

TEAM Number _____

Total Team Points _____/100 pts.

Current Environmental Issues Test

Agriculture & the Environment...Knowledge & Technology to Feed the World

**Partial credit will be awarded on some questions.*

1. Match the correct term below with the correct definition. Write answers in blanks below. **10 pts./_____**

- | | |
|--------------------------------|---|
| _____ Agroecology | A. A prescribed system of agriculture revolving around 3 central practices: no-till, cover crop, and crop rotation. |
| _____ Systems Agronomy | B. The application of ecological concepts and principles to the sustainable design and management of farms and food systems that balance economic viability, environmental resource management and societal concerns. |
| _____ Conservation Agriculture | C. A methodological approach towards a system of agriculture which considers local circumstances (environmental and economic) and agronomic knowledge in order to recommend a diversity of sustainable practices to farmers. |
| _____ Sustainable Agriculture | D. Integrated conservation-agriculture landscapes in which biodiversity conservation is an explicit objective in agriculture and rural development, and rural development is considered in shaping conservation strategies. |
| _____ Ecoagriculture | E. A general term covering a wide variety of farming practices that seek to maximize productivity while minimizing environmental damage; often used synonymously with agroecology. |

Points Awarded _____/ 10 pts.

2. Agricultural practices have the ability to cause environmental degradation or can also be designed to provide important ecosystem services such as sequestering CO₂. Select the agricultural practices that can add carbon back to soil. More than one answer may be chosen.

5 pts./ _____

- a. Use of organic fertilizers
- b. Applications of synthetic fertilizers
- c. Use of cover crops (“catch crops”)
- d. Mulching with crop residues
- e. Tillage

Answer(s): _____

3. Depending on the specific agricultural practices, agroecosystems can either produce various ecosystem services or have negative ecosystem impacts. Please describe TWO (2) disservices of agriculture and TWO (2) ecosystem services potential from agriculture.

4 pts./ _____

Disservices of agriculture:

Ecosystem services from agriculture:

4. Demand for bioenergy is increasing both in the U.S. and abroad, and this demand may be met using forest products such as wood pellets or agricultural products such as switchgrass. Explain the trade-offs between biodiversity and overall forest cover when this demand is met with more forest products as opposed to agricultural products, and vice versa.

4 pts./ _____

Points Awarded ____ / 13 pts

5. Which of the following is **not** one of the 6 basic resource management strategies utilized in 'ecoagriculture' approaches? **2 pt/_____**
- a. Use crop, grass and tree combinations to mimic natural habitats
 - b. Protect and expand larger patches of high-quality natural habitat
 - c. Focus on urban and suburban green growth
 - d. Develop effective ecological networks and corridors
 - e. Minimize or reverse conversion of natural areas

6. Mark each statement as 'True' or 'False.' Correct any statements that are false. **5 pts/_____**

a. Soil holds more carbon dioxide than the atmosphere.

b. Some studies indicate properly managed soil could double its carbon storage capacity.

c. Most farmers worldwide can afford the financial risk of investing in "greener" ways to farm.

d. Soil conservation efforts should focus on subarctic regions, since most carbon dioxide that has been released from the soil following the industrial revolution was from agriculture land in these areas.

e. Converting grasslands into agricultural land releases carbon dioxide into the atmosphere.

7. There are many management systems and conservation methods to improve soil health. One of the common practices is an un-harvested crop grown as part of a planned rotation to provide conservation benefits to the soil.

This practice is called a _____.

4 pts./_____

List three (3) benefits to soil health by using this conservation management system:

Points Awarded _____ / 11 pts

8. Compared to conventional systems, organic agriculture can improve _____ but generally results in reduced _____.

2 pt/_____

- a. product quality, yields
- b. biodiversity, yields
- c. product quality, pest pressure
- d. yields, product quality
- e. biodiversity, pest pressure

Answer: _____

9. In his NY Times op-ed, Jayson Lusk argues that industrial farms are good for the environment because:

2 pts./_____

- a. They allow growers to make more money to spend on herbicides
- b. Industrial farms have the capital to invest in innovative technology
- c. They increase the number of farms and farm workers
- d. all of the above
- e. none of the above

Answer: _____

10. Imagine you are a smallholder farmer in Paraguay and you are told by an “expert” that you must grow your crops in a no-till system to improve the health of your soils. Given the expense of herbicides, explain to this expert how this practice may not be sustainable for your system. (Hint - think of the economic and social aspects of sustainability)

