

Consideration from Conventional to Organic Production System

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Today's Talk

- What is organic farming
- Principles of organic farming
- Steps from conventional to organic farming
- Fertility management in organic farming
- Pest and disease management
- Some research results

What is Organic Farming



Organic farming is a production system that regenerates the health of soils, ecosystems, and people



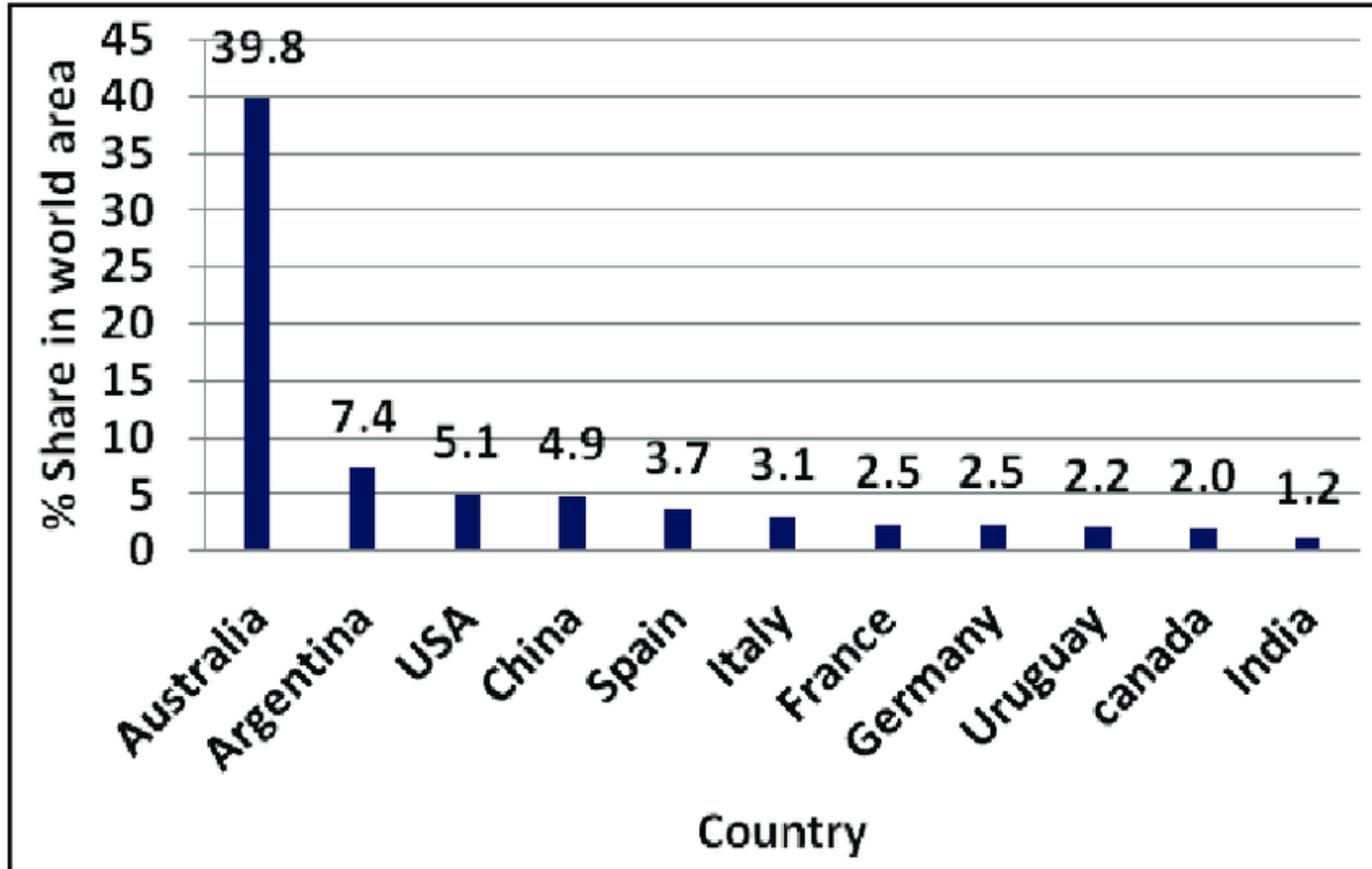
Organic farmers use biological fertilizer inputs and management practices such as cover cropping and crop rotation to improve soil quality and build organic soil matter



