

Quiz

OPTIMIZING SOIL & PLANT HEALTH IN AGRI-FOOD PRODUCTION

Regenerative Agriculture - its benefits and innovations



By: Eric & Ines Batterton
Owners & Founders of My Nordic Garden
 My NORDIC Garden
Regenerative & Sustainable Urban Gardens

Module 1: Introduction to Soil Health

1) Name 5 characteristics of healthy soil.

2) Why is soil health important in agri-food production? Explain!

3) List 3 common agricultural practices that contribute to the degradation of fertile farm land.

4) Pinpoint the main difference between Sustainable and Regenerative Agriculture.

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Module 2: Soil Testing and Analysis

1) Why is soil testing important? Explain!

2) List 5 physical & chemical soil properties.

3) What does NPK stand for and how do each of them contribute to plant growth?

4) How does microbial activity impact the overall health of soil ecosystems?

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Module 3: Building Healthy Soil with Composting

1) What is 'compost'? Define the word.

2) Name 5 benefits of composting for soil health.

3) What does 'brown' and 'green' material mean and why is the ratio important?

4) Name the two main composting processes. Briefly describe how they work.

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Module 4: Preventing Mould and Fungal Diseases

1) Explain the following statement: 'All moulds are fungi but not all fungi are moulds'.

2) Identify the two main factors that determine mould growth.

3) Name some diagnostic tools used to identify mould and fungal diseases.

4) Name a few in-field and post-harvest measures for preventing mould and fungal disease.

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Module 5: Nutrient Management & Fertilization

1) Define nutrient management.

2) What are the importance of micronutrients? Explain briefly and name a few.

3) Name two ways to detect nutrient deficiencies in your plants.

4) True or false? Mark the true statements!

- Synthetic fertilizers are better for soil health than organic fertilizers.
- Synthetic fertilizers release nutrients quickly.
- Organic fertilizers are cheaper upfront.
- Organic fertilizers enhance soil structure, fertility & microbial activity.

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Module 6: Organic Soil Amendments & Alternatives

1) What are some types of organic soil amendments? Name 5.

2) Why is tilling detrimental to soil health?

3) What are some alternatives to no-till?

4) Research task: Find out, why in some cases no-till farming may not be suitable.

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Module 7: Crop Rotation & Plant Pairing

1) Why does crop rotation work? Briefly explain the theory.

2) Name the three principles of effective crop rotation.

3) Give a short definition of companion planting.

4) Name 5 companion plants and their benefits.

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Module 8: Water Management & Irrigation Practices

1) Name the sources of water used for agricultural needs.

2) Name 3 water conservation strategies.

3) What are some of the risks of water mismanagement? Give a brief explanation.

4) Research task: Find one more large body of fresh drinking water that has been severely depleted due to human activity .

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Module 9: Integrated Pest Management

1) What is IPM? Give a brief definition.

2) What are the key principles of IPM?

3) Name cultural practices that help with pest management.

4) IPM allows the use of organic, physical and chemical pest management. Create a list of pros and cons for each method.

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Module 10: Soil Conservation & Sustainable Practices

1) What is your main takeaways from this course?

2) If you haven't done so yet, implement the regenerative practices you've discovered in this course in your own garden or farmland. Keep a record of your progress and observe the changes as your soil begins to improve. Documentation is key.

Answers

Module 1: Introduction to Soil Health

- 1) crumbly/fluffy structure, air and water pockets, microorganisms, earthworms, nematodes, fungi, pleasant smell (forest smell), organic matter (dark brown color)
- 2) Soil health significantly impacts crop yields, ecosystem stability & long-term success of farms. It is vital for promoting plant growth, plant resilience and adaptation to climate change. Healthy soil is rich in essential nutrients, retains water well and has a lively microbial community.
- 3) Compacting, Tilling, (Over-)Fertilization, Monocropping, Livestock Pressure
- 4) Sustainable agricultural practices support (not detract from) natural resources - keeping the as-is state, whereas regenerative agriculture aims to restore natural resources with the focus on soil health. Balances environmental priorities with agricultural output.

Module 2: Soil Testing and Analysis

- 1) It's important to understand the physical and chemical composition of soil. Farmers can make informed decisions based on results. Nutrient balance is essential for optimizing plant growth, ensuring economic efficiency & environmental stewardship.
- 2) pH, nutrients (NPK), mineral content, organic matter, texture, microbial activity
- 3) N: Nitrogen, essential to produce proteins, for photosynthesis & reproduction
P: Phosphorus, vital for photosynthesis & plant growth
K: Potassium, vital for plant metabolism & development
- 4) Microbes play a key role in nutrient cycling & disease suppression, they make nutrients available to plants. Microbes loosen soil which increases air & water pockets within the soil.

