



Dr. Blosa Science

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Basic Science in agriculture (revision question)

Please consult your biology

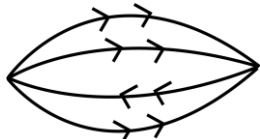
1. Trees may die after ringing because of
 - A. Interrupted flow of water from the roots
 - B. Interrupted flow of assimilate
 - C. Reduced water absorptions from the soil
 - D. Increased transpiration
2. How can rickets in livestock be controlled by providing
 - A. Minerals and vitamins
 - B. Vitamins and carbohydrate
 - C. Lipids and vitamins
 - D. Proteins and minerals
3. Calcium demand is highest in cattle during
 - A. Fattening
 - B. Early growth
 - C. Gestation
 - D. Lactation
4. Which one of the following is true of behavior of auxin during phototropism? They
 - A. Activated on the illuminated side of the shoot
 - B. Distributed on the dark side of the shoot
 - C. Destroyed on the lit side of the shoot
 - D. Moved to the illuminated side of the shoot
5. Which one of the following takes place during the dark stage of photosynthesis
 - A. Oxygen is given off as byproduct
 - B. Carbon dioxide combines with ribulose diphosphate
 - C. Water molecules are split
 - D. Electrons are emitted from chlorophyll molecules
6. Light intensity affects the rate of transpiration by
 - A. Influencing the opening and closing of the stomata
 - B. Affecting air movement around the leaf surface
 - C. Providing energy necessary for transpiration
 - D. Providing energy which accelerates evaporation
7. In a test cross, a tall organism is proved to be heterozygous for tallness if it produces
 - A. Tall and dwarf offspring
 - B. Tall offspring only
 - C. Only dwarf offspring
 - D. Offspring of intermediate height

8. The formation of ribulose diphosphate in the Calvin cycle is an example of a reaction called
 - A. Condensation
 - B. Regeneration
 - C. Oxidation
 - D. Reduction
9. Why are polyploidy plants not sterile? They
 - A. Back cross
 - B. Are mainly hybrids
 - C. Cross pollinate
 - D. Self- pollinate
10. The cohesion-tension mechanism of water movement in plants deals mainly with
 - A. Evaporation of water through stomata
 - B. Diffusion of water from cells in the roots to the shoot.
 - C. Attraction of water molecules to the wall of the xylem
 - D. Presence of hydrogen bonds that hold water molecules
11. Which one of the following hormones causes ripening of bananas?
 - A. Ethylene
 - B. Abscisic acid
 - C. Gibberellin
 - D. Cytokinin
12. Example of posterior pituitary hormones are
 - A. FSH and LH
 - B. ADH and oxytocin
 - C. Prolactin and secretin
 - D. Prostaglandin and melatonin
13. Water has a good solvent ability because its molecules are
 - A. Symmetrical
 - B. Asymmetrical
 - C. Plane set
 - D. Double bonds
14. Which of the following is found in germinating seeds?
 - A. Lactose
 - B. Galactose
 - C. Sucrose
 - D. Maltose
15. Which of the following is a variant form of a gene?
 - A. Gamete
 - B. Allele
 - C. Locus
 - D. Homologue
16. Which of the following substances is involved in the closing of the stomata during water stress
 - A. Potassium ions
 - B. Abscisic acid
 - C. Calcium ions
 - D. Maleic acid

17. The hydrophobic nature of non-polar molecules is important in living things because
 - A. Dissolve to form substances
 - B. Are chemically unreactive
 - C. Help to determine the structure of many cells
 - D. Form a base to cellular reaction
18. In animal breeding, breeding true is particular to
 - A. Speciation
 - B. Codominance
 - C. Homozygosity
 - D. Test cross
19. Which one of the following defines the ratio of additive genetic variance to the total phenotypic variance?
 - A. Heritability
 - B. Heterosis
 - C. Selection differential
 - D. Selection index
20. Transfer RNA (tRNA) are specific in
 - A. Each recognizes a particular amino acid
 - B. They are smaller than mRNA
 - C. They are coded for in the cytoplasm
 - D. Each recognizes a particular kind of enzyme.
21. Which of the following hormones influence ovulation
 - A. Follicle stimulating hormone
 - B. Luteinizing hormone
 - C. Lactogen
 - D. Oxytocin
22. What is the main source of oestrogen in pregnant cows?
 - A. Ovaries
 - B. Placenta
 - C. Adrenal cortex
 - D. Mammary glands
23. Which of the following involved in the cohesion-tension theory of water movement in the plants? They
 - A. Evaporation of water through the stomata
 - B. Presence of hydrogen bonds that hold water molecules
 - C. Diffusion of water from cells in the roots cells in the shoot
 - D. Attraction of water molecules to the walls of the xylem
24. Most pathogenic bacteria cause disease by
 - A. Destroying individual cell of the host
 - B. Depleting the energy level of the cells
 - C. Depriving the cell of oxygen
 - D. Disrupting normal function of cell by producing toxins
25. The ability of an enzyme to act on a specific substance depends on the enzyme's
 - A. Molecular weight
 - B. Protein nature

