

# AGRICULTURE

Paper 5038/01

Paper 1

## General comments

Although every effort is made to simplify the language requirements of the examination, it appeared that a substantial number of candidates struggled to understand the questions or were unable to express clear ideas in their answers. It is essential that candidates can understand and use correct scientific and technical terminology as this may help to clarify and validate answers which might otherwise be rejected. It is also essential that candidates have knowledge of all syllabus areas if they are not to be handicapped in answering the questions in **Section A** and in making best choices of question in **Section B**. Candidates must read the questions carefully so that answers are appropriate and relevant. The different requirements of *describe* and *explain* should be understood (these are stated in the syllabus) and where **one** example, problem or reason is asked for, candidates should give only one. If more than one is given, it is likely to result in no mark. As the candidate's knowledge is not clearly demonstrated, the Examiner will not select a correct answer from a list. Practical experience, however limited and on however small a scale of growing crop plants and keeping animals, is invaluable in answering questions on this paper. Encouraging this practical experience is a stated aim of the syllabus and candidates should be given every opportunity to develop this.

## Comments on specific questions

### **Section A**

#### **Question 1**

- (a) (i) The majority of candidates identified the insect as a piercing and sucking type but did not specify phloem as the tissue from which the insect feeds. Additional detail such as this is needed for full marks.
- (ii) Most candidates gave a correct example of a piercing and sucking insect, usually 'aphid', but locust, bee, butterfly and stalk borer were common incorrect examples.
- (b) (i) The insect is a vector of virus diseases. This was generally known but not always clearly expressed. Good answers explained that the insect would feed on a diseased plant and then transmit the virus when it passed on to an uninfected plant.
- (ii) Many candidates gave a clear statement about the insecticide being absorbed into the plant and consequently affecting the feeding insect. However some candidates confused 'systemic' with 'selective'.
- (c) The question asked candidates to 'state and explain'. This required a suitable method with an outline of how it would be effective, for both marks to be awarded. Some candidates referred to the use of predators and gave an explanation or used an example to gain both marks but this detail was often omitted. The question asked for a method of control for 'this pest', i.e. the one named. 'Crop rotation' is not an effective method of controlling aphids but weed control and early planting would be appropriate. Candidates should ensure that their answers fulfil the question requirements.



## Question 2

- (a) (i) Few candidates referred to the **furrows** running up and down the slope, described in the question, which would have allowed run-off to carry soil down them to the bottom of the slope.
- (ii) Contour ploughing was the expected answer, as the **correct** practice relating to that described. However, this was not a common response, candidates seeming to ignore the description of ploughing and concentrating only on the reference to a slope. Terracing would be a method of reducing erosion on sloping land and was accepted but candidates should read questions carefully in order to give the most appropriate answer.
- (b) (i) The action of wind and rain on bare soil would be the cause of erosion in this case. Many candidates mentioned one but not both agents.
- (ii) Many candidates did not make it clear that maintaining soil cover would prevent this erosion. If 'growing crops' was the answer given it should be made plain that this needed to occur as soon as the previous crop was harvested. There were some good answers that suggested other methods, such as mulching, planting a windbreak or leaving the remains of the previous crop unploughed.
- (c) (i) Candidates generally understood that bare soil would result from overstocking as this would lead to overgrazing but did not make it clear that this is because the pasture plants would be damaged, so would either not recover or recover very slowly.
- (ii) Too many answers simply read 'don't overstock'. Candidates should avoid repetition of the question, as this does not clearly demonstrate their understanding. 'Don't exceed the carrying capacity' would show that the term *overstocked* was understood. Other correct answers referred to methods of controlling grazing such as the use of fences or rotational grazing.

## Question 3

- (a) (i) The correct answer was 75%. A cross between two heterozygous individuals would result in a 3:1 ratio of white: other colour phenotypes.
- (ii) Many candidates clearly did not understand the term *heterozygous*.

In order to gain full marks, candidates should state the symbols they have chosen for the alleles (using appropriate convention), show the parents' genotypes correctly, show the results of the cross and label the resulting genotypes with the correct phenotypic characteristics. Candidates tend to use branching diagrams when working out the cross but this can easily lead to errors. The use of a Punnett square might be more reliable. If candidates show more than one cross in their answer, they must indicate which is the correct one. An Examiner will not choose from a selection, it is for the candidate to demonstrate his/her knowledge and understanding.

