

Exercise walk-through

5.15

Sustainable Agriculture

AP Environmental Science

Agriculture and food

The **Green Revolution**

raised yields with high-yield crops, fertilizer, irrigation, mechanization, and monoculture.

Costs: eutrophication, desertification, lost biodiversity.



Intensive farmland: high yield, high impact

What intensive farming costs



*Tillage, fertilisers and monoculture raise yields – and erode
soil*

Tilling, **monoculture** and heavy
fertiliser and pesticide use cause:

- **erosion** and **soil salinization** ;
- nutrient runoff, driving **eutrophication** ;
- loss of biodiversity.

Meat, grazing and desertification

CAFOs use large amounts of land, water, feed and energy, and generate waste and **methane**. Meat is far less energy-efficient than plant food: the **10% rule** means every trophic level wastes more energy.

Overgrazing – livestock eating vegetation faster than it regrows – strips the soil's protective cover. On dry land that drives **desertification**.

The answer is **rotational grazing**: move the livestock so no area is grazed bare.

Exercises 2.1-2.3

2.1 How does crop rotation restore soil nutrients?

[1]

2.2 How does no-till farming reduce erosion?

[1]

2.3 What is contour plowing for?

[1]

Exercises 2.1-2.3

2.1 How does crop rotation restore soil nutrients? [1]

2.1

- Rotating crops (especially legumes) replenishes nutrients like nitrogen
-

2.2 How does no-till farming reduce erosion? [1]

2.2

- It avoids plowing, so roots keep holding the soil in place
-

2.3 What is contour plowing for? [1]

2.3

- To slow runoff and reduce erosion on slopes

Exercise 3.1

3.1 Planting a legume in a rotation helps because it

[1]

☐

A removes nitrogen

B adds (fixes) nitrogen to the soil

C increases erosion

D needs no water

Exercise 3.1

3.1 Planting a legume in a rotation helps because it

[1]

☐

A removes nitrogen

B adds (fixes) nitrogen to the soil

C increases erosion

D needs no water

3.1 B

- adds (fixes) nitrogen to the soil

Exercise 3.2 (a)

3.2 A farmer adopts cover crops and no-till.

(a) Explain how each reduces soil erosion.

[2]

Exercise 3.2 (a)

3.2 A farmer adopts cover crops and no-till.

(a) Explain how each reduces soil erosion.

[2]

(a)

- Cover crops keep the soil covered and held by roots; no-till avoids exposing loose soil, so both reduce erosion

Exercise 3.2 (b)

3.2 A farmer adopts cover crops and no-till.

(b) State one other benefit of cover crops.

[1]

Exercise 3.2 (b)

3.2 A farmer adopts cover crops and no-till.

(b) State one other benefit of cover crops.

[1]

(b)

- Cover crops add organic matter/nutrients and suppress weeds

Exercise 3.3

3.3 Explain how contour plowing on a slope reduces erosion.

[2]

Exercise 3.3

3.3 Explain how contour plowing on a slope reduces erosion.

[2]

3.3

- Plowing across (along) the slope creates ridges that slow water flowing downhill, giving it time to soak in rather than washing soil away