1. Q 9

(a) (i) Explain what is meant by the term *dormancy* in seeds

(ii) How does digestion contribute to successful seed germination?

1. Answer the following questions in relation to the investigation you carried out to show digestive activity during seed germination.

State whether you carried out this investigation using starch agar **or** skimmed milk (protein) agar.

* 1. Name a type of enzyme in the seed that carries out this digestion.
  2. Why were the seeds soaked in water at the start of the investigation?
  3. When preparing the seeds, they were also split and sterilised.
     1. Why is it recommended that you sterilise the seeds?
     2. Why were the split seeds placed open-side down on the agar?
  4. How did you know that digestive activity had occurred on one of your investigation plates?
  5. How did you know that digestive activity had **not** occurred on one of your investigation plates?
  6. Give **one** reason for what you observed in part (v).

MS 2016 Q 9

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| **9.** | (a) |  | **2(3)** |
|  | (i) | *Dormancy:* Period of low (or no) metabolism **or** period during which germination | |
|  |  |  | does not occur **or** period of no growth **or** period of low (or no) activity |
|  | (ii) | *Contribution of digestion:* To make nutrients (or food) soluble **or** to make nutrients (or | |
|  |  | food) available **or** to make nutrients (or food) transportable (to the embryo) | |
|  |  | **or** to make nutrients (or food) more easily absorbed (by embryo) | |
| **9.** | (b) |  | **4(4) + 4(2)** |
| *Starch agar or skimmed milk agar: if neither stated, award maximum of six points i.e. [4(4) + 2(2)]* | | | |
| *Enzyme in (i) must match named substrate i.e. starch or protein* | | | |
| *Named reagent colour changes must match named substrate in parts (iv) and (v)* | | | |
|  | (i) | *Type of enzyme:* Amylase **or** protease (or named protease) | |
|  | (ii) | *Why soak seeds:* To enable metabolic activity (or digestion) **or** to start up the | |
| germination process **or** to allow nutrients dissolve (or to move) **or** to activate enzymes | | | |
| **or** to soften the testa **or** to break dormancy | | | |
|  | (iii) | 1. | *Why sterilise seeds:* To kill (or remove) all microorganisms |
|  |  | 2. | *Why open-side down:* Enzyme exposed to (or in contact with) the substrate |
|  | (iv) | *How know had occurred:* (Flooded plates with) iodine or biuret (solution) | |
|  |  |  | Clear areas around (under) seeds (or described) |
|  | (v) | *How know had not occurred:* No clear areas **or** all areas stain positive colour | |
|  | (vi) | *Reason for observation in (v):* Seeds were dead **or** enzyme had been denatured | |

**Q 2014 7**

(a) (i) Name a part of a seed in which food for germination is stored.

(ii) Name the **three** factors necessary for seeds to germinate.

**(b) Answer the following questions on seed germination.**

* 1. At the start of the investigation to show digestive activity during germination the seeds were sterilised.
     1. Why is this necessary?
     2. How did you sterilise the seeds?
  2. Name the substance that is used as a medium on which to germinate the seeds.
  3. What substance, to be digested by the seeds, was added to the above medium?
  4. What control did you use in this demonstration?
  5. How did you demonstrate that digestive activity had taken place?

**MS 2014 7**

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| **7.** | (a) | (i) | \*Cotyledon **or** \*endosperm | | **3** |
|  |  | (ii) | Water / oxygen / suitable temperature (or warmth) | | **3(1)** |
|  | (b) | (i) | 1. | To kill (or inhibit) any microorganisms (or bacteria and fungi) | **3** |
|  |  |  | 2. | Disinfectant **or** named disinfectant. | **3** |
|  |  | (ii) | Agar | | **3** |
|  |  | (iii) | Starch **or** milk **or** protein | | **3** |
|  |  | (iv) | (Same set-up and procedure with) boiled seeds | | **3** |
|  |  | (v) | Iodine (or biuret) (solution) / negative result (or described) beneath | |  |
|  |  |  | seeds / indicates the absence of (or digestion of) starch (or protein) | | **3(3)** |

**Q 2013 9 (iv)**

When investigating digestive activity during seed germination:

* + 1. How did you supply a substrate suitable for the digestive enzymes?
    2. How did you ensure that no digestive enzymes were available on the control plate?

**MS 2013 9 (iv)**

1.Milk agar **or** starch agar

2. Boiled seeds

**Q 2012 7 (b) (iii) (iv) and (v)**

(iii) What type of agar plates did you use when investigating the digestive activity of seeds?

(iv) How did you demonstrate that digestive activity had taken place in the investigation referred to in part (iii)?

(v) How did you demonstrate the requirement for oxygen when investigating the factors necessary for seed germination?

**MS 2012 7**

|  |  |
| --- | --- |
| (iii) Milk **or** starch | **3** |
| (iv) Does not give a positive result where digestive activity occurred **or** described | **3** |
| (v) Anaerobic jar (or described) **or** boiled water + oil  **or** one with O2 and one without O2 (and compare) | **3** |

**Q 2009 8**

1. (a) (i) What is meant by *germination*?

(ii) Why is digestion necessary in a germinating seed?

(b) (i) Digestive activity during germination can be demonstrated by using agar plates.

What is an agar plate?

1. An extra food material is added to the agar plate for **this** demonstration.

Give an example of such an extra food material.

1. Outline the procedures that you carried out in setting up this demonstration.

**MS 2009 8**

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| **8.** | (a) | (i)  (ii) | Growth of seed (or embryo part or of embryo)  To make (food) soluble **or** to make (food) transportable | **3**  **3** |
|  |  |  |  |  |
|  | (b) | (i) | Petri dish containing a jelly (or solid medium) | **3** |
|  |  | (ii) | Starch **or** milk | **3** |
|  |  | (iii) | Soak (seeds) / split (seeds) / how sterilised correctly / position (seeds) on agar / keep plate warm **or** stated temperature (max. 35 oC) | **2(3)** |
|  |  | (iv) | Boiled seeds | **3** |
|  |  | (v) | Starch agar: Iodine (solution) **or** milk agar: biuret solution. | **3** |
|  |  | (vi) | 1. No blue-black (under seeds) **or** no purple (under seeds) 2. Blue-black (under seeds) **or** purple (under seeds) | **3**  **3** |