- (b) Very few candidates gave a correct response. Those few that did realised that characteristics from a local breed could be advantageous in terms of resistance to local conditions of climate or disease.

## Question 4

- (a) (i) Many candidates referred to 'the humidity of the soil'. Humidity is a term that refers to the moisture content of the air. It is important that correct terminology is used so that candidates' understanding is clear. The correct response would be that moisture would be retained in the soil (mulch, in itself, does not supply water, however). Candidates could also have stated that mulch could maintain a suitable temperature for germination. Only one of these effects was required by the question, either would have been accepted.
- (ii) Few candidates referred to the roots being damaged, still fewer to root hair damage, which would be the critical factor at the seedling stage. The question stated that the seedlings were thoroughly watered so 'give them more water' was not a sensible answer. Lack of nutrients at this stage will not result in wilting so 'give fertiliser' was also an incorrect but common answer.

- (iii) Mulch is not an effective way to treat young plants, as they would be likely to be smothered, damaged or succumb to fungal disease. Again, 'water more' and 'give fertiliser' were common, incorrect answers. However, a good number of candidates suggested shading the plants, a much more practical solution than planting after sunset (another common idea), since the plants would still be vulnerable the next day.
- (b)(i) Comments on use of the term *humidity*, in (a)(i), also apply here. Many candidates mentioned the effect of the mulch in retaining moisture but fewer picked up the idea that the hollow would hold water, which would then percolate the soil rather than run off. Many candidates thought that the mound of soil in the second diagram was to overcome erosion problems, without thinking this through, since deliberately mounding the soil might be seen as increasing this. The mound of soil would enable water to run off, preventing water-logging and hence root damage. Generally those who gave correct reasons provided a clear explanation of this.
- (ii) The correct answer was that this would reduce transpiration. Candidates should avoid stating that it would 'prevent transpiration', since this is inaccurate. *Transpiration* and *evaporation* are not synonymous. The correct term is required.

### Question 5

Careless reading of the question resulted in some inappropriate answers. The instructions *describe* and *explain* require different approaches to the answers given.

- (a) Most candidates were able to name correct examples of ruminant and non-ruminant livestock. However, although it is true to say that poultry are non-ruminants, the diagram clearly showed mammalian digestive systems. Candidates might have focused on more appropriate answers in the rest of the question if they had thought about mammalian examples.
- (b)(i) A **description** of the main difference between the two systems should be that the ruminant has a four-chambered stomach whilst that of the non-ruminant is a single chamber. Many candidates stated that the ruminant has four stomachs, which is inaccurate.
- (ii) An **explanation** of the difference in structure was required here. This could include a comparison of the diet of the two types, the need to digest cellulose, how this is achieved (in the rumen of a ruminant or in a different structure in other non-ruminant herbivores) or is not required if the diet is more varied. Storage in the rumen, chewing the cud and the role of rumen flora are all points that could validly be made in the context of the question. Many candidates simply described what they saw in the two diagrams, scoring few marks as this did not address the question or demonstrate their knowledge.

### Question 6

- (a)(i) Most valid answers given referred to the rapid re-growth of grasses. The position of the growing point which would be undamaged by grazing animals, resistance to trampling and drought were other possible valid points but many candidates were unable to give any of these.
- (ii) The high protein content of legumes such as lucerne was the expected answer, although nitrogen-fixation could also be accepted. Again there were few correct answers.
- (iii) The role of trees in pasture would be to provide shade for the animals.
- (iv) The animals suited to pasture with **many bushes** would be browsers such as goats. Many candidates failed to read the question carefully and were still referring to trees.
- (b)(i) Many candidates were unable to give an answer here or misunderstood the term *controlled burning*. The question did not ask for the importance of 'control'. Those who gained marks referred to the promotion of new growth, clearing weeds or bushes and killing parasites or insects.
- (ii) The question required the candidates to *state and explain* one problem. For example, soil erosion could be the stated problem. The explanation would be that the soil is left bare (and exposed to the agents of erosion). Stating two problems but explaining neither would gain only one mark.

- (iii) A similar approach was needed in this part of the question. An appropriate precaution might be 'to avoid burning on a windy day'. The explanation would then be that this would reduce the risk of the fire getting out of control.

