20.1 FOOD SUPPLY

Modern technology has resulted in increased food production in terms of:

- agricultural machinery to use larger areas of land and improve efficiency
- chemical fertilisers to improve yields
- insecticides to improve quality and yield
- herbicides to reduce competition with weeds
- selective breeding to improve production by crop plants and livestock, e.g. cattle, fish and poultry

The negative impacts to an ecosystem of large-scale monocultures of crop plants

- Monoculture: It is the agricultural practice of producing or growing a single crop, plant, or livestock species, variety, or breed in a field or farming system at a time.

- **The following are some of the negative impacts to an ecosystem of large-scale monocultures of crop plants:**

✓ Outbreaks of diseases/pests/plagues
✓ Some species can be endangered or become extinct
✓ Food chains might get disrupted
✓ Loss in the variety of habitats
✓ Loss of nutrients resulting in disrupted soil fertility. (Planting a single crop on the same area of soil repeatedly can deplete the soil of its valuable nutrients)
✓ Decrease in the soil water (Desertification)
✓ Increased soil erosion
✓ The crops become vulnerable to "Crop-Specific pests", hence use of pesticides has increased.
✓ Water quality in ground water, streams and rivers is usually decreased when synthetic fertilisers and pesticides are used.

- The following are some of the positive impacts to an ecosystem of large-scale monocultures of crop plants:

✓ There is efficient food production, so less land is required
✓ There can be a targeted use of fertilisers
✓ Same pesticides and fertilisers can be used

Board question:

M/J/2017-P42-QIc

(c) Many farmers grow crop plants as monocultures to improve yields.

Fig. 1.1 shows a monoculture of wheat.

Fig. 1.1

Describe the impact of large-scale monocultures on the environment.

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MARK SCHEME:

1	outbreaks / spreading, of diseases / pests / plagues ;	**4**	
2	endangered / extinction, of species ;		**A** loss of (bio)diversity
3	disruption to food chains / described ;		
4	loss in (variety) of, habitat / places where organisms live / described ;		
5	loss of nutrients / disrupted nutrient cycling ; disrupted (soil) fertility		
6	decreased in (soil) water / desertification ;		
7	soil erosion / described ;		**A** landslides / reduced soil volume
8	increased (described) pollution ;		
9	deforestation ;		
10	efficient food production so less land required ;		
11	AVP ;		e.g. targeted use of pesticides / AW

(a) Modern technology has increased food production.

The boxes on the left show types of modern technology.

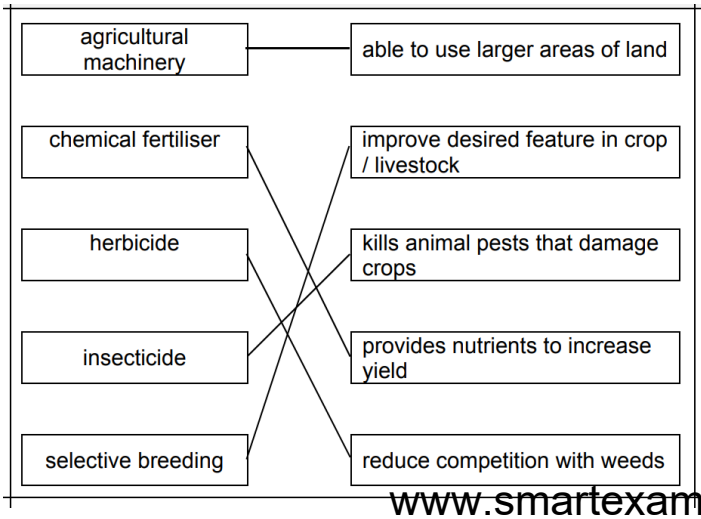
The boxes on the right show how modern technology has improved production.

Draw **five** lines to link the type of modern technology with the way in which it has improved food production.

modern technology	**improvement in food production**
agricultural machinery	able to use larger areas of land
chemical fertiliser	improve desired features in crops and livestock
herbicide	kills animal pests that damage crops
insecticide	provides nutrients to increase yield
selective breeding	reduce competition with weeds

[4]

MARK SCHEME:



4	5 correct = 4 marks 3 or 4 correct = 3 marks 2 correct = 2 marks 1 correct = 1 mark

Intensive animal farming or industrial **livestock production**, also known by its opponents as factory **farming**, is a type of **intensive** agriculture, specifically an approach to **animal** husbandry designed to maximize **production**, while minimizing costs.

The negative impacts to an ecosystem of intensive livestock production as follows:

- **Poor living conditions and hygiene for livestock**

Intensive farming involves the use of various chemicals, growth hormones and excess crowding on a small space. This results in poor living conditions and hygiene for the livestock which later leads to infections and various diseases.

- **Excessive use of agro-chemicals**

Intensive farming involves the utilization of numerous types of agro-chemicals including chemical pesticides, fertilizers, herbicides, insecticides, and acaracides. When these chemicals are used they not only destroy their intended targets such as pests, weeds and parasites but also contaminate the food products. The insecticides and pesticides also kill beneficial insects which contribute to biodiversity loss. The workers and humans nearby are equally affected by the chemical sprays and humans who consume the food indirectly take in the chemicals.

- **Deforestation and alteration of the natural environment**

✓ The removal of trees, slush and burn techniques, and the clearing of forest areas to create room for agriculture has led to massive deforestation and soil erosion. As an outcome, natural habitats and wild animals have been heavily affected as the destructive practices have persistently contributed to habitat loss. There is loss of biodiversity and extinction of species.

✓ The use of chemical fertilizers and herbicides contaminates water soils, wildlife habitats, and water bodies like oceans, rivers and lakes. Fertilizer nutrients in particular are the main cause of eutrophication in most of the world's water bodies such as oceans, lakes, and rivers.

The social, environmental and economic implications of providing sufficient food for an increasing human global population

A famine is a widespread scarcity of food, caused byseveral factors including war, inflation, crop failure, population imbalance, or government policies. This phenomenon is usually accompanied or followed by regional malnutrition, starvation, epidemic, and increased mortality.

The problems that contribute to famine include:

- **Unequal distribution of food:**
  Some countries produce more quantities of food crops due to favorable climatic conditions compared to other countries which leads to unequal geographic distribution of food.
- **Drought and flooding:** Drastic climatic conditions like draughts and flooding can lead to destruction of food crops. Lack of cooperation from neighboring countries in exporting their produce can further worsen the situation
- **Increasing global population:** Modern irrigation techniques, sophisticated farming machinery, improved fertilizers, governments grants can help increase the produce. But the ever increasing population creates a pressure on the available resources . This is because when population increases, it brings along with it, an increased demand for use of land for various other activities.
- **Poverty:** Some countries in poor geographic location might be unable to import food products from other countries