- C. Activation energy
 - D. Surface configuration
26. Plants growing under humid conditions lose excess water by
- A. Transpiration
 - B. Cuticular transport
 - C. Guttation
 - D. Use of lenticels
27. Which of the following groups of organisms in an ecosystem contains the greatest amount of energy
- A. Decomposer
 - B. Herbivores
 - C. Omnivores
 - D. Carnivores
28. Sets are planting materials used in the propagation of
- A. Irish potatoes
 - B. Banana
 - C. Sugarcane
 - D. Cassava
29. Which of these vitamins are not essential to goats?
- A. C, B, K
 - B. B, C and D
 - C. D, A and C
 - D. A, B, C
30. Which among these glands given below is responsible for the production of oxytocin hormone that controls milk let down from the udder?
- A. Exocrine glands
 - B. Pituitary glands
 - C. Pancreatic glands
 - D. Adrenal glands
31. Which of these sets of diseases given below are protozoan?
- (i) Fowl pox (ii) trypanosomiasis (iii) Redwater (iv) black quarter
(v) anaplasmosis (vi) Hog cholera
- A. (i), (iv), (v)
 - B. (ii), (v)
 - C. (i), (iii), (iv)
 - D. (iii), (vi)
32. A chemical reaction in which two or more hexose sugar molecules combine to form complex molecules is called
- A. Isomerism
 - B. Hydrolysis
 - C. Condensation
 - D. Dehydration
33. Pawpaw fruits are classified as
- A. Cherries
 - B. Drupes
 - C. Berries

- D. Pomes
34. The reaction below represents one to the following process identify which one
 $C_6H_{12}O_6 + O_2 \rightarrow 6CO_2 + 6H_2O + \text{Energy}$
- Glycolysis
 - Aerobic respiration in plants
 - Anaerobic respiration in plants
 - Anaerobic respiration in animals
35. Which of the following organelles is associated with fat metabolism in a plant cell?
- Golgi apparatus
 - Endoplasmic reticulum
 - Mitochondria
 - Ribosome
36. Parthenogenesis is the process by which
- Isogametes fuse to form a zygote
 - Inisogametes fuse to form a zygote
 - Sperm and ova fuse to form a zygote
 - An ovum develop into a zygote without fusion with sperm
37. Polyploidy can be got by the following means except
- Substitution of part of chromosome by another part
 - The cell acquiring a complete extra set of chromosomes
 - When a set of chromosomes doubles after fertilization
 - After metaphase spindles fail to develop and the cell does not divide
38. Which of the following genetic terminologies refer to the site of crossing over during meiosis?
- Synapsis
 - Chiasma
 - Diakinesis
 - Centromere
39. In herbaceous plants, support in provided by
- Sclerenchyma tissue
 - Turgidity of parenchyma
 - Thickness of collenchyma cell
 - Lignification of tracheid
40. Which of the following stages in the cell division is represented in the figure below?

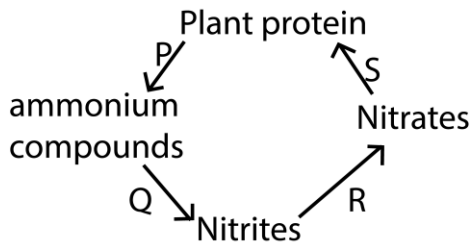


- Prophase I
 - Prophase II
 - Metaphase I
 - Metaphase II
41. In farm animals premature births are sometimes caused due to insufficient amount of
- Progesterone
 - Oxytocin
 - Oestrogen
 - Prolactin