### Question 7

One feature of the building was given as an example. Repeating this example did not gain marks. It was given to aid candidates in identifying appropriate 'features'. 'Roof' and 'door' need to be qualified if they are to be counted as features. The **sloping/overhanging** roof could be used as an example, as this would protect the crop from rain. Others could be the **locked** door, the legs raising the building from the ground and the baffles on the legs, each of which would afford a particular protection (against thieves, damp and vermin respectively).

### Section B

In this section, it is expected that candidates will expand points that they make. Answers should not be in the form of a list. However, it is essential that candidates make sure that their answers are relevant and answer the question set. Appropriate choice of question is vital – generalities based on scant factual knowledge are unlikely to gain many marks.

### Question 8

Although many candidates attempted this question, few seemed to have any specific knowledge of the topic. Damage caused by dust revealed this inadequate knowledge most clearly. Dust, a particular problem in dry, windy seasons, would cause friction when it gets into grease around joints and bearings. Clogged air filters would also be a problem. Some knowledge of maintenance and servicing would be needed for candidates to state these problems and explain how to address them. Too many answers simply suggested washing the tractor after use and putting a cover over it.

Some answers about the damage caused by sunlight were a little better but, again, precise knowledge was lacking. Paint peeling and tyres drying out and cracking were well made points and storage out of direct sunlight was obvious but few candidates thought of the wooden parts of cultivation equipment, which might dry out and crack. Whilst references were made to expansion of metal, caused by heat, candidates struggled to explain the significance of this.

In previous sessions, candidates have shown good knowledge of the agents of rusting and how it could be prevented but this was not seen here. Many candidates suggested that water and sunlight cause rust, when water and oxygen are required for rusting to occur. However, the effects – weakened metal and blunting of cutting edges - were mentioned in some better answers, together with cleaning, drying, oiling and dry storage of equipment in rust prevention.

### Question 9

This question suffered from a similar problem to the previous one – a lack of precise knowledge resulting in rambling answers with little relevance to the question.

- (a) Suggesting that the farmer might use land for forestry or a game reserve because it would be 'easier' than keeping livestock or growing crops misses the point of the question. Reasons why a part of his land might be unsuitable for such purposes were expected – aspects of topography resulting in difficulties of cultivation or grazing, for example. Some ecological concern, such as the conservation of a particular species occurring on the land, could be accepted but too many answers became long accounts (often inaccurate) of the effects of deforestation, wandering into climate change, which were inappropriate in this context. However, many realised that game reserves could be a source of income through tourism.
- (b) Many candidates failed to answer the question set, repeating much of their material from (a). This question specifically asked for the uses of trees and tree planting **in agriculture**, a point ignored by many candidates. Erosion control and windbreaks are valid in this context and explanations of how trees fulfil this role could have been outlined. Other points could include the provision of timber (and its uses), fruits, fuel and shade with examples or other expansion.



### Question 10

- (a) (i) Candidates generally understood the principles of rotational grazing but there were some candidates who confused this with crop rotation. Many candidates drew diagrams to show the division into paddocks and sequence of use but did not use these to best effect as they lacked annotation and labels.
- (ii) Candidates did not always make it clear that animals would remain in sheds, yards or kraals in zero grazing regimes but generally understood that grass would be cut and carted to the animals.
- (b) There were too many rather vague answers, along the lines of 'the farmer would have better control of his livestock', without explaining what would be controlled. Control of feeding, breeding parasites and disease outbreaks would all be more easily achieved with intensive grazing. Better answers also referred to more efficient use of pasture and the reduced land requirement and there were some well-made points concerning the security of livestock where fencing is used.

### Question 11

- (a) (i) It is important that candidates name the livestock where this is stipulated in the question as this may impinge on marks given in subsequent sections.
- (ii) A considerable number of candidates ignored the requirement to describe **records** that should be kept and gave descriptions of stockmanship related to care of the livestock. These did not answer the question and gained few marks. Good answers stated the types of record that would be needed, such as feeding, production, breeding and so on, then going on to expand these with descriptions such as the amount and type of feed given, the amount of a named product, etc. Candidates who drew an exemplar record book with suitable entries were few, but perhaps showed their greater practical experience in doing so – a valuable asset in answering this question.
- (b) Too many answers concentrated on **containing** an outbreak of disease, when the question asked about actions to **prevent** outbreaks occurring. Isolation, treatment and culling infected animals did not address the question set. Regular checks on animals, aspects of hygiene related to housing, feeding and water provision, as well as the use of prophylactics and vaccination were points looked for, along with expansion of these. A number of candidates showed good practical knowledge and experience by giving examples of hygiene related to specific livestock – preventing mastitis in cattle, for example. A few candidates still seem to think that vaccination is a treatment given to sick cattle, rather than a means of disease prevention.

