



Concept Review

Chapter 15

Summary of Terms

Bioaccumulation The process whereby a toxic chemical that enters a food chain at a low trophic level becomes more concentrated in organisms higher up the chain.

Compost Fertilizer formed by the decay of organic matter.

Consumer An organism that takes in the matter and energy of other organisms.

Decomposer An organism in the soil that transforms once-living matter to nutrients.

Horizon A layer of soil.

Humus The organic matter of topsoil.

Integrated Crop Management A whole-farm strategy that involves managing crops in ways that suit local soil, climatic, and economic conditions.

Integrated Pest Management A pest-control strategy that emphasizes prevention, planning, and the use of a variety of pest-control resources.

Microirrigation A method of delivering water directly to plant roots.

Mixed Fertilizer A fertilizer that contains the plant nutrients nitrogen, phosphorus, and potassium.

Nitrogen Fixation A chemical reaction that converts atmospheric nitrogen to some form of nitrogen usable by plants.

Organic Farming Farming without the use of pesticides or synthetic fertilizers.

Pheromone An organic molecule secreted by insects to communicate with one another.

Producer An organism at the bottom of a trophic structure.

Regenerative Agriculture A form of agriculture holding that proper practices can be sustainable as well as help us to recover from past harmful practices.

Salinization The process whereby irrigated land becomes saltier as the irrigation water evaporates.

Straight Fertilizer A fertilizer that contains only one nutrient.

Trophic Structure The pattern of feeding relationships in a community of organisms.

Review Questions

15.1 Humans Eat at All Trophic Levels

1. What are the two major chemical products of photosynthesis?
2. In a trophic structure, what distinguishes a producer from a consumer?
3. Why are the number of trophic levels limited?

15.2 Plants Require Nutrients

4. Do plants require oxygen?
5. What effect have terrestrial plants had on the composition of ocean water?
6. Why are calcium and magnesium deficiencies rare in plants?

7. What is the most common form of sulfur absorbed by plants?

15.3 Soil Fertility

8. Which horizon is void of life?
9. What are four important components of fertile topsoil?
10. What is one of the great advantages to having humus in soil?

15.4 Natural and Synthetic Fertilizers

11. What is the difference between a straight fertilizer and a mixed fertilizer?
12. What advantages do mixed synthetic fertilizers have over compost?

13. What advantages does compost have over mixed synthetic fertilizers?

15.5 Pesticides Kill Pests

14. What are three classes of insecticides?
15. Is DDT still being used today?
16. Glyphosate interferes with the biosynthesis of which two amino acids?

15.6 Past Agricultural Practices

17. How do pesticides and fertilizers end up in our drinking water?
18. What is missing from synthetic fertilizers that makes them harmful to soil?
19. How is irrigation damaging to topsoil?

15.7 Quality Agricultural Practices

20. What are the advantages of microirrigation?
21. What is organic farming?

22. How is space technology used to reduce the amount of pesticides applied to farmlands?

Quantitative Questions

23. Rank the following organisms from lowest to highest trophic level: (a) Beetle (b) Cougar (c) Kangaroo Rat (d) Gray Fox (e) Cactus
24. Rank the relative amounts of macronutrient ions in dry plant material, from greatest to least: (a) Nitrogen, N (b) Sulfur, S (c) Magnesium, Mg (d) Phosphorous, P (e) Calcium, Ca
25. Rank the following in order of increasing concentration of mercury, Hg: (a) zooplankton (b) trout (c) swordfish
26. Rank in order of increasing salt concentration: (a) rainwater (b) lake water (c) stream water (d) ocean water



Solutions (Odd)

1. Carbohydrates and oxygen are the two major chemical products of photosynthesis.
3. The number of trophic levels is limited by a dwindling supply of food resources. Each higher trophic level supports successively smaller populations.
5. Terrestrial plants that exclude sodium ions have raised the oceans' levels of sodium ions to more than three times that of the potassium ions.
7. Sulfur is most commonly absorbed by plants as sulfate anions: SO_4^{2-} .
9. Fertile topsoil is composed of organic matter, mineral particles, water and air.
11. Straight fertilizers contain only one nutrient, but mixed fertilizers contain a mixture of three essential nutrients.
13. Compost has a higher percentage of organic bulk than mixed fertilizer. This keeps soil loose for aeration.
15. DDT was banned in the United States in the 1970's but is still used in other countries, primarily to control the spread of malaria-bearing mosquitoes.
17. Pesticides and fertilizers are washed away from fields into streams, rivers, ponds and lakes to end up in our drinking water.
19. Irrigation is damaging to topsoil because irrigated water contains salts that are left behind once the water evaporates. This process raises the salinity of the soil.
21. Organic farming is farming without the use of synthetic pesticides and fertilizers.
23. $e < a < c < d < b$
25. $a < b < c$