42. Which one of the following best explains why plants of the same species may respond differently in deficiency of the same nutrients
- Uneven distribution of nutrients in the soil
 - Genetic variation of the plants
 - Uneven distribution of water in the soil
 - Different photosynthetic mechanism of the plant
43. In flowering plants the final stage of development of the ovule is the
- Seed
 - Seed coat
 - Fruit
 - Embryo
44. In rabbits, brown fur is dominant over black, when two rabbits were mated; the offspring were in ratio of 1 brown: 1black. Which one of the following genotype of the parents?
- Both were heterozygous
 - Both were homozygous recessive
 - One was homozygous recessive and the other heterozygous
 - One was heterozygous and another homozygous dominant
45. Which one of the following correctly describes the greenhouse effect?
- Increasing atmospheric carbon dioxide prevents heat loss from earth's surface
 - Depletion of the ozone layer increases the atmospheric temperature
 - The earth gives out carbon dioxide which prevents light rays from the sun reaching the earth.
 - The action of CFCs on ozone layer produces heat that increases atmospheric temperature
46. The bacteria which converts ammonia into nitrites in the soil are
- Nitrobacter and azotobacter
 - Rhizobium and azotobacter
 - Pseudomonas and nitrosomonas
 - Nitrobacter and clostridium
47. Which of the following is found in both DNA and RNA?
- Double helix
 - Ribose
 - Sugar phosphate chain
 - Thymine
48. Ruminant animals are able to digest grass because of the
- Possession of the rumen that digest grass
 - Presence of microorganisms in rumen
 - Inability to utilize other form of feed
 - Possession of the teeth to digest grass
49. Which of the following is the habitat of the tapeworm in the primary host?
- Liver
 - Intestine water
 - Muscles
 - Bile duct
50. In animals reproduction, the hormone produced by corpus Luteum is responsible for
- Secondary sexual characteristics of a cow
 - Development of the duct system in the udder

- C. Development of the udder
 - D. Maintenance of pregnancy
51. One way in which enzymes differ from inorganic catalyst is that they
 - A. Are very unstable
 - B. Can be used over and over again
 - C. Are less efficient than inorganic catalysts
 - D. Catalyze irreversible reactions
 52. Which of the following vitamins is required for quick absorption of calcium in the body?
 - A. Vitamin C
 - B. Vitamin B
 - C. Vitamin D
 - D. Vitamin A
 53. The infective stage of the pork tapeworm to man is found in the pig's
 - A. Digestive tract
 - B. Fecal matter
 - C. Muscle
 - D. Fatty tissues
 54. The immunity acquired by an animal after it has recovered from a disease is called
 - A. Passive immunity
 - B. Active immunity
 - C. Natural immunity
 - D. Artificial immunity
 55. Anaplasmosis is caused by
 - A. Ticks
 - B. Protozoa
 - C. Bacteria
 - D. Viruses
 56. Which of the following are products of microbial fermentation in the rumen?
 - A. Fatty acids and glycerol
 - B. Volatile fatty acids and ammonia
 - C. Peptones and peptide
 - D. Glucose and alcohol
 57. Which of the following is a major advantage of asexual reproduction in crop production?
 - A. Production of identical individuals
 - B. Maintenance of a constant gene number
 - C. Increase in hybrid vigor
 - D. Production of higher yielding plants
 58. The hormone directly responsible for development of male secondary sexual characteristics in animals is
 - A. Progesterone
 - B. Oestrogen
 - C. Testosterone
 - D. Luteinizing hormone
 59. Which one of the following is a vector for rift valley disease of sheep?
 - A. Mosquito
 - B. worm

- C. Tsetse fly
 - D. Snail
60. Which of the following substances will combine to form lactose?
- A. Sucrose and fructose
 - B. Glucose and fructose
 - C. Glucose and galactose
 - D. Fructose and galactose
61. One advantage of using a vegetative planting material in crop production is that
- A. Gives a high yield
 - B. Maintains mother characteristics
 - C. Matures uniformly
 - D. Is pest resistant
62. Which stage of the liver fluke infests the host animal?
- A. Adult
 - B. Miracidium
 - C. Sporocyst
 - D. Cercaria
63. Which of the following phenotypic ratios result from dihybrid inheritance?
- A. 1:1
 - B. 1:2:1
 - C. 3:1
 - D. 9:3:3:1
64. Which of the following is not caused by deforestation?
- A. Global atmospheric warming due to greenhouse effect
 - B. disappearance of water catchment areas
 - C. improved germination of positively photoblastic seeds
 - D. decrease in plant diversity
65. Which one of the following causes of seed dormancy is due to anatomical state of seeds?
- A. Embryo dormancy
 - B. Impermeable seed coats
 - C. Embryo immaturity
 - D. Presence of germination inhibitors
66. Which of the following is not an adaptation by *Ascaris* as a parasite?
- A. Presence of cuticle covered with mucus
 - B. Possession of a long intestine
 - C. Possession of a muscular pharynx
 - D. Tolerance to low oxygen concentration
67. The figure below is a simplified representation of a nitrogen cycle