Module 3: Building Healthy Soil with Composting

- 1) partly decayed organic matter that feeds plants, feeds soil biology, and improves soil
- 2) improves soil structure, retains water, provides nutrients, as a mulch it keeps soil & roots cool, reduces erosion, buffers pH, supports microbial activity
- 3) brown material: carbon rich, dry, e.g. dry leaves, sticks, straw, wood chips
green material: nitrogen rich, fresh & moist, e.g. lawn clippings, kitchen scraps, coffee grounds, manure
- 4) aerobic composting: 'hot' composting, involves the decomposition of organic material in oxygen rich environment and heat
anaerobic composting: 'cold' composting, involves the decomposition of organic material in low oxygen environments

Module 4: Preventing Mould and Fungal Diseases

- 1) Fungi are a diverse group of eukaryotic organisms., they include yeasts, moulds & mushrooms. Moulds are a specific type of fungus.
- 2) temperature and moisture
- 3) leaf sampling, soil sampling, laboratory tests, regular observation, record keeping, home testing kits
- 4) In-field: crop rotation, resistant varieties, proper spacing (air flow), sanitation (clean tools), water management, mulching, timely harvest
post-harvest: good hygiene, reduced storage time, avoid contamination at processing/packaging, careful handling of produce, monitoring temperature & humidity in storage

Module 5: Nutrient Management & Fertilization

- 1) Nutrient management is the strategic application of nutrients to optimize plant growth and soil health.
- 2) Micronutrients are essential elements that plants need in small quantities for various physiological functions. For example: copper, iron, manganese
- 3) yellowing leaves, irregular or stunted growth
- 4) True or false? Mark the true statements!

-  Synthetic fertilizers are better for soil health than organic fertilizers.
-  Synthetic fertilizers release nutrients quickly.
-  Organic fertilizers are cheaper upfront.
-  Organic fertilizers enhance soil structure, fertility & microbial activity.

Module 6: Organic Soil Amendments & Alternatives

- 1) Mulch, Compost, Manure, Green Manure, Cover Crop, Organic Fertilizer
- 2) Effects of tilling: strong degradation of soil; top 6-10" turned over, exposed to air; disrupts life of soil organisms; kills earthworms; damages soil structure & mycelium connections; exposes soil > erosion; kills living roots in the soil; reduces water retention capability > drought, floods; nutrient loss, loss of organic matter; chemical fertilizers used to supplement nutrient loss
- 3) ridge-tilling, mulch-tilling, strip-tilling
- 4) Research task to find your own answer

Module 7: Crop Rotation & Plant Pairing

- 1) It's not 100% scientifically proven, why crop rotation increases yields, but influencing factors include: different nutrient demands of plants, interrupting pest & disease life cycle, increased microbial activity.
- 2) crop families, timing & sequence, cover crops
- 3) Companion planting is growing two or more plants next to each other for mutual benefits.
- 4) Examples on slides 13 & 14 of Module 7 include: Marigold, Calendula, Rue, Borage, Lavender

Module 8: Water Management & Irrigation Practices

- 1) Surface water (lakes, rivers..), groundwater, rain water/snow melt, recycled water, desalination
- 2) mulching, cover crops, drought resistant crops, drip irrigation, smart irrigation system
- 3) Examples are:
 - emptying aquifers > irrigation needs outgrow refill/precipitation
 - drainage of fresh water lakes > over-use of water for irrigation
 - run-off contamination from fertilizer > eutrophication of rivers & lakes
 - run-off from nearby livestock > contamination of crops with E.coli
 - non-sanitary equipment in crop processing > listeria contamination
- 4) Research task to find your own answer

Module 9: Integrated Pest Management

- 1) Integrated pest management (IPM) involves evaluating all plant protection methods and integrating measures to prevent harmful organism populations.
- 2)
 - Usage of Agriculture Methods with least negative impacts on environment
 - Monitoring & Identification of harmful organisms , e.g. by observation, forecasting, diagnosis
 - Economic Threshold (ET) for pest action: pest population level at which the cost of managing the pest = crops loss cost
 - Usage of Multiple Control Methods
 - Always biological, physical & non-chemical methods over pesticide usage
 - If Pesticide necessary: reduced dosage, application frequency, partial application > always keep detailed records
- 3) Crop Rotation; Intercropping; Soil Health Management & Adequate Cultivation Techniques; Usage of Resistant/Tolerant Cultivars & Certified Seeds/Plants; Balanced Fertilization, Liming, Irrigation, Drainage; Hygiene Measures to prevent spreading of harmful organisms; Protection & Enhancement of beneficial organisms
- 4) see table next page

	Pros	Cons
organic	<ul style="list-style-type: none"> + Biodiversity Enhancement + Environmental Protection + Economical Benefits + Natural Resilience + Health Benefits + Sustainable Practices + Long-Term Solution 	labor intensive & time consuming
physical	<ul style="list-style-type: none"> + Biodiversity Enhancement + Environmental Protection + Economical Benefits + Natural Resilience + Health Benefits + Sustainable Practices + Long-Term Solution 	labor intensive & time consuming
chemical	+ quick fix	<ul style="list-style-type: none"> -Biodiversity Loss: contaminating soil, water & non-target organisms -Toxicity to Humans: health risks to farmworkers, consumers, community -Pest Resistance: increased dosages, increased environmental risks -Disruption of Ecological Balance: unintentionally effecting beneficial insects & animal higher up in the food chain, soil degradation & effects on microbial communities -Short-Term Solution -Pest Resurgence: populations may rebound if underlying issues not addressed -Liability Issues: harm caused by chemicals can lead to legal consequences

Module 10: Soil Conservation & Sustainable Practices

1) Individual Answers

2) Individual Answers and Documentation