

# AGRICULTURE

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Paper 5038/01

Paper 1

## General comments

It should be noted that the examination tests knowledge with understanding. This means that candidates should be able to select appropriate knowledge to answer a question. Candidates should avoid reciting a list of facts without thinking about the relevance of the facts; this approach is unlikely to result in many marks being gained, since it does not demonstrate the candidate's understanding of the topic. The ability to handle data and solve problems is the second area tested in the examination and accounts for more than half the marks (as stated in the syllabus). This means that where data, such as graphs are provided, or unfamiliar scenarios are described, candidates are expected to solve problems using their knowledge and practical experience. Repeating statements from the question is unlikely to gain marks. Candidates need to be aware of the expectations in demonstrating their abilities in both assessment objectives as well as understanding that they need detailed knowledge of all syllabus areas coupled with practical experience, wherever possible.

## Comments on specific questions

### **Section A**

#### **Question 1**

This question, which required largely biological knowledge, was well answered by candidates, many of whom subsequently appeared to have insufficient knowledge of practical agriculture. Although the question stated that Fig. 1.1 showed the carbon cycle, a minority of candidates tried to answer in terms of the nitrogen cycle.

- (a) (i) The process is *photosynthesis*.
- (ii) Since carbon dioxide had already been given in the question, it was expected that candidates would give two other requirements, such as *sunlight* (or *light energy* - "sun" is insufficient), *water* or *chlorophyll*.
- (iii) The process is *respiration*.
- (b) (i) Although many candidates labelled the phloem correctly, there was confusion between phloem and xylem in some cases.
- (ii) This part of the question was generally poorly answered. "For growth" was a common answer but insufficient, as the sugar must be used to manufacture proteins in order for this to occur and this was not stated in any answers seen. Storage in an appropriate plant organ or use in respiration to produce energy were good answers.

#### **Question 2**

This question required both practical knowledge and the ability to assess information and draw conclusions from it. Whilst some candidates showed a good ability to do both, many gave answers that revealed a lack of experience of either requirement.

- (a) (i) Candidates should know that a selective herbicide kills only certain types of plant. To state that it kills only weeds, not the crop, is not sufficiently accurate.
- (ii) The question referred specifically to pasture, so reference to crops, seen in many answers, suggests that candidates had not read or understood the question fully. Whilst competition with the

wanted plants is an acceptable answer as one of the two reasons for killing the weeds, candidates should have made reference to some weeds being poisonous to livestock, possibly tainting products such as milk or reducing the general nutrient quality of the pasture.

- (iii) This required candidates to use information and make a deduction. A pleasing number were able to do this and suggested that the herbicide would have reached the vegetable crop via the manure. However, many did not appear to have read the question carefully in order to understand the sequence of events.
- (b)(i) Here candidates showed a better grasp of using information and were able to explain that the operator risked spray running into his boots if he tucked his trousers into the top of them.
- (ii) and (iii) These two sections were generally well answered, candidates showing a good knowledge of the dangers of spraying in windy or wet conditions. However, stating that the spray could “affect” the operator or other crops does not clearly make the point that the chemical may be toxic and therefore dangerous to health or damaging to other plants. A failure to make a point clearly risks losing marks so precise terms should be used.

### Question 3

Few candidates showed any knowledge of fence construction, although this is a clear syllabus requirement.

- (a) Candidates should know that a post and rail fence must be a wooden structure so references to posts rusting were inappropriate. The purpose of soaking in creosote would be to prevent rotting (by fungal attack) and insect damage. “To make them last longer” is insufficient.
- (b) Fig. 3.2 contained sufficient information for candidates to deduce that the plumb line was to ensure that the fence post was vertical, but few were able to do this. “To make sure that the post is straight” is not sufficient as it may mean straight in relation to the line of the other posts. “Straight in the ground” or, better still, “set vertically” would avoid ambiguity.
- (c)(i) This showed a lack of practical knowledge as very few candidates had any idea of how to ensure that the posts were in a straight line. Many referred to the plumb line, which was inappropriate in this context. Those who gave correct responses described the use of a line from one corner post to the next so that the other posts could be set along that line at suitable intervals.
- (ii) Again there was little evidence of practical experience here. Only a minority of candidates stated that the top strand of wire should be attached first (either A or B was accepted as some candidates pointed out that it might be difficult to work on the fence if the barbed wire was attached first) but few gave a correct reason. A common incorrect answer was that the barbed wire should be attached first to stop animals escaping, candidates not appreciating that it is unlikely that the fence would be built around the livestock. A very few knew that the top wires would hold the posts in position whilst the other wires were being attached.

