

# AGRICULTURE

Paper 5038/11

Paper 11

## Key messages

- Candidates should be reminded to check carefully that they have given an answer for all **Section A** questions.
- Candidates should take note of the mark allocation for each question and plan their answers accordingly.

## General comments

There were many very good responses to the questions and candidates demonstrated that they had sufficient time to complete the paper. Many candidates were able to show their practical experience of agriculture. The question paper also tested data response. Almost all candidates attempted these questions and stronger candidates tended to deal with them effectively.

In **Section B**, **Questions 10** and **12** were the most popular choices, with **Questions 11** and **13** slightly less frequently selected. The candidates who attempted **Question 14** often provided strong responses. Many answers in this section were detailed and well organised.

## Comments on specific questions

### **Section A**

#### **Question 1**

- (a) (i) This question was answered well by the majority of candidates.
- (ii) Many candidates had no issue identifying the layer.
- (b) Most candidates were able to state two of these living things. Some weaker candidates resorted to repetition.
- (c) This question was answered well by the majority of candidates, who often demonstrated good knowledge of soil formation. Weaker candidates confused physical and biological weathering.

#### **Question 2**

- (a) This question was answered well by the majority of candidates, with many clear descriptions of soil erosion. Although rare, the most common problem was to fixate on nutrients alone being carried away.
- (b) Most candidates correctly identified a cause of soil erosion and many made a suggestion to reduce its effects.
- (c) This question was answered very well by almost all candidates.
- (d) This question was answered well by the majority of candidates. Many gave a detailed and developed explanation of an impact of overwatering a crop.

### Question 3

- (a) There were many strong responses regarding sexual reproduction.
- (b) Only the very strongest candidates answered this question well. The most common issue was to confuse the features of the two flowers in answers.
- (c) This question was answered well by the majority of candidates.
- (d) Many candidates described fertilisation in a plant with clarity and detail. Weaker candidates confused this with pollination.
- (e) This question was answered well by stronger candidates. Weaker candidates tended to not clearly describe the benefits of cross and insect pollination.

### Question 4

- (a) (i) Almost all candidates answered this question correctly.
- (ii) This question was also answered well by almost all candidates, with many high quality descriptions of seed dispersal.
- (b) (i) This question was answered well by almost all candidates.
- (ii) This question was answered well by almost all candidates. Many responses included contamination and toxicity as reasons to remove weed seeds from harvested crops
- (iii) Many candidates showed good knowledge of this area of the syllabus and an ability to explain.

### Question 5

- (a) This question was answered well by almost all candidates. Some candidates answered in depth. Many candidates provided a clear, accurate equation in their description.
- (b) This question was answered well by the strongest candidates. Strong responses identified two different factors that could affect the rate of photosynthesis. The most common issue was to suggest light intensity.
- (c) Most candidates answered this question well but some showed confusion with the transpiration stream.

### Question 6

- (a) This question was answered well by almost all candidates who used the photograph well and showed a reasonable practical understanding of handling chemicals.
- (b) (i) This question was answered well by almost all candidates. Many of whom described the need to avoid unintended chemical mixing.
- (ii) This question was answered well by almost all candidates. Some answers only received partial credit due to their limited depth, such as not describing how water should be disposed of.
- (c) Most candidates answered this question well. Strong candidates identified the potential impacts of both high and low concentrations of chemical sprays on crops and the environment.
- (d) This question was answered well by stronger candidates, who suggested a wide range of environmentally friendly alternatives to farm chemicals.

### Question 7

- (a) (i) This question was answered well by almost all candidates.
- (ii) This question was answered well by all but the weakest candidates.

- (iii) Most candidates answered this question well but some weaker responses confused protein-rich food material with high-energy food material.
- (b) This question was answered well by stronger candidates. Many responses identified the volume of milk produced or reproductive capability as well as the ability to avoid illness.