6 pts/_____

11. Which of the following is true about forest farming?

2 pts/_____

- a. Combining forestry and livestock production leads to unsustainable soil erosion rates.
- b. Can yield food and medicine as long as no timber is harvested.
- c. Can be a diverse mix of native and non-native plants, animals, and fungi that produce timber, wildlife, food, and medicine.
- d. Only works when research identifies specific combinations of trees, understory plants, and fungi to be established
- e. All of the above

Answer: _____

Points Awarded ____ / 12 pts

12. Imagine you were asked to visit this location before planting and help determine if the current location would make for a pollinator friendly habitat. What criteria would you use to determine if this area would be suitable for the garden? Include ideas from the “Farming for Bees” publication to support your decision.

4 pts/ _____

13. When farming for bees, a rather new plant selection trend is the use of ‘cocktails’.

Define “cocktails”.

3 pts/ _____

14. A farmer has hired you to take yield estimates of his cover crop. After taking cuttings from several areas in the field, you dry them for 48 hours in an oven at 140F (60C). The total dried weight of the samples is 4.5lbs (2 kg). Using a yardstick, you found the total area covered to be 50 sq. ft (4.65 meters). Given the total dry weight and area, calculate the total yield (lb/acre or kg/hectare)?

Hint: 1 acre covers 43,560 sq. ft.; 1 hectare covers 10,000 meters (Calculator provided)

Show your work; Answer: _____

4 pts/ _____

15. Several cover crops produce an effect known as allelopathy. What is allelopathy and why is it beneficial to select cover crops with allelopathic effects?

3 pts/ _____

Points Awarded _____ / 14 pts

16. List one (1) benefit and one (1) challenge likely faced by urbanites who have transformed their grass yard to an intensively managed garden.

4 pts/_____

Benefits: _____

Challenges: _____

17. List two (2) reasons why consuming meat *in moderation* could be considered efficient, sustainable, and eco-friendly.

4 pts/_____

(1) _____

(2) _____

18. Explain how a farmer could use imagery collected from a drone to help make a fertilizer decision for a growing crop.

3 pt/_____

19. Despite a slight increase in young farmers in the US, the number of beginning farmers (farmers who have been in operation less than 10 years) dropped 10% between 2007 and 2012. What was the number one reason cited by respondents to the survey by the National Young Farmer's Coalition?

2 pts./_____

- a. Lack of access to farmland
- b. Declining interest in agriculture careers
- c. Declining commodity prices
- d. Increased concern about climate change
- e. Rising prices of farm equipment

Answer: _____

Points Awarded ____ / 13 pts

20. List two (2) potential advantages and two (2) potential disadvantages to growing food crops created through the use of the gene-editing technique, CRISPR. **8 pts./_____**

Advantages:

(1) _____

(2) _____

Disadvantages:

(1) _____

(2) _____

21. List at least three (3) ways that genetic engineering can improve agricultural crops and three (3) potential concerns about genetic engineering. **6 pts./_____**

Improve Agri. crops

(1) _____

(2) _____

(3) _____

Potential Concerns

(1) _____

(2) _____

(3) _____

22. What percentage of corn produced in the *United States* is genetically engineered? **1 pt /_____**

- a. 64%
- b. 72%
- c. 88%
- d. 93%

Answer: _____

Points Awarded ____/ 15 pts

23. What percentage of crops *globally* are destroyed annually by pests and disease? **1 pt./**_____

- a. 4-5%
- b. 10-15%
- c. 15-20%
- d. 20-40%

Answer: _____

24. Observe the bags of sugar on the table. The sugar made from sugar beets are from genetically engineered plants. When the beets are processed, no trace DNA or proteins remains from the original crop- the sugars are chemically identical. Do you think this product (sugar) should be labeled as a genetically engineered crop? Explain both sides of reasoning for and against labeling and use evidence to support your answer (1 paragraph limit).

6 pts/_____

25. List five (5) different roles that robotics can play in agriculture? **5 pts/**_____

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____

Points Awarded ____ / 12 pts

Tie Breaker: In “Breaking Ground,” the author writes that Christine Su believes diversity in the agtech workforce can positively affect a company through the inclusion and consideration of diverse perspectives.

How do you think considering diverse perspectives may benefit an agtech company, such as Su’s own start-up, “PastureMap”?

4 pts/ _____

1. _____
2. _____
3. _____
4. _____

For Tie Breaker:

Points Awarded _____ / 4 pts