Willows at Work

Use pilot data to evaluate a plant-based cleanup plan.

BOT.4 "Students will explore the global value of plants and the interaction between humans and plants. Identify plants used in the bioremediation of an area due to natural processes (e.g., fire), industrial pollution, or wars..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the proposed plant action, circle the table values that compare the plots, and number two reasons the team must test or revise its plan.

A Test Beside the Creek

1. Beside a former battery recycling yard, soil tests find cadmium, a toxic metal. Rain could carry contaminated soil toward a creek. A restoration team considers willows, which can take up some cadmium through their roots. This approach, called phytoextraction, removes metal from the site only if contaminated plant material is harvested and disposed of safely.

2. To test the idea, the team assigns similar small plots to willow planting or no planting. Both plots start with the same measured soil cadmium concentration. After eight weeks, the team samples soil again. The table reports an imagined pilot study, not a cleanup standard. A lower number means less cadmium per kilogram of sampled soil.

PILOT STUDY: CADMIUM IN SURFACE SOIL

Plot	Week 0 (mg/kg)	Week 8 (mg/kg)
Willows planted	12	9
No planting	12	11

3. The planted plot shows a larger decline, but one plot of each type cannot prove willows caused the difference. Cadmium may also move into deeper soil or wash away. Before expanding the plan, the team would repeat the test with several plots, check nearby water, and measure cadmium in harvested stems and leaves. Any harvest needs controlled disposal.

2 ANSWER WITH EVIDENCE

Use the passage

1. How much did soil cadmium decrease in each plot? What does the comparison suggest about planting willows?

2. Why must the team harvest and safely dispose of contaminated plant material for this plan to remove cadmium from the site?

3. Why do the table values alone not prove that willows removed the missing cadmium?

4. Choose two checks the team should add before expanding the plan. How would each check help evaluate the cleanup?

3 YOUR TURN

Your own words

Design a plant-based repair plan for a roadside ditch receiving zinc from tire wear. Describe the plant action, a comparison test and measurement, a safety step, and a result that would make you change the design; state what a digital chart would show.

Willows at Work

PART 1 · READ AND MARK

Underline the proposed plant action, circle the table values that compare the plots, and number two reasons the team must test or revise its plan. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How much did soil cadmium decrease in each plot? What does the comparison suggest about planting willows?	**The planted plot decreased by 3 mg/kg, and the unplanted plot decreased by 1 mg/kg. The comparison suggests planting may have helped reduce surface-soil cadmium.**
2	Why must the team harvest and safely dispose of contaminated plant material for this plan to remove cadmium from the site?	**Cadmium taken up by the willows remains at the site unless contaminated plant material is removed and disposed of safely.**
3	Why do the table values alone not prove that willows removed the missing cadmium?	**There was only one plot of each type, and cadmium might have moved into deeper soil or washed away.**
4	Choose two checks the team should add before expanding the plan. How would each check help evaluate the cleanup?	**Repeat the test with several plots to see whether the difference persists, and check nearby water to see whether cadmium has washed away. Measuring cadmium in harvested plant material is another valid check.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would plant locally native grasses in one ditch section to hold polluted sediment in place and leave a similar section unplanted for comparison. After three rainstorms, trained staff would measure zinc in water entering and leaving each section. They would restrict access to polluted sediment. A digital bar chart would compare the average change in zinc concentration for the two sections. If the planted section does not reduce zinc more than the unplanted section, I would redesign the planting area and test again.

Accept other evidence-based checks that distinguish plant uptake from movement of cadmium. For Part 3, accept a different suitable plant action if the proposed measurement can test its stated purpose and the plan addresses safety.