Combined Science - Biology - Key stage 4
Ecology

Case study: Dr Beth Penrose

Dr Clapp

Independent practice

1. Define bioaccumulation.
2. Explain why apex predators are often worst affected by bioaccumulation.

Independent practice - answers

1. Define bioaccumulation.
   The gradual build up of a substance in an organism

Independent practice - answers

2. Explain why apex predators are often worst affected by bioaccumulation.

As you move through a food chain each level eats multiple organisms from the level below them. If there are low concentrations in the producers then the levels in the primary consumers will be higher as they will eat multiple producers. Each secondary consumer will eat multiple primary consumers and each apex predator will eat multiple secondary consumers. This means the concentration has increased by the time it gets to the apex predator and it is more likely to be affected.

Independent practice

1. Identify the independent and dependent variables from the method the scientists use.
2. List as many control variables as you can that they used to make their results reliable.

Independent practice - answers

1. Identify the independent and dependent variables from the method the scientists use.
   Independent variable: Different cultivars
   Dependent variable: Concentration of Cs isotopes
1. List as many control variables as you can that they used to make their results reliable.
   Time of mixing, same size pots, same amount of soil, controlled light, constant temperature, 40 days

Independent practice

Source: The ASE

1. Calculate the concentration ratios for each of the cultivars
2. Calculate the mean average concentration ratio for kale 1 and kale 2

Independent practice

Source: The ASE

Kale cultivar	Soil radioactivity level*	Plant shoot radioactivity level *	Concentration ratio	Mean
Kale 1	0.020	0.0050		
Kale 1	0.023	0.0073		
Kale 1	0.021	0.0068		
Kale 2	0.032	0.0054		
Kale 2	0.019	0.0061		
Kale 2	0.016	0.0048		

Independent practice - answers

Source: The ASE

Kale cultivar	Soil radioactivity level*	Plant shoot radioactivity level *	Concentration ratio	Mean
Kale 1	0.020	0.0050	**0.25**	**0.30**
Kale 1	0.023	0.0073	**0.32**	
Kale 1	0.021	0.0068	**0.32**	
Kale 2	0.032	0.0054	**0.17**	**0.26**
Kale 2	0.019	0.0061	**0.32**	
Kale 2	0.016	0.0048	**0.30**	