Which of the following bacteria are responsible for the changes along Q and R

- A. Rhizobium and clostridium
 - B. Nitrosococcus and putrefying bacteria
 - C. Nitrosomonas and nitrobacter
 - D. Azobacter and clostridium
68. Roughages in animals nutrition is essential because it
- A. Contains plenty of nutrients
 - B. Eliminates possibility of constipation
 - C. Is easily digested by bacteria in the caecum
 - D. Stimulates the secretion of salts
69. The introduction into Uganda two species of South American beetles which naturally feed on water hyacinth is an example of
- A. Herbivory
 - B. Predatory
 - C. Biological control
 - D. Ecological balance
70. The pastoralist usually retains with his herd, a bull whose ancestor have got desirable characteristics. This an example of
- A. Inbreeding
 - B. Artificial insemination
 - C. Cross breeding
 - D. Artificial selection
71. Which of the following may be a result of inbreeding?
- A. Improved fertility
 - B. accumulation of lethal genes
 - C. polyploidy
 - D. increased mutation rate
72. which of the following sequence correctly represent the action of nitrifying bacteria
- A. ammonia → nitrites → Nitrate
 - B. ammonia → nitrates → nitrites
 - C. nitrites → nitrates → ammonia
 - D. nitrate → ammonia → nitrite
73. What is the role of luteinizing hormone? It promotes
- A. Release of ovum
 - B. Healing of the uterine walls
 - C. Disintegration of the ovum
 - D. Implantation of the zygote
74. In most mammals a high sperm count is maintained by
- A. Subjecting the animals to high temperature
 - B. Maintaining the testis in the abdominal cavity

- C. Insulating the testis
 - D. Having the scrotal sac outside the abdominal cavity
75. Which one of the following vitamins is water soluble?
- A. A
 - B. E
 - C. D
 - D. C
76. The initial absorption of water by the seeds during germination is caused by
- A. Osmotically active substances within the seed
 - B. Imbibition pressure involving expenditure of energy
 - C. Active absorption involving expenditure of energy
 - D. Mass flow through the micropyle
77. Which of the following blood pigment contains copper?
- A. Haemocyanin
 - B. Myoglobin
 - C. Haemoerythrin
 - D. Haemoglobin
78. A sample of animal feed gave positive results with both Biuret and Benedict's solution tests. Which of the following is contained in the food sample
- A. Fat, mineral salts and proteins
 - B. Proteins and carbohydrates
 - C. Mineral salts and proteins
 - D. Fats and carbohydrates
79. In plants, which cell structure outside the nucleus contains hereditary materials?
- A. Nucleous
 - B. Mitochondria
 - C. Starch granules
 - D. Smooth endoplasmic reticulum
80. In order to determine whether an organism is homozygous dominant, it should be crossed with an organism that is
- A. Recessive
 - B. Heterozygous
 - C. Hybrid
 - D. Dominant
81. Within any ecosystem, the total number of secondary consumers must be
- A. Less than the total number of herbivores
 - B. Greater than the total number of herbivores
 - C. Equal to the number of producers
 - D. Consistently the same number year to year
82. In cattle, the gene P, for hornless is dominant to the gene p, for horns. if a bull and cow with gene type Pp are crossed, what percentage of offspring are hornless
- A. 25%
 - B. 50%
 - C. 75%
 - D. 67.5%
83. A major disadvantage of asexual reproduction is

