Fieldwork question

A group of Geography students conducted a field study in a farm in the New Territories. Figure 4a is a map showing the crop types of the farm and the soil sample sites recorded by the students. Table 4b shows the enquiry question of the study and the details of data collection. Table 4c on p. III-11 shows the collected data, while Figure 4d shows the classification of soil types by soil texture.

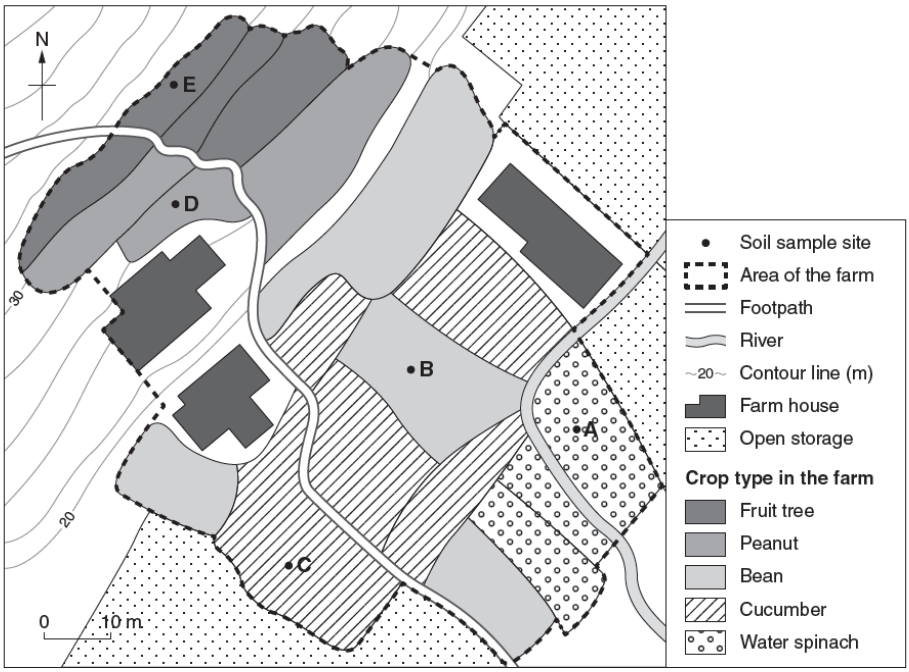

Figure 4a

Table 4b

Enquiry question	Does soil texture affect the choices of crops in a farm?
Date of data collection	20 December
Time of data collection	09:00–12:00
Sampling method	1 Divide the farm according to the crop types and record the crop types on a large-scale map 2 Collect one soil sample at will from each type of crop for measuring soil texture
Tool for measuring soil texture	 *A set of sieves*  *An electronic scale*

Table 4c

Sample site	Soil texture			Crop grown	Soil requirement of the crop (from online references)
	Sand (2–0.061 mm)	Silt (0.061–0.003 mm)	Clay (< 0.003 mm)		
A	43%	25%	32%	Water spinach	• Poorly drained • High water content
B	60%	28%	12%	Bean	• Well drained • Medium water content
C	68%	25%	7%	Cucumber	• Well drained • Medium water content
D	79%	18%	3%	Peanut	• Very well drained • Low water content
E	82%	15%	3%	Fruit tree	• Very well drained • Low water content