### Question 8

- (a) (i) This question was well answered by the majority of candidates. The most common issue was to confuse the embryo and the endosperm.
- (ii) This question was answered well by almost all candidates.
- (b) Many candidates could describe two conditions. Weaker responses were occasionally very vague, such as stating temperature and leaving it unqualified.

### Question 9

- (a) (i) Stronger candidates answered well and demonstrated good understanding of the concept of dominance.
- (ii) This question was answered well by stronger candidates. A common issue was to incorrectly use key phrases such as heterozygous and homozygous.
- (b) This question was answered well by stronger candidates. However, some candidates showed a lack of understanding of parent and offspring genotypes, gametes and the expected ratios arising from crosses. Candidates should be reminded to clearly link offspring phenotype with genotype.
- (c) (i) This question was answered well by almost all candidates. Most focussed on the potential grazing difficulties effectively.
- (ii) This question was answered well by the strongest candidates, who described the initial breeding of non-sufferers and its continuation through further generations or the importation of disease-free stock.

## Section B

### Question 10

- (a) The meaning of the term organic farming was generally well understood.
- (b) This question was answered very well by the majority of candidates.
- (c) Most candidates gave good answers for this question although some needed to remember the farming system was organic or did not realise the implications.

### Question 11

- (a) Many candidates demonstrated a good understanding of the process of transpiration. The strongest candidates included details of the processes of evaporation and/or diffusion.
- (b) This question was answered well by the majority of candidates. The most common problem was to incorrectly describe the effect of high levels of humidity on the rate of transpiration.
- (c) This question was well answered by the majority of candidates, who accurately described translocation, the conversion of glucose produced during photosynthesis into starch and its accumulation in plant storage organs. Weak responses referred to the storage of soluble glucose.

### Question 12

- (a) This question was well answered by the majority of candidates, who explained the need to report notifiable diseases to a range of appropriate authorities. Only the strongest candidates justified this action in terms of the potential for contagion and rapid disease spread.

- (b) This question was well answered by the majority of candidates, many of whom described disease spread by (direct and indirect) contact, vectors, feed, water and other means.
- (c) This question was answered well by the majority of candidates. Many excellent explanations demonstrated a thorough understanding of how to reduce the spread of disease between livestock.

**Question 13**

- (a) This question was answered well by most candidates.
- (b) The strongest candidates answered this question well and showed a depth of understanding.
- (c) This question was well answered by the majority of candidates, many of whom correctly identified a combination of potential pasture, livestock and management impacts.

**Question 14**

- (a) This question was well answered by the strongest candidates, who correctly described the proportions of clay, sand and silt in a loam soil and often also identified a key property such as aeration, drainage or nutrient content.
- (b) Candidates generally answered this question well and many candidates linked particle size and air space to water-holding capacity and drainage rate.
- (c) This question was answered by some. Many candidates could offer some possible drainage solutions. Strong candidates accurately identified and linked to the properties of a clay soil.

# AGRICULTURE

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Paper 5038/12

Paper 12

## Key messages

- Candidates should be reminded to check carefully that they have given an answer for all **Section A** questions.
- Candidates should take note of the mark allocation for each question and plan their answers accordingly.

## General comments

There were many very good responses to the questions and candidates demonstrated that they had sufficient time to complete the paper. Many candidates also showed they had practical experience of agriculture. The question paper also tested data response. Almost all candidates attempted these questions and stronger candidates tended to deal effectively with them.

In **Section B**, questions tended to be equally popular and there were many answers that were detailed and well organised.

## Comments on specific questions

### **Section A**

#### **Question 1**

- (a) (i) The majority of candidates gave a good example of biological weathering mainly focused on the action of roots.
- (ii) This question was answered well by the stronger candidates, many citing acid rain.
- (b) (i) This question was answered well by almost all candidates. Most candidates could describe two suitable properties.
- (ii) This question was answered well by stronger candidates. Some weak candidates gave a property that would be the same between the two soils.
- (c) (i) This question was answered well by stronger candidates. Weaker candidates demonstrated a lack of knowledge of this topic.
- (ii) Stronger candidates answered this question well. Many weaker candidates demonstrated a lack of knowledge of this concept.
- (iii) Most candidates answered well and identified and often explained how farming practices could lead to the formation of soil pans.