- A. Accumulation of deleterious genes by mutation
 - B. Formation of new species due to environment
 - C. Formation of new types due to recombination
 - D. Inability to form new types due to mutation
84. Which of the following does not yield smaller units on hydrolysis
- A. Glycogen
 - B. Fructose
 - C. Sucrose
 - D. Starch
85. Which one of the following sets of vitamins is not required in the formulation of feed of ruminants
- A. B, D and E
 - B. A, D and E
 - C. B, C and K
 - D. D, E and K
86. Which one of the following events occur in both mitosis and meiosis
- A. Synapsis
 - B. Crossing over
 - C. DNA synthesis
 - D. Halving of chromosomes
87. Which one of the following is a vector of Nairobi sheep disease?
- A. Mosquito
 - B. Tick
 - C. Tsetse fly
 - D. Snail
88. Which of the following livestock diseases is characterized by swelling of lymph nodes?
- A. Lumpy skin disease
 - B. Trypanosomiasis
 - C. East coast fever
 - D. Rider pest
89. The main nitrogenous compound excreted by birds is
- A. Nitric acid
 - B. Nitrates
 - C. Ammonia
 - D. Uric acid
90. The centromere is
- A. An x-like exchange of chromosome parts seen at late prophase
 - B. A chromosomal organ half of movement
 - C. The longitudinal half of a chromosome
 - D. point on a chromosome where mitotic spindle fibers attach to pull sister chromatids apart during cell division.
91. The life span of seed is
- A. Non variable
 - B. Predictable from outward appearance
 - C. Variable and follow an obvious pattern
 - D. Variable and follows no obvious pattern

92. Glucose and fructose have the same basic formula CH_2O , but some of their chemical properties are different because
- The molecule of glucose has a straight chain structure unlike the fructose
 - The molecules of glucose has a ring structure
 - Fructose is aldose and glucose a ketose
 - The positions of the hydroxyl group are different on the molecule of the two sugars
93. When a molecule of DNA replicates, it is thought to unwind and 'unzip' along the
- Bonds between the deoxyribose and phosphate units
 - Bonds between a phosphate group and a nitrogenous base
 - Hydrogen bonds between the base pairs
 - Phosphate to phosphate bond
94. If the code for an amino acid is ATA on DNA molecule this code on the transfer RNA molecule may be written as
- AUA
 - ATG
 - TUG
 - GTA
95. Which of the following is an adaptation to aquatic environment?
- Long roots
 - Well-developed root system
 - Large cortex with air spaces
 - Lack of stomata
96. In pea plants, long stem is dominant to short stem. If plants that are heterozygous for stem length are crossed, the probable percentage of tall offspring would be;
- 0%
 - 50%
 - 75%
 - 100%
97. Transfer RNA (tRNA) species are specific in that
- They are smaller than mRNA molecules
 - Can recognize a particular kind of proteins
 - Each can recognize a particular amino acid
 - They are coded for in the cytoplasm
98. A hormone in cow responsible for onset of lactation is
- Oestrogen
 - Progesterone
 - Relaxin
 - Prolactin
99. In which of the following parts of chloroplast are splitting enzymes mostly located?
- Stroma
 - Intergrana
 - Cytoplasm
 - Grana
100. Which one of the following ways does not cause change in gene frequency in population
- Mutation
 - Epistasis

- C. Migration
- D. Genetic drift

Answer to objective questions									
1 B	11A	21B	31B	41.A	51A	61B	71B	81A	91D
2 A	12B	22B	32C	42B	52C	62D	72A	82C	92D
3 C	13B	23D	33C	43A	53C	63D	73A	83A	93C
4 B	14D	24D	34B	44C	54B	64B	74D	84C	94A
5 B	15B	25D	35B	45A	55C	65B	75D	85D	95C
6 A	16B	26C	36D	46C	56B	66B	76A	86C	96D
7 A	17C	27B	37 A and C	47C	57A	67C	77A	87B	97C
8 D	18C	28C	38B.	48B	58C	68B	78B	88A	98D
9 D	19A	29A	39B	49B	59A	69C	79B	89D	99D
10C	20A	30B	40D	50D	60C	70D	80A	90B	100B

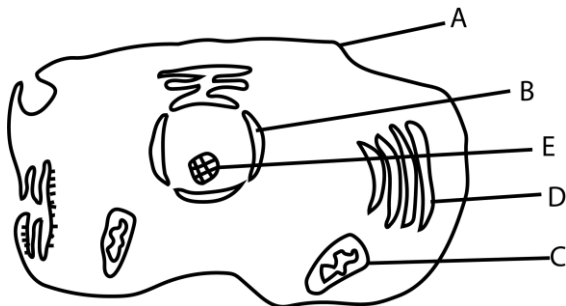
101.(a) Describe the events that occur in mitotic metaphase

- Spindles develop from asters
- Pairs of chromatids become attached to the spindle at centromere
- Centromeres line up at right angles at the equator
- Centromeres lined up at the equator divide

(b) Suggest causes of variation in organisms

- Genetic interactions and epistasis
- Polygenic inheritance where two or more pairs of alleles contribute to single phenotypic trait.
- Feeding cause variation in size
- Climate
- Mutation
- Cross – over in prophase I
- Disease
- Selection and breeding
- Interbreeding
- Accidents may deform an organism

102. (a) The figure below shows a typical cell



- (i) Giving reasons for your answer, state whether the cell in the figure is an animal or plant cell.
It is animal cell because it lacks a cell wall and prominent central vacuole.

