2025 Bi H2 Q10

Section: Sustainability and Interdependence
Topic: Crop Protection

Question Summary:
This question considers competition between weeds and crops, the action of selective herbicides, global trends in herbicide resistance, and natural selection processes that explain the increase in resistant weed species.

Worked Solution

(a)(i) The presence of weeds reduces the productivity of wheat plants because weeds **compete** with wheat for light, space, water, and minerals.

(a)(ii) Selective herbicides have a greater effect on some weeds because they have **broader leaves** and absorb **more of the chemical** than narrow-leaved crops such as wheat.

(b)(i) In 1980 there were 8 resistant species. In 2020 there were 480 resistant species. 480 divided by 8 = **60 times** greater.

(b)(ii) As resistant weed species increased, crops faced **more competition** from weeds that herbicides could no longer control. This reduced crop yield and therefore decreased global food security.

(c) Herbicides kill non-resistant weeds. Resistant weeds survive and **reproduce**, passing on resistance alleles to the next generation. Over time, the resistant form becomes more common in the population due to **natural selection**.

Final Answer:
Weeds compete with wheat. Broad leaves absorb more herbicide. 60 times increase. Resistant weeds reduce food security. Herbicides select for resistant individuals, increasing resistance frequency.

Revision Tips
- Competition reduces crop productivity.
- Selective herbicides target specific groups of plants based on leaf type.
- Resistance spreads when survivors reproduce.
- Food security depends on reliable crop yield.