#### **Question 2**

- (a) (i) This question was answered well by stronger candidates.
- (ii) This question was answered well by most strong candidates.

- (b) (i) This question was answered well by stronger candidates. Weaker candidates confused nitrogen deficiency and availability.
- (ii) Stronger candidates gave good answers and typically identified manure or compost as an organic way of correcting nitrogen deficiency.
- (c) This question was answered well by most candidates. However, some candidates did not include a correct unit for mass.

### Question 3

- (a) This question was generally answered well and candidates showed some thoughtfully application of knowledge to the photograph.
- (b) This question was answered well by the majority of candidates. Some weak candidates described the impact of the harrow on the seedbed.
- (c) Many candidates completed the table successfully to explain the fertility benefit of adding manure. The other two rows were also often completed correctly.

### Question 4

- (a) This question was answered well by stronger candidates, who demonstrated a typically very clear understanding of the other requirements of photosynthesis.
- (b) (i) This question was answered well by the majority of candidates.
- (ii) Most candidates answered well and typically mentioned the presence of stomata, the high density of chloroplasts and leaf surface area.
- (c) This question was answered well by stronger candidates. The most common misconception by very weak candidates was to suggest that food was transferred via stomata.

### Question 5

- (a) (i) This question was answered well by almost all candidates.
- (ii) This question was answered well by many candidates.
- (b) Many of the stronger candidates often gave an accurate description.
- (c) Most candidates supplied good diagrams and these were often clearly annotated.

### Question 6

- (a) (i) Stronger candidates gave good answers to this question and identified a range of phenotypes.
- (ii) This question was answered well by the strongest candidates and many identified genes obtained from the offspring's mother and dominance as having the potential to change appearance.
- (b) (i) Only the strongest candidates answered this question well. Weak candidates sometimes confused alleles and characteristics.
- (ii) This question was answered well by stronger candidates. However, some candidates showed a lack of understanding of genotypes and resulting phenotypes or ratios. Candidates should be reminded to clearly link offspring genotype and phenotype.

### Question 7

- (a) This question was answered well by stronger candidates. Some weak candidates identified the part of the tube adjacent to the anus as the oesophagus.
- (b) Most candidates included aspects of both digestion and absorption in their response.

- (c) This question was answered well by stronger candidates who showed good knowledge of the multiple stomachs. Stronger responses generally used technical language well to state clear differences.
- (d) Only the strongest candidates tended to answer this question well and explained many of the features. Good knowledge of microbes and rumen function was shown in the strongest responses.

**Question 8**

- (a) This question was answered well by stronger candidates. Weaker candidates did not link knowledge of the life cycle to pest control methods.
- (b) This question was answered well by many candidates.
- (c) This question was usually answered very well. Candidates tended to suggest a wide range of cultural pest control methods.
- (d) This question was answered very well by stronger candidates, who included explanation of the mode of action of a systemic pesticide and explained its effectiveness in killing pests.

**Question 9**

- (a) This question was correctly answered by the majority of candidates.
- (b) (i) Some very good answers were seen and many candidates correctly described both irrigation and drainage showing a generally careful use of technical language.
- (ii) This question was answered very well by the stronger candidates. Some candidates made some vague and unqualified comments that needed better development for credit.
- (iii) Some very good answers were seen which clearly explained the negative impacts of failure to remove excess water from soil, focused mainly on anaerobic conditions.

**Section B**

**Question 10**

- (a) This question was answered well by most candidates, who correctly described the process of growing crops in nutrient-rich water in the absence of soil.
- (b) This question was answered well by many candidates. An issue for some weaker candidates was to state that plants grown in hydroponic systems were at absolutely no risk from diseases and pests.
- (c) Many candidates gave detailed answers explaining the benefits of genetically modified crops, including increased yield, disease and pest resistance and tolerance of extreme weather conditions.