### Question 12

- (a) Some candidates attempted this question with little idea of how a small storage dam would be constructed, listing wholly inappropriate materials and methods. However, there were many very good answers, most with clear, well-labelled diagrams that needed little further explanation. Shape (and the reason for it), materials and means of preventing erosion were all included.
- (b) Most answers listed the uses of the stored water, with limited expansion of individual points. Appropriate uses would be associated mainly with livestock or irrigation. Candidates expanded these points, stating the ways in which water would be used for livestock, such as cleaning housing and drinking. Availability of water for dry seasons was a valid point and some candidates pointed out that the water could have domestic uses if it was appropriately treated. This proviso was essential if this point was to be accepted. The use of pumps or channels to use the water for irrigation could have been mentioned but was seldom seen. However, washing equipment and mixing chemicals were stated uses, which showed some thought and initiative in answering the question.

# AGRICULTURE

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Paper 5038/03

Practical

## General comments

Centres should be congratulated for resourcing the exam in an effective and appropriate way. Providing well prepared and carefully presented material greatly enhances candidates' performance in a practical exam.

Almost all candidates answered or attempted to answer all three questions. The quality of response even from the weakest candidate created an impression of candidates having a worthwhile experience from the examination and the course.

Where candidates are asked to draw it is important that they understand that they do not need to be skilled artists but should be able to draw simple clear line diagrams of specific parts. The best work, even from candidates with poor drawing skills, is where diagrams were large and clearly labelled.

Although candidates almost always attempted all three questions it is worth drawing candidates' attention to the marks available for each question in that there is no set mark distribution. If a weakness was evident it was in the application of the relevant theory.

## Comments on specific questions

### Question 1

- (a) (i) Most candidates effectively removed a sepal, petal and stamen and drew clear diagrams of each part. Provided the diagrams could be identifiable as a specific part a mark for drawing was awarded.
- (ii) Most candidates gained full marks although too many diagrams were small and lines indicating the ovules were difficult to identify.
- (iii) Almost all candidates gave good answers showing good understanding of insect pollination. Scent and colour were the most common responses. Some candidates had an understanding of the target effect of flowers.
- (b) (i) A wide range of wind pollinated plants was supplied although by far the most common was maize. Most candidates gained full marks by identifying and labelling three different parts.
- (ii) Wind pollination was less well understood and answers tended to be a little confused. Marks were awarded for the idea of exposed parts and comments on the structure of wind pollinated pollen grains, although technically these would not have been visible.

### Question 2

- (i) It was anticipated that AS4 being a dark soil would warm more, and this was the case for most Centres. Marks were simply awarded for a logical range of figures showing a rising trend.
- (ii) Although the mark was for AS4, where a Centre had candidates consistently showing that AS3 had the greatest rise in temperature candidates were credited for this.
- (iii) Most candidates were able to plot a bar graph using an appropriate scale and label the axes. Some weaker candidates found this question hard, but where they had drawn and labelled axes they were able to gain two marks, the other two marks being for plotting the graph.



- (iv) Some answers were poorly expressed, but provided the candidate indicated that a more accurate reading of soil temperature was achieved a mark was awarded.
- (v) A mark was awarded if candidates expressed and showed an understanding that water would affect the accuracy of the experiment. The better candidates were able to explain that water required more energy to raise its temperature and so the soil would be slower to warm.
- (vi) The most common response was to repeat, or to suggest ways of using deeper soil samples, or to suggest inserting the thermometer below the soil.

### Question 3

- (i) It was really pleasing to note that this simple and effective soil analysis was well done by almost all candidates. One mark was awarded for each correct answer. The dark organic soil was AS7, clay AS6 and coarse sandy soil AS5.
- (ii) The properties of these samples were less well understood with few candidates gaining full marks. Most could identify a sandy soil as being easily leached and dark organic soil as absorbing the sun's energy. Weaker candidates were not clear as to the effect of lime and its ability to flocculate a clay soil.