### Question 4

- (a)(i) Most candidates read the volume correctly from the diagram as  $125 \text{ cm}^3$ .
- (ii) This required no real calculation but surprisingly few candidates gave the correct answer of 75%. If  $100 \text{ cm}^3$  of water are added to  $100 \text{ cm}^3$  of dry soil but the resulting volume appears as  $125 \text{ cm}^3$ ,  $75 \text{ cm}^3$  of the water must have filled the pore spaces, so 75% of the  $100 \text{ cm}^3$  of soil was air.
- (b)(i) This was well answered by most. “Air” was the commonest response but microorganisms, organic matter and minerals were also correct answers.
- (ii) Whilst most candidates understood that the soil would lack air (and thus oxygen), fewer clearly made the point that this would prevent respiration occurring in plant roots, leading to plant death.

### Question 5

- (a) (i) Most candidates interpreted Graph **A** correctly, stating that live weight decreased in the dry season.
- (ii) Expected answers were that there would be insufficient food and that the food would be of poor quality in the dry season. Many candidates seemed to think that they were simply required to copy information from the graph – that the pasture was unimproved or unfenced or continuously grazed (none of which answered the question) – without understanding that reasoning and deduction are expected, using the data provided.
- (b) Again, candidates copied statements from the graphs. This did not answer the question, which required them to use the information shown by the lines of the two graphs, **A** and **B**, comparing them to show that the live weight gain in **B** did not fall in the dry season, as it did in **A** and that overall the gain was greater in **B** than in **A**.
- (c) Many candidates appeared to understand that the live weight gain in **C** was greater than either **A** or **B** but did not state this clearly. It was apparent that many candidates did not understand the meaning of *stocking rate* or the term LSU. Many seemed to think that there would be fewer animals per hectare in **C**, whereas the pasture improvements allowed a significantly higher stocking rate. This and the increase in live weight gain could increase production and, therefore, revenue, justifying the increased expense.
- (d) Those who understood the term *stocking rate* were able to give good answers, referring to overgrazing and its consequences, such as deterioration of pasture quality, erosion and insufficient food for the livestock.

### Question 6

- (a) Most candidates completed this simple calculation without difficulty:  
 $(60\,000 \div 3\,000) = 20\text{ kg}$
- (b) (i) Again this calculation was completed by most candidates. A few made errors in the arithmetic but if the correct method had been used and working shown, a mark was gained for this, even though one mark was lost for the answer. This demonstrates the importance of showing working where asked for, as it was here:  
 $(50\,000 \div 60\,000) \times 100 = 83\%$
- (ii) There were many good reasons given for non-germination, such as planting too deeply, lack of water, lack of a suitable temperature, non-viable seed or seed eaten by animals or birds. Some candidates forgot that seeds do not require minerals from the soil or light for photosynthesis to germinate and competition is not relevant in terms of germination.
- (c) (i) Suppressing weeds, reducing erosion risk and maximising land use were all good points but references to groundnuts fixing nitrogen, which would be of use to the maize, were incorrect. The effects of nitrogen fixation would only be of use to future crops grown on this land (if at least some of the groundnut roots were left after harvesting so that the soil is effectively inoculated with nitrogen-fixing bacteria).
- (ii) Reference to competition, in terms of water or minerals, was not relevant as the farmer would address this if he was intercropping. However, the tall maize shading the groundnuts was a valid point made by a number of candidates and other good answers included difficulties in cultivation, harvesting and application of treatments (herbicides, for example) to one crop which might adversely affect the other.

### Question 7

- (a) This was another instance of a requirement for candidates to apply basic principles to information provided in a potentially unfamiliar situation. Since the life cycle of the parasite was shown to involve wet pastures and the presence of water snails, remedies should have focused on these. Good answers included suggestions to drain the pasture, kill the snails (the secondary host) and avoid cattle grazing on the contaminated pastures. Reference to the use of anthelmintics was accepted but suggestions such as burning of the pasture or spraying insecticides were not.