**Question 11**

- (a) Many candidates answered this question well and demonstrated a clear understanding of weaning.
- (b) This question was answered very well by many candidates, who gave clear descriptions of appropriate care, housing, husbandry, feeding and the medical care needed by young mammalian farm animals.
- (c) Many candidates answered this question well and explained the positive benefits of colostrum clearly.

**Question 12**

- (a) Generally stronger candidates answered well and described key differences between sexual and asexual reproduction. A misconception in weaker answers was that sexual reproduction produced identical offspring.
- (b) Many candidates gave detailed answers. One issue was for weaker candidates to compare pollination methods rather than focus on the question.
- (c) Many candidates gave good answers explaining benefits of asexual reproduction. Strong responses showed an ability to apply relevant knowledge to the question.

**Question 13**

- (a) This question was answered very well by the majority of candidates. Many correctly described cleaning, oiling or greasing, sharpening, keeping dry and secure storage.
- (b) Many candidates correctly identified a range of hand tools and their function in the fence construction.
- (c) Generally this question was very well answered. Many candidates described wooden, wire and electric fences and explained their purposes effectively.

**Question 14**

- (a) Many candidates accurately described a range of properties including particle size, water retention, drainage and workability.
- (b) This question was answered well by many candidates, who clearly described methods to test soil pH on a field scale. Many candidates seemed able to draw on their practical experience.
- (c) Stronger candidates identified the importance of a good soil crumb structure in ensuring effective crop production and explained its impact on the key requirements for growth.

# AGRICULTURE

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Paper 5038/02

Coursework

## Key messages

- Centres need to allocate sufficient time to deliver the practical aspects of the syllabus and to ensure practical and investigative skills have been taught and developed before embarking on producing the coursework. Many centres manage this well.
- Prior to planning opportunities to assess, centres should refer to the criteria for the coursework and the grade level descriptors for the key grades within the syllabus.
- When choosing practical exercises or topics for investigation it is important to identify the level of demand presented by the topic to ensure that each candidate can reach their full potential.
- Visual evidence such as images and videos should be checked before submission and should be appropriately organised, named or labelled.

## General comments

The general standard of work this year was good and many centres incorporated photographic evidence. Many centres also submitted video clips with some excellent candidate commentaries, which can act as evidence to support the centres marking. The enthusiasm of candidates and their hard work was very evident. Many candidates demonstrated excellent practical skills and a good scientific approach, which often incorporated good agricultural practice.

The strongest work was often from centres who seemed to have given candidates sufficient time to carry out the work and incorporated it into the overall planning for delivering of the course. These candidates tended to fully discuss their findings and explain them in a way that did not assume background knowledge from the readers of the portfolios. In weaker work, investigations were often rushed and superficial and the topics chosen were of a low level of demand.

Unfortunately some centres submitted investigative projects which were not individual and were group-based activities. Too much of this work was simply copied background evidence. In these submissions creditable work was often limited to very simple statements and there was a lack discussion and explanation. It is important to ensure work is original to individual candidates and that candidates are offered a wide range of exercises covering different syllabus sections. Equally, the investigation topics need to vary.

## Comments on specific marking criteria

### **Practical Exercises**

Most centres carried out an appropriate range of practical exercises. The practical skills were also clearly seen within some of the investigative projects. Evidence for practical skill ability was generally good with most work demonstrating high levels of competence.

Many candidates produced detailed records throughout the course and these were often supported by constructive critical reflections incorporating annotated photographs and video clips. Presentations with critical task reflection also proved popular and were effective, allowing candidates to illustrate and explain each exercise.