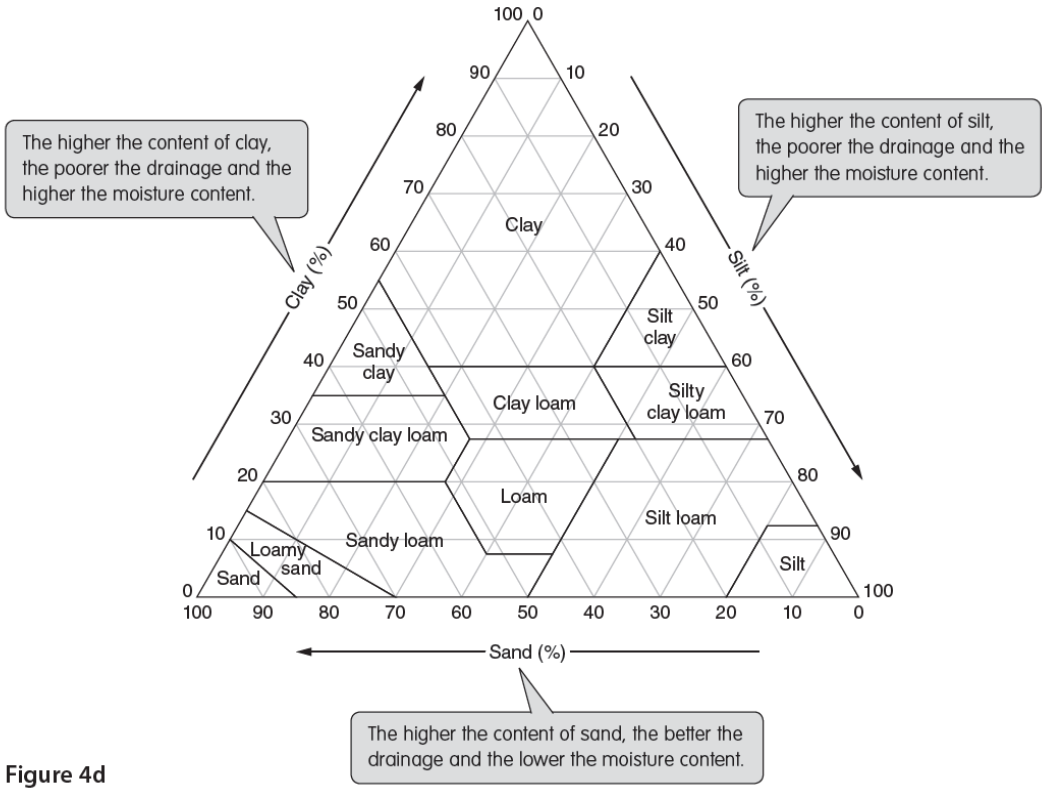

Figure 4d

a Refer to Table 4b on p. III-10. Explain the choice of the data collection time. (2 marks)

b Refer to Figure 4a and Table 4b on p. III-10.

i Identify the sampling method to choose the soil sample sites. (1 mark)

ii Describe ONE advantage and ONE disadvantage of this sampling method. (2 marks)

c Refer to Table 4b again. Describe the procedures of using the tools to measure the soil texture for each soil sample collected. (3 marks)

d Refer to Table 4c and Figure 4d on p. III-11.

i Identify the type of soil texture at Site E. (1 mark)

ii The students concluded that the farmers have a good choice of crops according to the soil texture of the farm.

Discuss whether the above conclusion is appropriate. (3 marks)

e Other than soil texture, suggest another field study topic to be carried out in the area shown in Figure 4a. Describe and explain the method(s) of collecting data. (6 marks)

Answers

a
- the field study is carried out in winter. In winter, weather is cool, dry and fine, which is comfortable for outdoor fieldwork 1
- there is a lower risk of disturbance by extreme weather conditions, such as typhoons and thunderstorms 1 (1)
- the field study is conducted in the morning. This is because farms usually open in the morning as most farm work is carried out during this period 1
- daytime is easier for data collection 1 (1)

b i Quota sampling 1 (1)

ii Advantages of quota sampling:
- convenient and low cost 1
- fair coverage of all types of crops 1
- comparisons can be made between different crop types 1 (1)

Disadvantage of quota sampling:
- statistically biased, since sample selection depends on the choice of the students 1 (1)

c
- dry the collected soil samples in an oven/in a room with a dehumidifier overnight before sieving 1
- pour the dried soil sample into the stack of sorting sieves with graduated mesh sizes, arranged in descending order with the largest mesh size at the top, and a catch pan at the bottom 1
- place a cover on the top, and then shake the sieves back and forth horizontally 1
- put the soil particles in the top sieve aside as the size of those soil particles is larger than 2 mm, which is larger than a particle of sand 1
- pour the soil particles in the remaining sieves and the catch pan on three trays respectively; then use the electronic scale to find the weight of each type of soil particle (i.e. sand, silt and clay) 1
- calculate the percentages of sand, silt and clay of the soil sample 1 (3)

d i Loamy sand 1 (1)

ii
- the conclusion is appropriate, as most crops in the farm are grown on soil that suits them 1 (1)
- e.g. soil at Site A is clay loam, over half (57%) of it is composed of silt and clay. It is poorly drained and thus suits the growing of water spinach as it needs soil with a high water content 1
- e.g. soil at sites B and C is sandy loam, over half (60%–68%) of it is composed of sand. It is well drained and therefore suits the growing of beans and cucumbers since they need medium water content in the soil 1
- e.g. soil at sites D and E is loamy sand, up to 80% of it is made up of sand. Soil there is thus very well drained. This particularly suits the growing of peanuts and fruit trees as they need low water content 1 (2)