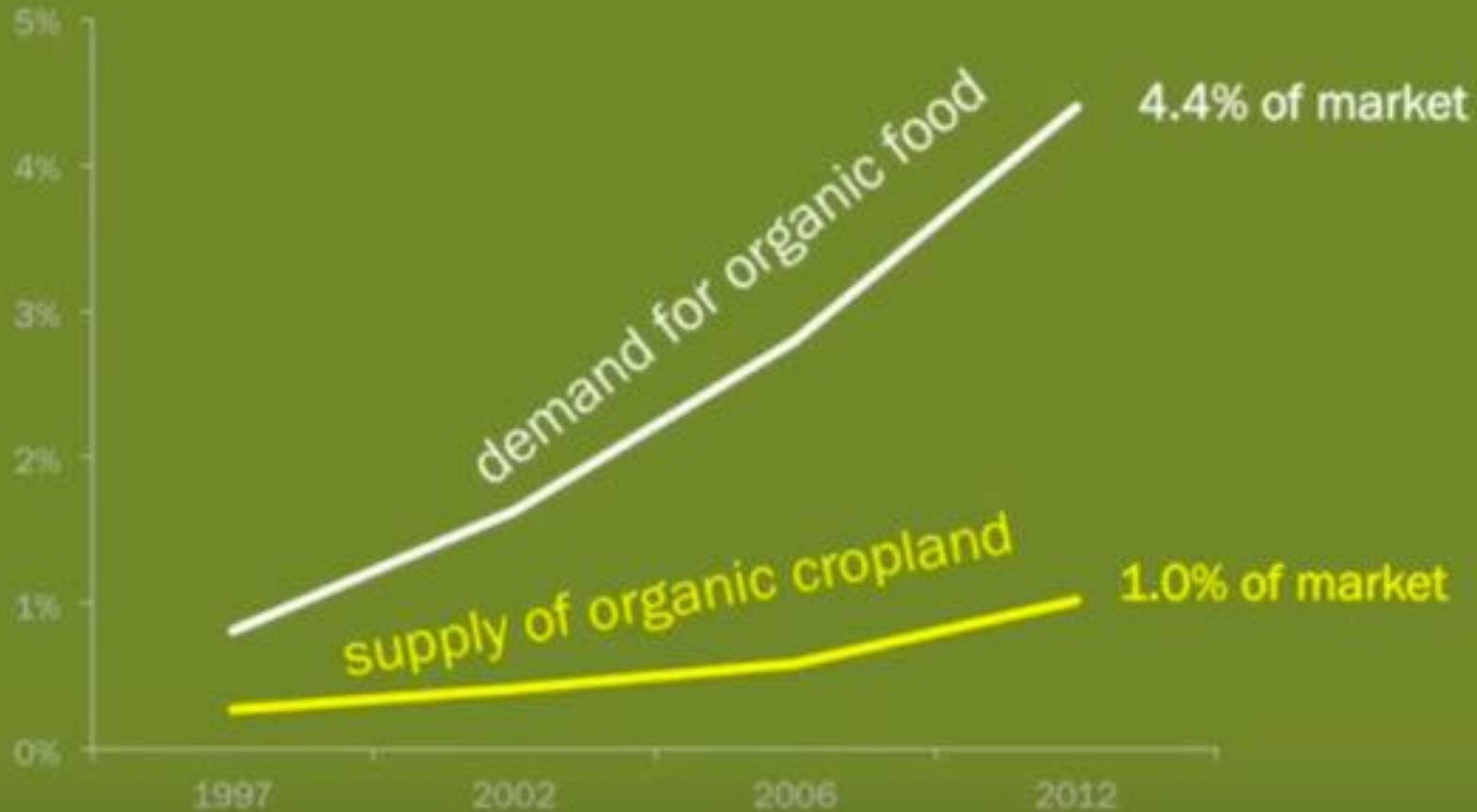
Organic farming do not use synthetic inputs like chemical fertilizers, pesticides, and herbicide. Genetically modified organisms (GMOs) are not allowed in organic farming