Centres who offer four simple skills need to be aware that practical exercises require sufficient demand to allow candidates to access the full range of marks. Simple tasks like clearing ground or digging a plot are not suitable for strong students unless candidates are identifying problems and resolutions and describing these in sufficient detail. Tasks need to allow candidates to fully demonstrate their skill ability and some needed to be made more demanding for stronger candidates. Centres also need to choose exercises which make best use of their local situation. There were some good examples where candidates selected some scientific exercises and incorporated laboratory tests along with cultivation.

The awarding of the highest marks should be for candidates of exceptional skill and ability who produce practical outcomes which fully meet all the marking criteria statements and match the level of demand.

## **Practical Investigation**

### **1. The selection of relevant questions (hypothesis) for the investigation**

Most candidates produced a hypothesis. However, they were often not fully developed, justified or explained in context. Candidates needed to relate their hypothesis to their own research. Some centres annotated candidates work to indicate the amount of support given to candidates in forming their hypothesis. Only fully independent selection and the formation of an appropriate challenging hypothesis should be awarded full credit.

The strongest candidates collected a good range of supportive background information and used this to support the formation of their hypothesis. They used the underlying agricultural principles and related scientific knowledge that would underpin their investigations. Candidates should fully discuss the research and reasons for arriving at their chosen hypothesis. This was often best covered when candidates have been given sufficient time to plan and prepare for their investigation.

### **2. The planning of the investigation and the principles on which it is based**

Planning was good in general and the strongest candidates linked their plan clearly to their hypothesis and this was supported by evidence that was suitably referenced. The plan needed to be clearly explained to enable the reader to replicate the investigation in a scientific way. It needed to incorporate the necessary steps required to carry out the investigation and the resources required, including the time scale needed for the investigation. Some of the strongest candidates referred to their background research and hypothesis and used this to develop a suitable plan for carrying out their investigation. Where amendments to the plan were required, these candidates justified their modifications of the plan. Some candidates had managed to gain access to livestock or land to carry out their individual practical investigation which often added strength to their work.

### **3. The handling of evidence**

Data collected was often quite simple and sometimes only just sufficient to produce a simple analysis of the results. To produce meaningful data candidates needed to take a comprehensive range of results, which were taken throughout the investigation. For example, simply producing a bar chart of final crop yield was insufficient to access the higher marks. In stronger work, results were recorded in detail and candidates indicated any specific procedures used for the collection of accurate data, taking care to use an appropriate and reliable sample size. Problems encountered were indicated and discussed in the conclusion.

Presentation of data was often simplistic but stronger candidates incorporated more than one method of analysing the outcome of their investigation. In stronger work, tables and charts were clearly labelled using appropriate units and graphs were annotated to ensure the reader could understand what was being shown.

Stronger candidates also annotated their graphs and charts to identify anomalies or relevant points of interest, e.g. environmental events beyond their control.

### **4. The ability to make deductions from the evidence or data acquired**

The strongest candidates fully explained the reason for their results and their conclusions related to the data and outcomes of their investigation. Weaker candidates often needed to draw conclusions or explain and discuss their results and outcomes in more detail. Some candidates saw experimental error or natural events beyond their control as spoiling or limiting their ability to draw conclusions and to

evaluate their results appropriately. Candidates should be encouraged to show and explain the importance of events beyond their control, and to link these to the conclusions that can be drawn from such events. It is important that candidates identify and explain how error may have occurred and how such errors might have impacted on their ability to draw a firm conclusion.

**5. The ability to recognise limitations of the investigation**

The strongest candidates took care to fully explain how future amendments or alterations could possibly overcome problems encountered. However, many candidates made general statements which were not explained sufficiently. Generally more detail and clearer explanation was needed.

**6. Description of practical, presentation, layout and originality (candidate's own work)**

Most centres marked this section accurately and in general the investigations were well presented. Candidates should be encouraged to present their work using appropriate sub-headings, making full use of diagrams and charts that need to be fully explained and annotated, referenced as needed and linked to the discussion in producing deductions and conclusions. Photographs greatly improved many reports making it easier to see and understand the work undertaken and to show the outcomes.