- (b)(i) Many candidates gave good answers, suggesting, amongst other possibilities, veterinary costs, vaccines, supplements and labour as other inputs. Capital costs, such as housing, would not be included in this sort of record, however.
- (ii) This required a simple statement that the total input costs should be subtracted from the total output returns. A positive result indicates profit whereas a negative result would mean a loss. Many candidates gave the first part of the answer (how the calculation should be carried out) but omitted the second part (the significance of a positive or negative answer), consequently losing a mark.
- (c)(i) This was poorly answered in many cases. Candidates gave examples of farm records that might be kept but these were often irrelevant in terms of the question. For example, the amount of food provided to the livestock would be important in terms of selection for breeding only if it was coupled with information about production or live weight gain (food conversion ratios). Yield, fertility and disease resistance were appropriate suggestions, seen in good answers.
- (ii) Some candidates lost marks here because they failed to make points fully and clearly. “No need to keep a bull” needs qualification, such as “so cost is reduced” or “so it is safer”, to explain how this would be an advantage. “Better breeds possible” needs to be expanded in terms of greater choice of a male for specific characteristics. “Cheaper” alone is also insufficient.

## Section B

### Question 8

- (a) A borehole or well may be a source of water but is not really a means of collection or storage, which was the question requirement. Collection of rainwater from roofs, a dam across a water course to create a reservoir and land drainage into a reservoir would have been appropriate, with brief outlines of methods and materials. Candidates tend to use the term “dam” to mean both a reservoir and the obstruction made across a water course to create the reservoir. This can lead to confusion and lack of clarity in answers, which may result in marks being lost. This would be avoided if the two words, *dam* and *reservoir*, were used correctly.
- (b)(i) As the question specified *field crops*, a watering can would not be a suitable method of irrigation. This was the example given by a number of candidates. A brief description of the method of delivery of water, requirements such as a pump and the source used were expected here. A few candidates drew simple diagrams to clarify their answers and generally gained marks from these. An example of a good answer could be *drip irrigation*, using perforated pipes on the soil close to the base of plants, stating the source of water to which the pipes were connected.
- (ii) The question asked for the advantages and disadvantages of irrigation in general, not just the method described in (i). Candidates who achieved good marks here understood that irrigation enabled a greater range of crops to be grown, extending the growing season, giving protection against drought and improving quantity and quality of product. “Waterlogged soil” is not valid as a disadvantage since it is assumed that a farmer would monitor the amount of irrigation required according to conditions. However, *erosion* and *soil salinisation* are disadvantages which can arise from regular irrigation, however well managed. Costs, both capital and for water, were also valid disadvantages. It should be noted that “cost” should always be qualified in answers.

### Question 9

- (a) The four chambers of the ruminant stomach were generally correctly named but many candidates had little idea of the function of each. Since the question specified the ruminant stomach, descriptions of other parts of the digestive tract, given by a substantial number of candidates, were irrelevant, did not gain marks and would have used time those candidates could have spent elsewhere on the paper. A clear outline of the function of each chamber was needed, with details such as the role of bacteria in the rumen, absorption of water in the omasum and the beginning of enzyme digestion in the abomasum. Some candidates drew a diagram but this would only gain marks if it was annotated in detail.

- (b) Most candidates described feeding requirements of a ruminant but many of these could say little beyond feeding it on milk from birth until it was weaned (some remembered to mention colostrum) and then allowing it to graze. Candidates who described the feeding regime for poultry generally gave better responses, which indicated practical knowledge and experience. These answers specified the type of feed at each stage of the chick's development, with the timing of the stages and, in some cases, the quantities fed. Most also remembered to mention the need for water. A little more detail on frequency or the addition of supplements would have improved these answers.

#### Question 10

- (a)(i) All candidates who attempted this remembered to name the crop they were describing.
- (ii) Many candidates attempted this question but few answered well. The syllabus outlines the detailed knowledge expected for growing one local crop. Candidates should, therefore, know their local conditions that allow a particular crop to be grown. This should include soil type and pH, the nutrient status of the soil, rainfall in terms of amount and season and the temperature range that allows the crop to thrive, together with any other local detail that might determine the success of the crop. Too many candidates gave answers along the lines of "needs a fertile soil with enough rainfall and plenty of sun to grow well". This does not demonstrate any real knowledge of growing any crop and gains no marks.
- (b)(i) Most candidates named an insect pest but some chose inappropriate examples, such as snails or rats – not insects so not valid answers.
- (ii) A description should include the part of the plant attacked or damaged, the way in which the damage is caused (such as the feeding method of the insect), visible symptoms and any other effects. For example, candidates who chose aphids as the pest often mentioned that they are vectors of plant diseases.
- (iii) The question required methods of control of the insect named in (i), so a general list of control measures, rather than the selection of those appropriate, was not always relevant. For example, *crop rotation* may be appropriate for some pests but would be ineffective for aphids or locusts – examples often given. Candidates should also specify *insecticide*, rather than *pesticide*, when describing chemical control. A correct, named insecticide is accepted. A number of candidates seem to confuse the terms *herbicide* and *insecticide*. Many candidates mentioned the use of predators and early planting but few gave examples of field hygiene such as removing or burning trash, although many mentioned the importance of weed control.