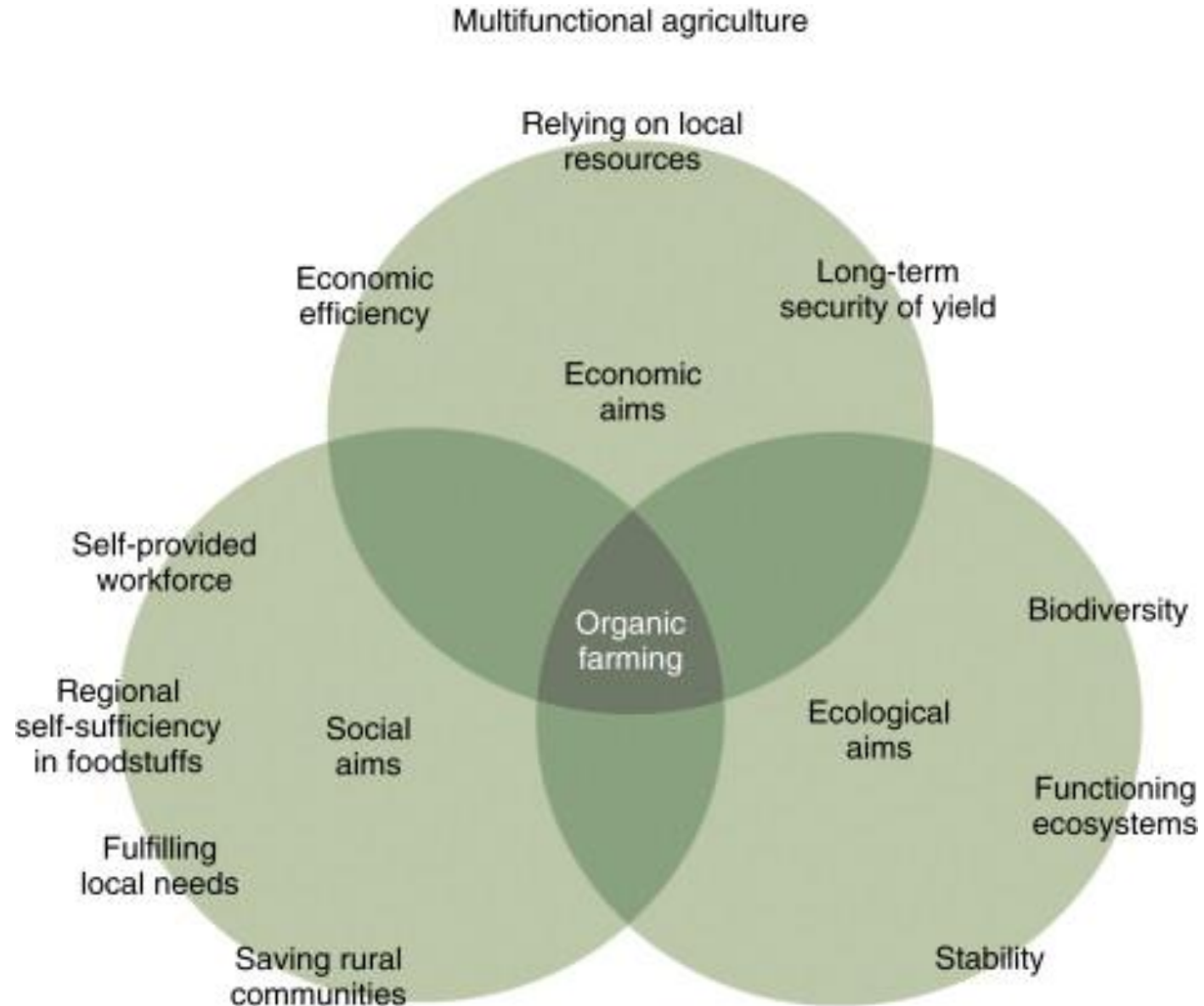
Countries with largest area under organic production



Because the demand for organic dwarfs the supply in the U.S.



What is Organic Farming



Conventional vs Organic farming

Conventional farming

- **Conventional** farming uses synthetic fertilizer to (derived from fossil fuels) to promote plant growth
- Uses synthetically produced insecticides and herbicides to reduce pests, disease and weeds.
- Heavy tillage and monocropping increase soil erosion and soil compaction and decrease water holding capacity, organic matter, and microorganisms
- Deteriorate soil fertility and overall soil health
- No sustainability, focused more on yield
- Use of GMO seeds

Organic farming

- **Organic** farming uses natural fertilizer (plant manure, biofertilizer, crop rotation) to promote plant growth
- Uses natural methods to reduce pests, disease and weeds.
- Practices like crop rotation, inter-cropping, cover cropping improve soil structure, increasing nutrient decreasing soil erosion, all drought, pests and diseases.
- Improve soil health and fertility
- Sustainability is the main focus
- No use of GMO seeds

Principle of Organic Farming



HEALTH



CARE

Principles of
ORGANIC FARMING



ECOLOGY



FAIRNESS

Principle of Health

- *Organic agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.*
 - Health of eco-systems, as well as the health of people and communities.
 - Healthy soil produces healthy crops, and in turn, healthy produce leads to healthy animals and humans.
 - Good health is imperative to our mental and physical wellbeing; it also increases our immunity and allows our body to regenerate.
 - Organic agriculture aims to provide healthy food that is nutritious and superior quality. By not using fertilizers, pesticides and additives, organic food plays an extra part in aiding good health.



Principle of Fairness

- *Organic agriculture should build on relationships that ensure fairness with regard to common environment and life opportunities.*
- The principle of fairness refers to good human relationships and quality of life
- Organic agriculture is based on providing a fair and just environment for people to live in
-
- Organic farmers are expected to ensure work completed at their farm is fair to all involved, from the farmers and pickers, through to the distributors and consumers
- It aims to provide quality food and other products, and animals are to be housed in conditions that are in accordance with their natural behaviors and wellbeing.



