

39. [8 marks]

(2005:27)

The influenza virus has a high rate of mutation which can lead to changes of the viral surface antigens that contain protein.

Analyse the impact of high mutation rates for this virus and the implications for human health.

[8]

HIGH MUTATION RATE – ANTIGENS ON VIRUS SURFACE
OF VIRUS CHANGE ∴ PREVIOUS ANTIBODIES

CANNOT WORK AGAINST NEW ANTIGENS

+ NO MEMORY CELLS (B OR T) THAT RECOGNISE
VIRUS ANTIGENS WILL BE PRESENT IN HOST

+ THE VIRUS WILL SPREAD MORE RAPIDLY → PASS TO OTHER HUMANS
WHICH MEANS HUMANS MAY GET SICK QUICKLY +
COULD DIE NB. IF HOST DIES QUICKLY HOWEVER →
VIRUS MAY NOT SPREAD + IT MIGHT DIE OUT (IE IF VIRULENT+)

HUMAN HEALTH – NEW VACCINES + DRUGS WILL BE NEEDED
AS OLD ONES WILL NOT WORK. (TO STOP EPIDEMIC)

– PEOPLE MORE SUSCEPTIBLE TO INFECTION eg. bird flu.
SINCE ORIGINAL FORMS OF FLU DID NOT KILL THEM
+ NOW THEY AREN'T IMMUNE TO NEW STRAIN.

BUT IF NEW VIRUS ATTACKS BODY QUICKLY → DIE
→ DON'T PASS ON VIRUS → FEWER PEOPLE
GET DISEASE.

38. [8 marks]

(2005:25)

Use the information provided to answer the following questions.

The Locust Plague

The Australian plague locust is a damaging, recurring, insect pest of pastures and crops throughout south-eastern Australia. The greatest activity is when locusts feed and move, usually from spring to autumn. Locust occurrence depends entirely on weather and feed conditions. Locusts reproduce rapidly, migrate hundreds of kilometres overnight and destroy large areas of pastures and crops.

Extract (adapted) from "Plague Locusts and Spring" by David Croft: from IREC Farmers' Newsletter, 60th Anniversary Edition, No 167, Winter 2004. Used by permission

- (a) Identify ONE appropriate method to estimate how widespread a locust infestation might be.

AERIAL SURVEYS OF LOCUST SWARMS OR REPORTS FROM FARMERS OF PRESENCE OF LGE NOS. OF LOCUSTS ON THEIR FARMS. [1]

- (b) State ONE other valid piece of information that could be collected about locusts, and identify how this information is useful in developing a method for controlling the pest.

• THEIR REPRODUCTIVE BEHAVIOUR. THIS WOULD HELP US KNOW WHEN THEY WOULD BE EASIEST TO CONTROL. [2]
• THERE MAY BE A STAGE IN THEIR LIFE CYCLE WHEN THEY DON'T FLY.

Media release about fighting locust plagues

Pesticide to fight locust plague

Spraying pesticide is effective in killing the locusts before they hatch. Costs are low and the procedures for spraying are well developed. Spraying close to harvest times is illegal and strict rules also prevent spraying near houses, roads and watercourses, as well as in national parks and endangered species' habitats.

Fungus to fight locust plague

A biological control, based on a naturally occurring Australian fungus, has been developed by the CSIRO. It is effective against locusts and grasshopper pests. The fungal spores have no environmental effects on aquatic organisms and are suitable for use in organic-beef-growing areas. Costs are low. The fungus is an Australian native species.

Transcript from Landline, "Australia's Largest Locust Plague" by Steven Letts, first broadcast 12 November 2000 on ABC Television is reproduced by permission of the Australian Broadcasting Corporation and ABC Online. © 2000 ABC. All rights reserved. The full transcript is available at <http://www.abc.net.au/landline/stories/s210157.htm>

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- (c) Assess the impacts of these alternative strategies of locust control on society and the environment. [5]

PESTICIDES - may be toxic to humans (ie impact on society)
BUT cheap.

- this could have a major impact on people living in areas which are sprayed eg. farmers could accumulate toxins + become sick.
- non-pest insects could also be killed (ie impact on environment)
- this could cause extinct of rare species of insects.
- locusts are food for many species (birds + small mammals) which means if they are removed from a food web, other species are affected significantly.

FUNGUS - no toxins to ruin production of organic beef.
+ cheap (impact on society)

- farmers growing organic beef can continue to sell their produce + make money.
- no one getting sick.
- fungus kills grasshoppers as well as locusts (impact on environment)
- some grasshoppers may become extinct
- food web disruptions - locusts + grasshoppers are food for many species eg. birds