#### Question 11

- (a) Candidates seemed to have little idea of the purpose of ploughing – primary cultivation which turns soil, buries weeds and trash – more knowledge gained through practical activities would help candidates to understand the reasons for carrying out different activities.
- (b) Although some candidates forgot that they were referring to a plough and described tractor maintenance, there were many good answers. Cleaning, oiling for lubrication and avoiding rust, dry storage, sharpening and repair were all well-made points.
- (c) Candidates understood the general points here but sometimes struggled to express them. References to "saving money" needed to be explained in terms of savings on labourers' wages or whether the returns from crops on a large or small scale justify the costs of machinery. "Saving time" can also be developed by explaining that large-scale cultivations and harvests can be completed in good time, avoiding problems with pests or the weather.

#### Question 12

- (a)(i) and (ii) Some of the examples given, particularly for wind-pollinated flowers, were incorrect. *Characteristics* of a wind pollinated flower are not quite the same as *adaptations*. Lack of colour or scent fit the former description but features such as loose anthers outside the flower, feathery styles or stigmas and copious amounts of very light pollen are all adaptations that promote wind pollination. Examples and descriptions of adaptations for insect pollination were generally better. Some candidates confused pollination with dispersal, especially when referring to wind.

- (b) (i)** Correct examples given included Irish potato and sweet potato, although the vegetative organ was not always named correctly – *stem* tuber for the former and *root* tuber for the latter (although more usually propagated by stem cuttings). There were many other correct examples, such as banana, but details of the method were lacking, such as the use of fungicides. A few candidates drew diagrams, which gained marks where appropriately annotated and were particularly helpful where candidates had described methods of budding or grafting.
- (ii)** The main advantage stated was that all the plants would be uniform, with no variation. Candidates also knew that they would be likely to mature and, therefore, crop more quickly than plants grown from seed, as well as being hardier than seedlings. Cost was mentioned but needed to be qualified in terms of savings on purchase of seed, in order to gain a mark. Few candidates, even those who used the banana as a an example, remembered that asexual reproduction may be the only way of generating new plants since some crops or cultivars do not produce viable seed.

# AGRICULTURE

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Paper 5038/03

Practical

## General comments

Centres appear to have had no problems in resourcing the paper and there was no evidence that problems were encountered with any of the questions. Almost all candidates completed all questions and there was a uniform response in almost all cases.

Where labelling of samples is necessary it is essential that this is done in a way in which candidates are unable to confuse the sample numbers. Candidates should be congratulated for attempting all parts of each question and taking care to express themselves in an unambiguous way.

## Comments on specific questions

### Question 1

- (a) Most candidates had no problem in labelling three parts of the plant. Some candidates need to take care with drawing and labelling questions to ensure that the label lines are clear and precise. Up to two marks were awarded for a clear diagram where parts of the plant were well defined. Candidates with poor drawing skills did not lose marks providing the parts shown were clearly identifiable.
- (b) Some candidates lost marks as a result of confusion between adventitious roots and rhizomes. In a few cases the identification of a leaf on a grass plant proved to be difficult. Some diagrams were outstanding with the parts well defined and labelling detailed and extensive.
- (c) The agricultural problems arising from rhizomatous plants were not well understood.

### Question 2

- (a) Providing that the sandy soil drained the fastest then candidates gained the marks.
- (b) Most candidates gained full marks for this question although weaker candidates either failed to label the axis or to include units. A few candidates attempted to draw a line graph based around data collected for water drained during the 5 minutes; no marks were awarded for this.
- (c) Free drainage of the sandy soil, **AS3**, was generally well explained. Some candidates, however, were confused about the reasons for the sandy soil draining more freely than the clay soil.

### Question 3

- (a) This was very much a new style of question attempting to get candidates to look at fuels and relate their properties to their application. The observations of the liquids and ball were almost always accurate but a few candidates confused **AS6** and **AS7**.
- (b) Almost all candidates gained full marks for identifying that **AS7** would be better for adhering to the tools than the others. Some candidates described in detail how the thick oil prevented rusting.