Principle of Ecological Balance

- *Organic agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them*
- Organic farms are based on an ecological system that balances with the environment and nature, including recycling and taking care of the eco-system.
- produce and raise organic animals, you need to take care of the farm itself. For crops, take care of the living soil.
- Ecological balance includes managing conditions and culture; and farmers, producers, traders and consumers should take environmental protection on board.
- Air, water, biodiversity, climate and land needs to be protected and can be done through the use of high-tech farming systems.

Principle of Care

- *Organic agriculture should be managed in a precautionary and responsible manner to protect the health and wellbeing of current and future generations and the environment*
- When it comes to organic agriculture, it's not just the environment today that matters, but we also need to have consideration for the environment of the future.
- This is where the principle of care comes in. Many organic farmers aim to increase their production, and while this is great – it must be done with care to ensure the future health of the planet is taken care of.
- Using organic farming technology is the best way to do this, and it's recommended organic producers keep up to date with new methods.



Steps Transitioning from conventional to Organic Farming

Information Phase:

Good Information First

Understand the national organic standards

How to improve soil fertility?

How to keep crops healthy?

How to best increase diversity in the farm?

How to keep livestock healthy?

How to give value to organic products and how to successfully sell them

Information Stage:

Getting Familiar with Organic Practices

- Mulching
- Intercropping
- Composting
- Green manuring
- Organic pest management
- Appropriate seed /plant materials

Pre-transition Stage

- **Assess farm resources**
 - Will the organic operation include livestock?
 - Will the livestock component transition to organic simultaneously with the crops or later?
 - Can livestock be added via ownership or by partnering with another farmer?
 - Are storage facilities adequate for additional crops, or for segregating organic and conventional crops?
 - Which crops and practices for the transition phase can best prepare the land for organic production, such as reducing weed populations or improving soil nutrient availability?
 - How will soil fertility be managed using rotations, cover crops, and application of organic materials (as directed by NOP regulation 205.203)?
 - Are affordable organic nutrient sources accessible?
 - Will the planned crop rotation require additional equipment or labor?

Pre-transition Stage

- **Choose a transition strategy**

- A gradual conversion of the whole farm is recommended
- Prohibited farm inputs and crops produced with a prohibited substance must be stored in separate facilities than organic inputs and produce. For example, treated grain or seed cannot be allowed any opportunity to comingle with organic grain. After any operation in conventional fields, equipment must be thoroughly cleaned before moving to transitional or organic fields to prevent contamination from conventional products. Cleaning of equipment, and procuring, handling, and storing of organic inputs and produce must be carefully documented.
- A buffer strip, usually 25 feet, is required between organic and conventional land. One can use the same crop as the field for buffers, but must be kept separate. Harvest equipment must be cleaned between buffer harvest and field harvest.
- Selecting land with the least limiting natural conditions (fertility, drainage, soil physical properties) and with low insect and weed pressure for initial organic transition.

Pre-transition Stage

- **Integrate market-based strategy**
 - Consider your market strategy early in transition process
 - Marketing decision will determine the type farming system
 - Marketing of transitional produce is a challenge. Produce from the second and third years of transition may be marketed as “transitional” as long as the word “organic” is not used. Several certifying agencies have programs for transitional verification

Pre-transition Stage

- **Develop business plan and record keeping system**
 - Develop a multiyear business plan from transition-to-organic farm
 - An organic transition planner (<https://www.sare.org/resources/organic-transition/>) is useful tool in preparing extensive, realistic budget and cash flow analysis including marketing
 - Recording keeping from seed to harvest, including sales and inputs is very critical
 - Consult with your organic certifying agency for record requirements

Transition Year 1

- **Develop Farm Management Approach**

- Converting to an organic system is involve changes in mindset and management habits
- Consider partnering with university researchers and recovering costs through program with SARE, Cares Trust, or OFRF
- Organic farming is more diverse than conventional farming, so it needs additional management skills and knowledge.
- Habits of observations, flexibility and intervention is more demanding in organic production
- Effective and efficient weed and soil fertility management

Transition Year 2 & 3

- Plant and conduct on farm trial
- Market transitional crop
- Prepare organic system plan for certification
- Start documenting land use and inputs

Managing Soil Fertility in Organic Production

Nutrient Sources

Cover Crops

- Improve soil physical, chemical and biological properties
 - Fix and trap the nutrients
 - Add organic matter to soil
 - Reduce nutrient leaching and runoff
 - Provide weed control
 - Provide food for pollinators
 - Furnish moisture conserving mulch
- Rotation
 - Living mulches
 - Green manures
 - Mulch on the soil surface

Selection of Cover Crops

- satisfy the producer's primary reason(s) for cover cropping;
- easy to establish and maintain with available equipment;
- well-suited to the local climate and the farm environment;
- not compete with income-generating crops grown simultaneously or subsequently;
- ability to withstand stresses likely to occur such as drought, frost, heat, etc.

