Communities and ecological energetic PPQs – ms

3 **(a)** Final/stable stage of a succession/community in equilibrium with the environment the composition of which is dictated by the climate; [1]

(b) **(i)** **Any two from**
- soil already formed/nutrients present
- underground root systems/storage organs can regenerate
- seeds in the soil
- other appropriate answer [2]

(ii) **Any four from**
- general sequence – herbs dominant initially, then shrubs, then trees
- herbs produce more seed/seed better adapted for dispersal/ r-selected (allow converse)
- in first five years herbs dominate due to limited competition/by example, e.g. light availability
- shrubs outcompete herbs/tree growth causes reduction in shrubs
- due to light shading/competition for water/nutrients
- trees only dominant after 15 years as they are slower-growing/ have a slower life cycle/K-selected [4]

(iii) Any two from
- some biomass from previous community distorting results
- difficult to obtain entire root systems
- less damage to ecosystem/plants killed if roots removed for measurement
- secondary succession can continue
- other appropriate suggestion [2]

8 **(a)** Tree smallest step (and at bottom of pyramid);
holly leaf miners larger than the parasitic wasps (at top of pyramid); [2]

(b) Kills host over a period of time/lives in or on host causing it harm; [1]

(c) **(i)** **Any four from**
- undertake investigation only when leaf miner emerges
- sample of both common and variegated varieties
- random sampling of holly tree, e.g. use of coordinates
- random sampling of leaves in each holly tree/sample at least 30 leaves
- number of leaves containing mines recorded
- leaf miner death due to parasitic wasp identified by examining for evidence of larvae consumed/parasitic wasp exit hole
- death by other cause identified by presence of mines but no exit hole
- exit hole of leaf miner (shows successful emergence)
- other appropriate response/large sample size to improve reliability [4]

(ii) Smaller percentage of variegated leaves affected *[not smaller numbers affected]*/fewer proportionally; [1]

(iii) Variegated holly trees in residential gardens are not in wasp's natural habitat/holly trees less likely to be clumped in same area/variegated leaves less nutritious/other appropriate response [1]

(d) **(i)** Less attractive/affect sales; [1]

(ii) Leaves – difficult to penetrate thick cuticle/shading effects of other leaves/easier washed off by rain/new leaves not affected/kills beneficial insects;
Roots – loss of pesticide due to leaching/damages soil ecosystem; [2]

1 Pioneer;
primary;
climax;
secondary; [4]

4 **(a)** **(i)** $2.0 \times 10^4 \div 1.0 \times 10^6$;
0.02 $(2 \times 10^{-2}) \times 100 = 2\%$; [2]

(ii) Gross primary production (photosynthesis) less respiration/
GPP − R; [1]

(iii) $2.0 \times 10^4 - 2.0 \times 10^3 = 1.8 \times 10^4$ (accept 18×10^3 or 18 000 or equivalent); [1]

(b) **(i)** **Any two from**
- temperature increases the rate of respiration
- higher temperatures are above the optimum for photosynthesis/ make photosynthesis less efficient
- thus respiration exceeds GPP (photosynthesis) [2]

(ii) Over this range of temperatures NPP is always high/always positive; [1]

(c) **Any two from**
- silage is a high energy/high protein food
- grass can be cut when most productive/it contains most energy
- cutting silage prevents grazing by other herbivores
- grass will continue to die and decay in the field passing some of its energy to decomposers/silage prevents further decomposition
- cattle spoil less of the grass by trampling
- cattle kept indoors move about less/are kept warm (thus conserving their energy)
- grass species can be selected for silage cutting (more upright and faster growing early summer species)
- silage can be stored for winter fodder
- other appropriate reason [2]

5 **(a)** The plastic does not remain as litter/does not interfere with harvesting/other appropriate suggestions; [1]

(b) **(i)** The higher temperature under the plastic (makes more/earlier growth more likely); [1]

(ii) **Any two from**
- (condensation on the plastic) suggests water will be retained under the plastic
- protects the seedling maize (e.g. from wind damage)
- weeds do not grow near the maize plants (only in the gaps)
- leaching of soil nutrients is reduced
- less soil erosion
- protection against late frost
- other appropriate advantage [2]

(c) **Any three from**
- all varieties yield above average in Carrick-on-Suir
- Hudson is the highest yielding in Carrick-on-Suir
- Nancis and Loft are high yielding in Dromore
- Rival and Janna produce poor yields in Dromore [3]

(d) **(i)** Cattle fed on the grass-maize silage ate more;
more energy is absorbed/stored; [2]

(ii) **Any two from**
- energy is used in respiration/released as heat
- energy is used in protein synthesis/used in muscle contraction/ any use of ATP
- energy is also lost in excretion *[not egestion/faeces]* [2]