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examiners and assessment experts

Detailed mark scheme

Suitable for all boards

Designed to test your ability and
thoroughly prepare you

2002

XVIII

1583

Time allowed
53 Minutes

Score

/44

Percentage

%

Biology

**AQA
AS & A LEVEL**

Mark Scheme

**3.5 Energy transfers in and
between organisms (A-level
only)**

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- 1 Growth of algae / surface plants / algal bloom blocks light;
2. Reduced / no photosynthesis so (submerged) plants die;
3. Saprobiotic (microorganisms / bacteria);
 3. *Accept: Saprobiont / saprophyte / saprotroph*
 3. *Neutral: decomposer*
4. Aerobically respire / use oxygen in respiration;
5. Less oxygen for fish to respire / aerobic organisms die;

[5]

- 2 (a) 1. To kill any fungus / bacteria on surface of seeds or in soil; 2. So only the added fungus has any effect. 2
- (b) So that only nitrate or ammonia / type of fertiliser affects growth. 1
- (c) 1. So that effects of nitrate or ammonium alone could be seen;
2. So that effects of fungus can be seen. 2
- (d) 1. Weigh samples at intervals during drying;
2. To see if weighings became constant (by 3 days). 2
- (e) With live fungus – showing effects of the fungus:
1. Fungus increases growth of roots and shoots in both;
2. Produces greater growth with nitrate.
- With heat-treated fungus – showing effects of fertiliser:
3. Similar dry masses for roots and shoots;
4. (Probably) no significant difference because SDs overlap. 4
- (f) 1. Dry mass measures / determines increase in biological / organic material;
2. Water content varies. 2
- (g) 1. Fungus with nitrate-containing fertiliser gave largest shoot: root ratio;
2. And largest dry mass of shoot;
3. 6.09:1 compared with ammonium-containing fertiliser 4.18:1

2 max

[15]

- 3 (a) (i) 1. Amino acid / protein / enzyme / urea / nucleic acid / chlorophyll / DNA / RNA / ATP / ADP / AMP / NAD / NADP;
2. DNA / RNA / nucleic acid / ATP / ADP / AMP / NADP / TP / GP / RuBP / phospholipids;
1. and 2. Accept any named equivalent examples e.g. nucleotides.
Neutral: ammonia / nitrite / nitrate / phosphate.

2

- (ii) 1. Saprobiotic (microorganisms / bacteria) break down remains / dead material / protein / DNA into ammonia / ammonium;
Accept: saprobionts / saprophytes / saprotrophs
Neutral: decomposer
2. Ammonia / ammonium ions into nitrite and then into nitrate;
Allow correct chemical symbols.
Accept: correct answers which use incorrect bacteria e.g. nitrogen-fixing but then reject m.p. 3.

3. (By) Nitrifying bacteria / nitrification;

3

- (b) 1. Nitrate / phosphate / named ion / nutrients for growth of / absorbed / used by plants / algae / producers;
2. More producers / consumers / food **so** more fish / fish reproduce more / fish grow more / fish move to area;
Must have idea of more plants related to some increase in fish.

2

[7]



- 4 (a) 1. Oxygen produced in light-dependent reaction;
2. The faster (oxygen) is produced, the faster the light-dependent reaction.

2

- (b) 35–36 μmol Oxygen per mg chlorophyll.

Correct difference at 500 $\mu\text{mol photons m}^{-2} \text{s}^{-1}$ or incorrect difference but division by 4 shown = 1 mark.

2

- (c) At all light intensities, chloroplasts from mutant plants:
1. Have faster production of ATP and reduced NADP;
 2. (So) have faster / more light-independent reaction;
 3. (So) produce more sugars that can be used in respiration;
 4. (So) have more energy for growth;
 5. Have faster / more synthesis of new organic materials.

Accept converse points if clear answer relates to non-mutant plants

4 max

[8]

5 (a) (i) Unit of energy / mass, per area, per year.

1

(ii) 1. Less light / more shading / more competition for light;
Neutral: references to animals

2. Reduced photosynthesis.
Accept: no photosynthesis

2

(b) 1. Pioneer species;
2. Change in abiotic conditions / less hostile / more habitats / niches;

Accept: named abiotic change or example of change e.g. formation of soil / humus / organic matter / increase in nutrients

Neutral: reference to change in environment unqualified

Neutral: more hospitable / habitable / homes / shelters

3. Increase in number / amount / diversity of species / plants / animals.
Accept: other / new species (colonise)

3

(c) 1. Net productivity = gross productivity minus respiratory loss;
2. Decrease in gross productivity / photosynthesis / increase in respiration.

2

(d) 1. Conserving / protecting habitats / niches;
2. Conserving / protecting (endangered) species / maintains / increases (bio) diversity;
3. Reduces global warming / greenhouse effect / climate change / remove / take up carbon dioxide;
4. Source of medicines / chemicals / wood;
5. Reduces erosion / eutrophication.

Accept: tourism / aesthetics / named recreational activity

1 max

[9]