Main Groups of Cover Crops

- Buckwheat
- Sunflower
- Mustards
- Forage radishes
- Cereal rye
- Sorghum
- Vetch
- Field peas
- Soyabean
- Wheat



Compost

- Compost provides many benefits as a soil amendment and a source of organic matter by improving soil biological, chemical, and physical characteristics:
 - Increases microbial activity
 - Enhances plant disease suppression
 - Increases soil fertility
 - Increases cation exchange capacity
 - Improves soil structure in clayey soils
 - Improves water retention in sandy soils
 - Reduces bioavailability of heavy metals



PC: Robert Rynk, WSU

- C:N ratio; particle size; Age; pH; salt concentration; purity, weed free, no phytotoxic compounds
- The National Organic Program (section 205.203) provides all guidelines for the selection of the compost

Manure

- Livestock manure good resource for organic soil management
- Provide important nutrients NPK
- More effective if used in combination with crop rotation or green manuring
- Applied to the field as raw manure (fresh or dried) or composted manure
- Raw manure is also used by composting with other feedstocks to produce humus-rich product
- **USDA Organic Regulations for Manures and Manure-Based Compost 7 CFR § 205.203(c)**

Commercial Organic Fertilizers

Chilean nitrate	Blood meal	Feather meal
Fish meal or powder	Sea bird or bat guano	Meat and bone meal
Soya bean meal	Processed liquid fish residues	Alfalfa meal
Pelleted chicken manure	Bone meal	Kelp extract
Soft rock phosphate	Potassium-magnesium sulphate	

Minor elements and special-purpose fertilizers

- Organic fertilizers contain few minor elements
- Different blends/tees of minor nutrients are available
- Synthetic fertilizers may be permitted by certifying agency in specific circumstances
- Specific approved sources of potassium, calcium and magnesium can be used to correct deficiency or imbalance

Organic Pest Management

- Relies on preventing pest problems from becoming economically damaging
- Maintaining a vibrant and healthy soil ecology
- Providing habitat for beneficial organisms, and limiting habitat for pests
- Crop rotation and soil and crop nutrient management practices, as provided for in §§205.203 and 205.205
- Sanitation measures to remove disease vectors, weed seeds, and habitat for pest organisms
- Select species resistance to prevalent pests, weeds, and diseases.
- Augmentation or introduction of predators or parasites of the pest species; (2)
Development of habitat for natural enemies of pests
- Non-synthetic controls such as lures, traps, and repellents.

Important Points for Organic Pest Management

- Develop a small library of pest-management reference materials.
- Identify local experts (entomologists, plant pathologists, soil scientists) who are willing to respond quickly to questions.
- Learn major pests (and their natural enemies!) of your main crops, understand their lifecycles, and learn how to use a hand lens.
- Train other workers on your farm on pest and damage ID, as well.
- Take digital pictures of unknown pests/ plant symptoms and send them to local experts for identification.
- Have at least a good-quality backpack sprayer; larger farmers may want to have a tractor-based spray rig with internal agitation.

Organic Disease Management

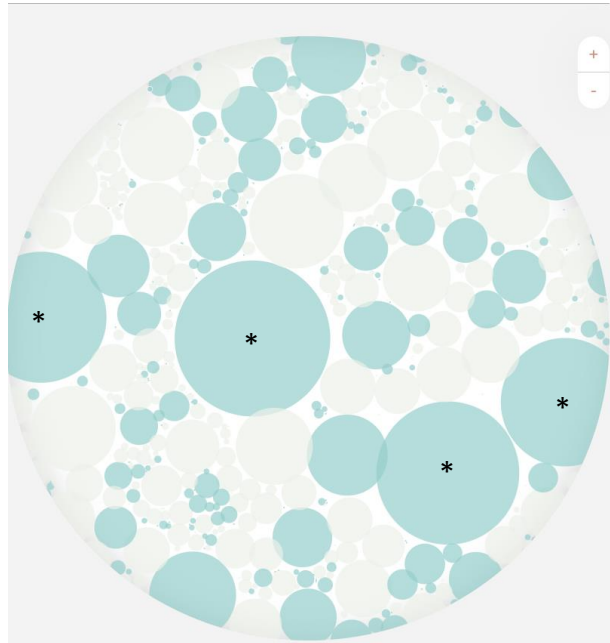
- Cultural control
- Soil solarization for controlling soil borne diseases
- Biorational control of diseases

