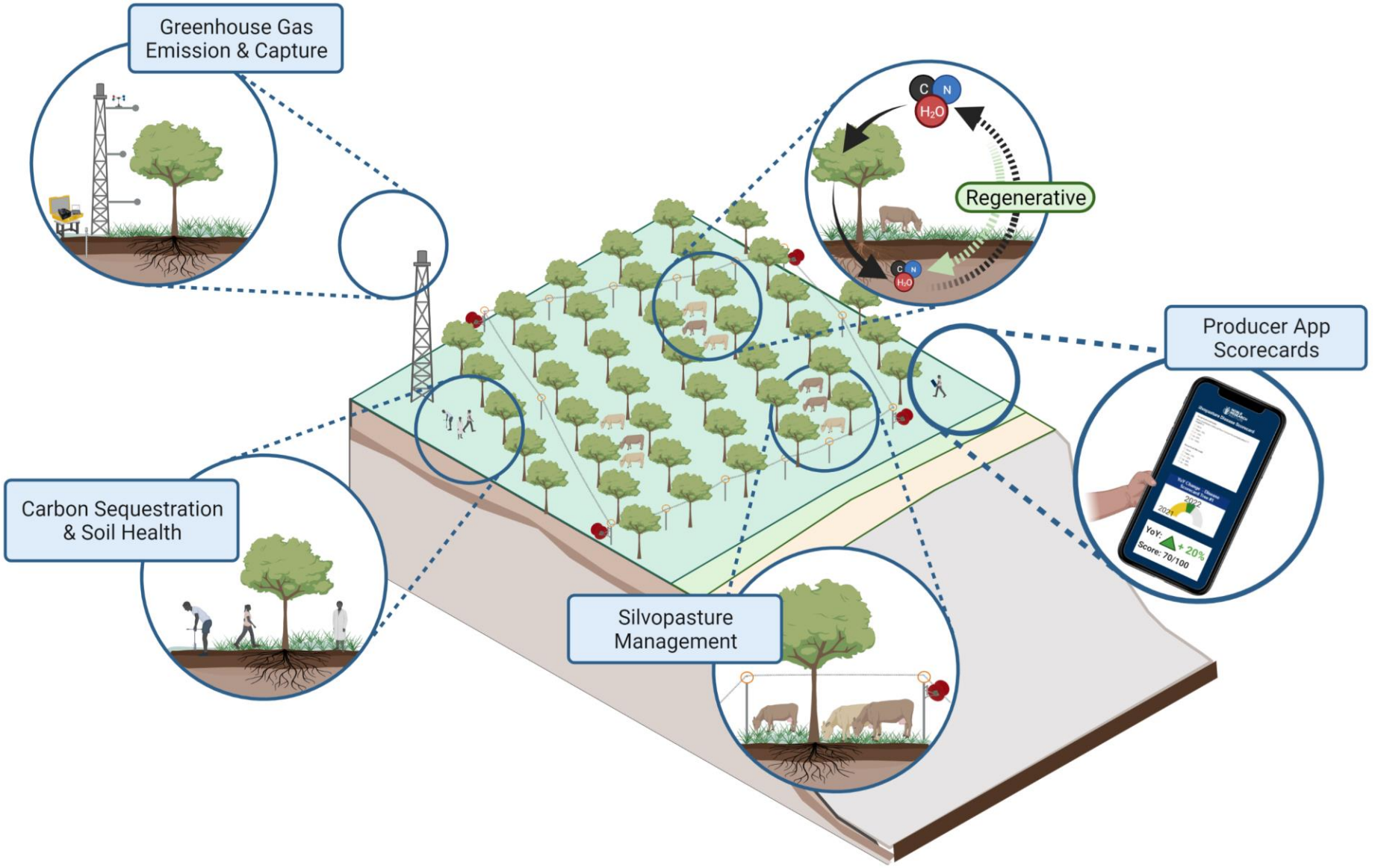
Antioxidants

Vitamin E

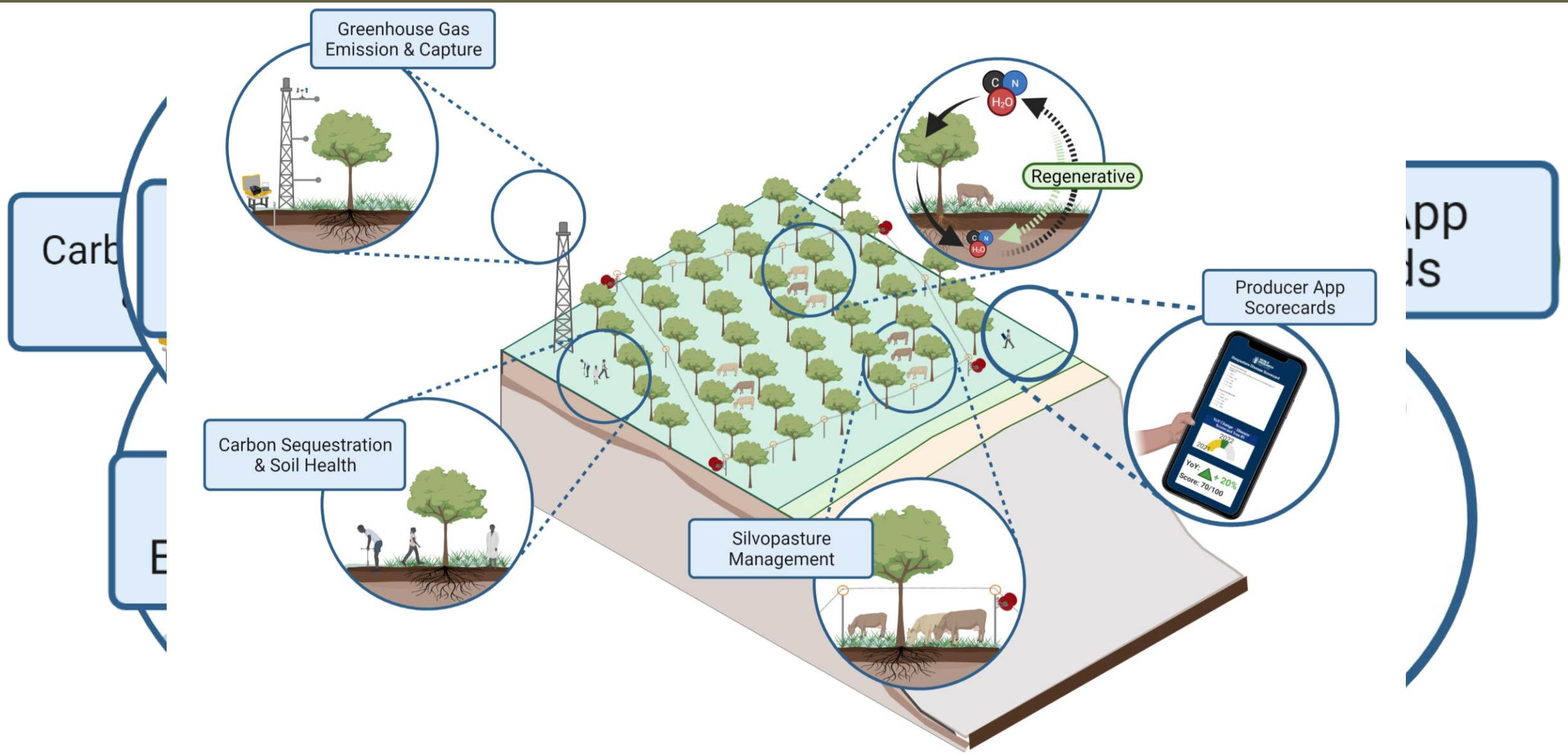
Phenolics

Carbohydrate content

Oil content & quality



USDA Partnerships for Climate-Smart Commodities



USDA Partnerships for Climate-Smart Commodities

Future Research Ideas

COVER CROPS

MICROBIAL FUNCTION

PRODUCER BOARD

PLANT DISEASE MANAGEMENT

MARKETING

Questions?

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FIVE SOIL HEALTH INDICATORS

ONE
SOIL COLOR

TWO
SOIL STRUCTURE

THREE
BIOLOGICAL ACTIVITY

FOUR
ROOTING RESISTANCE

FIVE
SOIL SMELL