e

Suggested field study topic	Relevant data and data collection method
Relief	• **Availability of data**: – There are variations in land height in the farm – Flat land is found at the south of the farm while higher ground is found at the north-west of the farm – We can thus examine the changes in slope gradient in the farm, which is a factor affecting the choice of crops and farming methods • **Fieldwork equipment/tools**: Measuring tape, abney levels/clinometers, ranging rods • **Sampling method**: Systematic sampling • **Data collection method**: – Use a measuring tape to select sample points at a 20-metre interval along the footpath running from south-east on the lowland to north-west on the higher ground – At the two ends of each slope segment, rest one ranging rod on the ground vertically – Look through the abney level/clinometer at the same height of the opposite ranging rods – Read off the angle of elevation and angle of depression – Calculate the average angle of the slope of each slope segment (Note: Well elaborated answers of other appropriate methods of measuring slope gradient are also acceptable, e.g. levelling.)
Water quality	• **Availability of data**: – There is a river running across the south-eastern part of the farm – We can thus assess the water quality in the river, which may affect the quality and availability of irrigation water – Amount of floating matter, smell and turbidity can be used as the indicators of water quality • **Fieldwork equipment/tools**: – A scoring sheet assessing the amount of floating matter, smell and turbidity of the river water (refer to the small table on p. T-16) – Three transparent and colourless flat-bottom bottles, white paper marked with a black 'X' • **Sampling method**: Convenience sampling

<table>
<tr><th>Suggested field study topic</th><th>Relevant data and data collection method</th></tr>
<tr><td></td><td>
• Data collection method:
– Walk along the river and select three sites in the farm area which are safe and accessible to collect water samples
– Observe if there is any floating matter such as oil, foam and plastic bags in the river at each site
– Fill the transparent bottles with the water samples. Smell the water samples
– Put the white paper marked with an ‘X’ under the bottle. View the ‘X’ mark from the mouth of the bottle and assess the turbidity
– Based on the observation and discussion among group members, circle the most suitable description for each item in the following scoring sheet
<table>
<tr><td colspan="6">Site:</td></tr>
<tr><td rowspan="2">Indicator of water quality</td><td colspan="5">Score</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Amount of floating matter</td><td>Very large</td><td>Large</td><td>Moderate</td><td>Little</td><td>Very little</td></tr>
<tr><td>Smell</td><td>Very strong</td><td>Strong</td><td>Moderate</td><td>Slight</td><td>None</td></tr>
<tr><td>Turbidity</td><td>Very high</td><td>High</td><td>Moderate</td><td>Low</td><td>Very low</td></tr>
</table>
– After scoring the water quality of all three sites, work out the average score of each indicator
(Note: Well elaborated answers of other relevant indicators of water quality are also acceptable, such as pH value, dissolved oxygen and nutrient content.)
</td></tr>
<tr><td>Urban encroachment</td><td>
• Availability of data:
– There are open storages to the north-east and south-west of the farm
– We can thus study the effects of open storages on the farming activity
• Fieldwork equipment/tools:
A list of interview questions about land use conflict such as pollution problems, risks of flooding and rising land rents
• Data collection method:
– Make an appointment with the farmer/farm owner
– Prepare a list of interview questions about pollution problems, risks of flooding and rising land rents in the area
– Examples of the interview questions:
~ What are the major types of open storages surrounding the farm?
~ Do the open storages affect the air, water or soil quality of the area? How does this affect your farm production?
~ Has your farm experienced flooding? Do you think flooding in your farm is caused by the open storages? Why?
</td></tr>
</table>

Suggested field study topic	Relevant data and data collection method
	~ How much is the monthly land rent? Is there any change in the monthly land rent in recent years? From your point of view, what is the major cause of such change? ~ What other effects do the open storages have on your farm or farm production? – Prepare follow-up questions to get more in-depth information from the farmer/farm owner – Test the questions in a pilot study and modify the questions if necessary (Note: Well elaborated answers of other appropriate methods of assessing the effects of urban encroachment are also acceptable, such as conducting air or water quality tests.)

[Appropriate topics suggested, with a detailed description and logical explanation of suitable data collection method(s)] (Max. 6)