Some Research Results

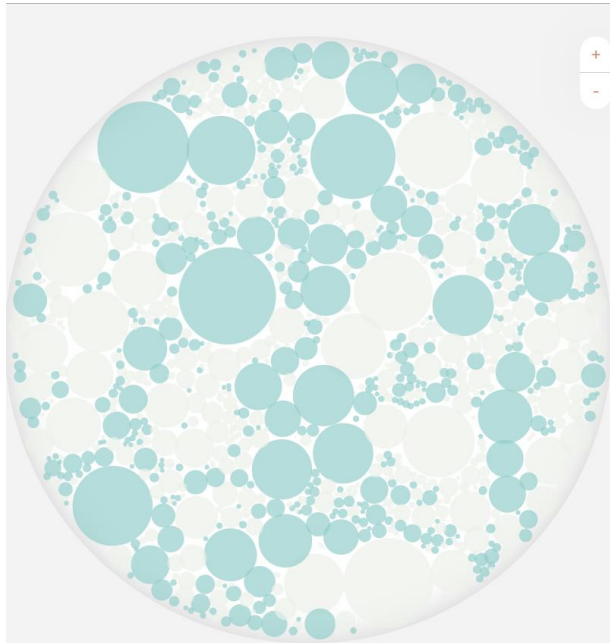
- Conventional production system
- Indigenous production system
- Regenerative production system



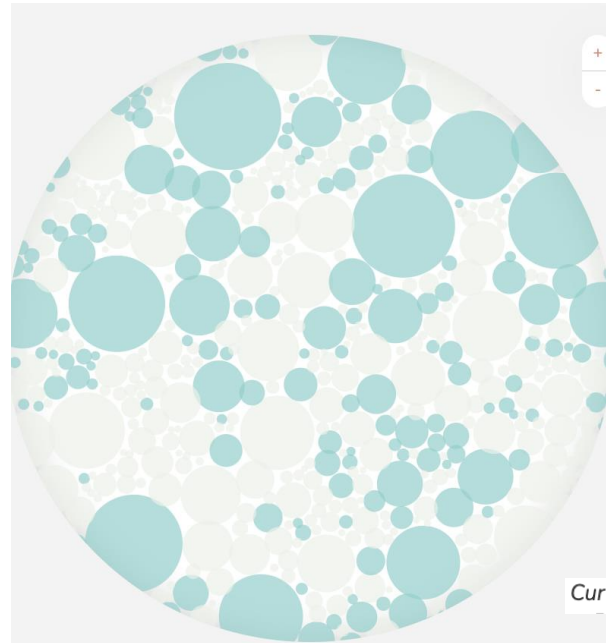
Evolution of the Fungal Population in Organic Plots



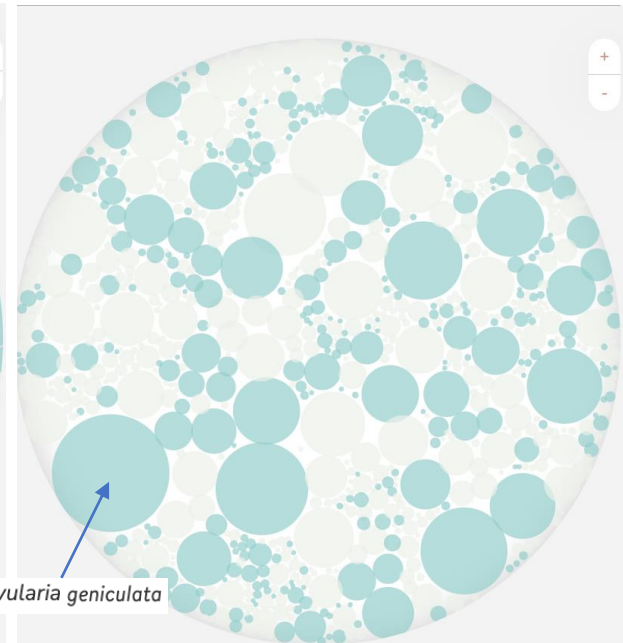
PREPLANT – 2/2021



Fall 2021



Summer 2022



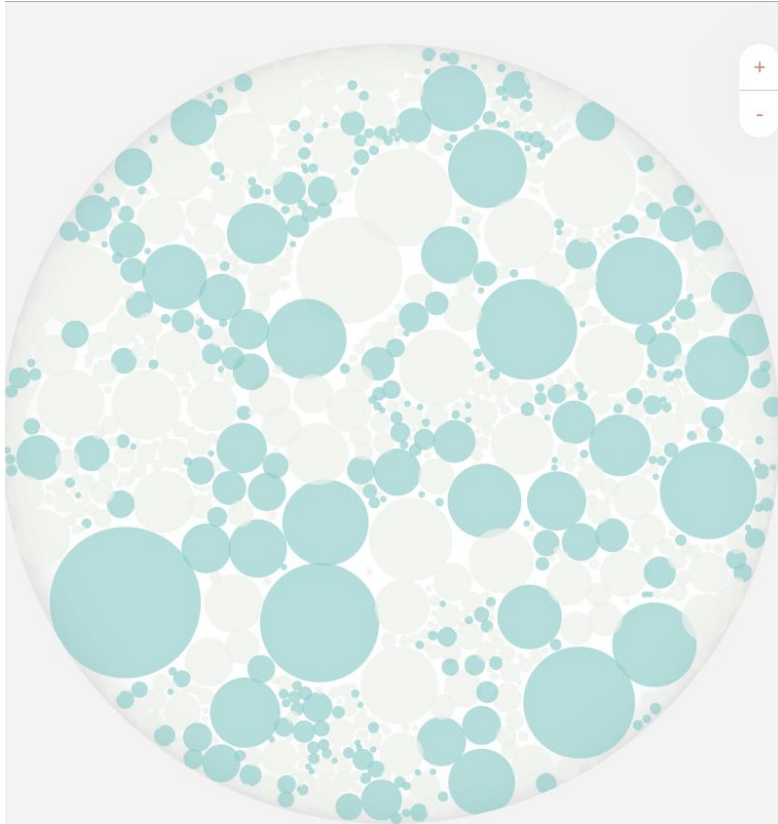
Summer 2023

<< Winter fallow. Citrus Planted 4/9/21

Cover Crops (10 species) planted each spring and fall -----

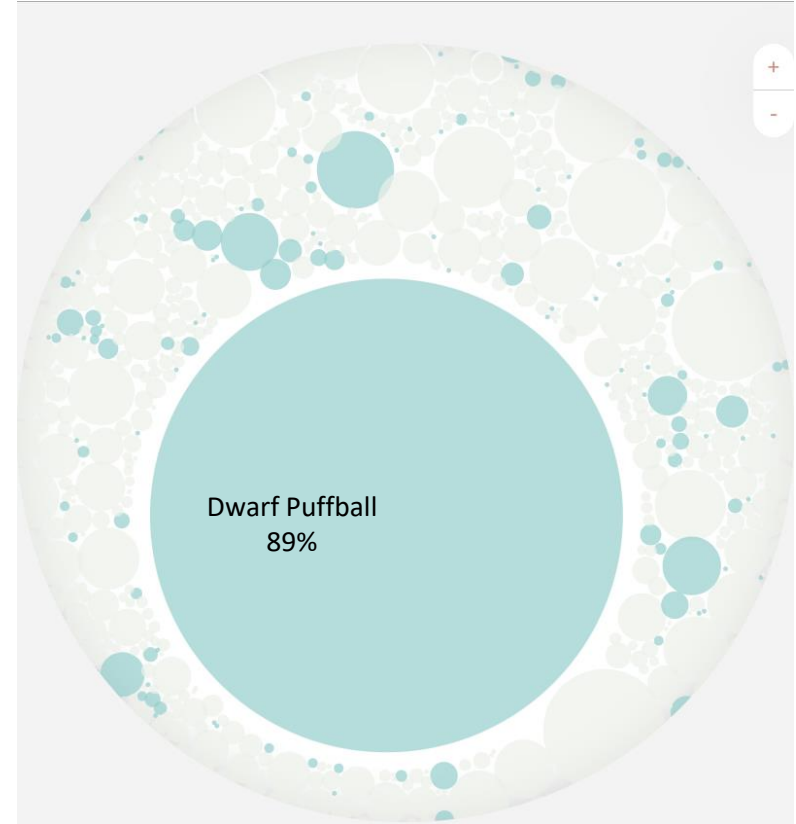
*45% of fungal biomass:
Penicillium brasilianum,
Hannaella oryzae,
Gibellulopsisens nigrescens,
Cryptococcus sp.

Organic



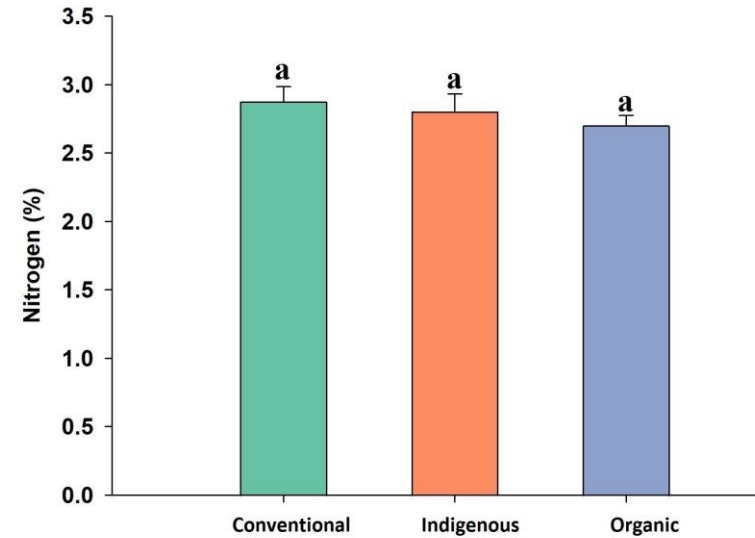
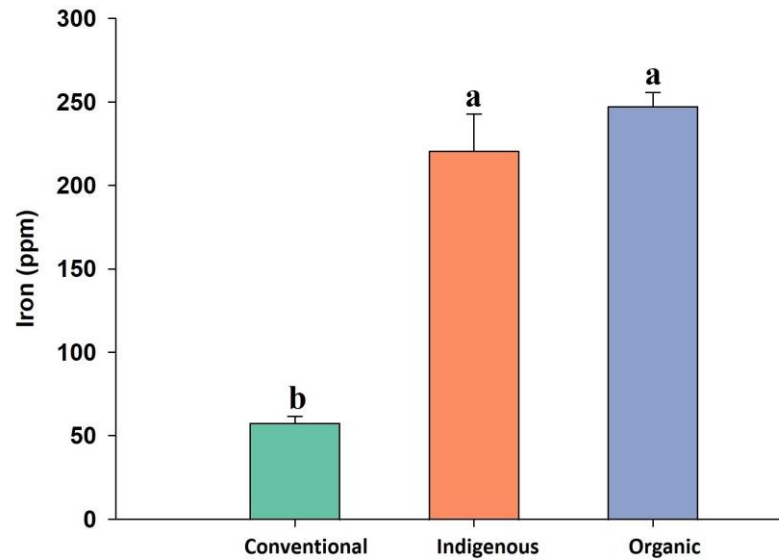
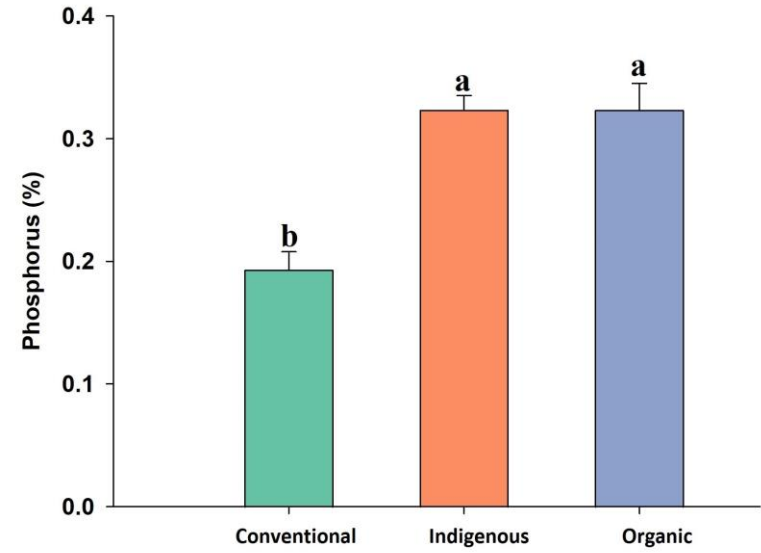
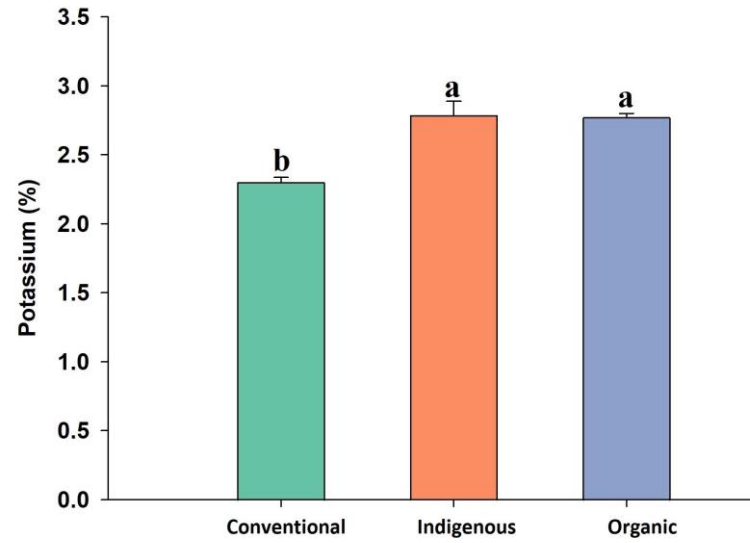
Organic + Cover crops
+ Inoculants

Conventional



Bare ground herbicide strip maintained
with glyphosate and synthetic fertilizers.

Plant Nutrient Analysis



Some Research Results



Take-home message

Pros

- Sustainable agriculture
- Healthier food
- Environmental conservation
- Reduce chemical inputs
- Efficient use of resources
- Improve soil health
- Potential profitability
- Diversified crops

Cons

- Lower yield
 - Higher initial cost
 - High labor requirement
 - Potential loss of crops
 - Supermarkets profit more than farmers
 - Knowledge-Intensive farming
 - More observations required
 - The Certification process
- It takes 3 year to get certification and market your produce as Organic
 - No synthetic entry from the day 1st of transition
 - Record Keeping very critical
 - Start from small scale and then extend

THANK YOU