(ii) Name the parts labeled A to E in the diagram

- A – cell membrane
- B – nuclear membrane
- C - mitochondrion
- D – smooth endoplasmic reticulum (SER)
- E - Nucleolus

(b) Give one function of each of the parts labeled

Cell membrane

- It separates the contents of the cell from the external environment.
- Controls exchange of materials between the cells and external environment
- It separates compartment with specialized functions inside the cell
- Acts as receptor site for recognizing external stimulus such as hormones.
- Allows uptake of materials by phagocytosis and pinocytosis.
- Support enzymes of complex metabolic pathways in place for close proximity.

Nuclear membrane

- Separate the cytoplasm from the nucleus
- Contains pores that allow exchange between the cytoplasm and the nucleus

Mitochondrion

- It is where respiration take place to produce ATP/energy

Smooth endoplasmic reticulum

- Smooth endoplasmic reticulum is a site of lipids and steroid synthesis.
- The tubes are for intracellular transport

Nucleolus

- Synthesize RNA

103.(a) Explain the role of photosynthesis in crop production

Photosynthesis produces carbohydrates or converts light energy into chemical energy in crops

(b) Explain the effects of the following environmental factors on photosynthesis

Light

- Stimulates synthesis of chlorophyll
- Promotes opening of the stomata
- Provide energy for the process of photosynthesis

Carbon dioxide

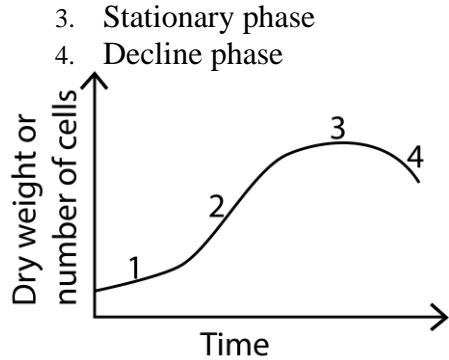
- It is reduced in the process of photosynthesis to produce carbohydrates

Temperature

- At low temperature the photosynthetic enzymes are inactive and the rate of photosynthesis is slow
- The rate of photosynthesis increases with temperature up to an optimum temperature due to activation of enzymes
- At very high temperature photosynthesis stops because the enzymes are denatures.

104.The figure below shows the curve which usually obtained when the growth of an organism (dry weight or number) is plotted against time. In general, the curve shows 3 or 4 stages of growth.

1. Lag phase
2. Logarithmic or exponential phase

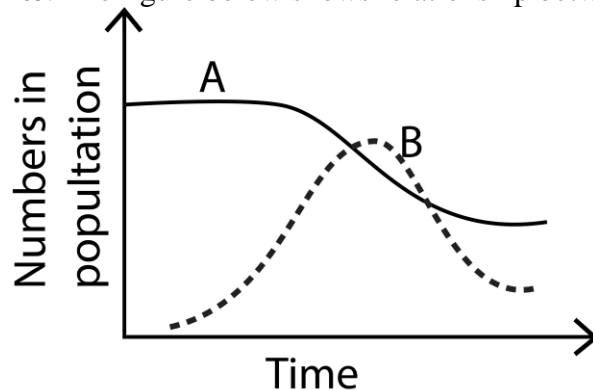


Suppose the figure represents the growth curve of a population of bacteria in flask of nutrients medium inoculated with a few bacteria to start with

Explain what would be happening in

- (i) The lag phase
There is slow rate of increase in number due to few reproduction/doubling cells
 - (ii) The exponential phase
Fast rate of increase in number due to presence of many reproducing/doubling cells , availability of nutrients and space; low toxin levels.
 - (iii) Stationary phase
The rate of reproduction is equal to the rate of death because of accumulating toxins/wastes, decrease in available food and space
- (b) Supposing the growth curve was an annual herbaceous plant name the stages which 1, 2, 3 and 4 represents in the plant cycle
1. Seed inoculation and germination
 2. Period of rapid vegetative growth leaves produced succession until flower and fruit formation
 3. Fruit ripening stage
 4. Senescence

105. The figure below shows relationship between a pest and biological agent



- (a) Giving reason, state which curve represents the
- (i) The pest

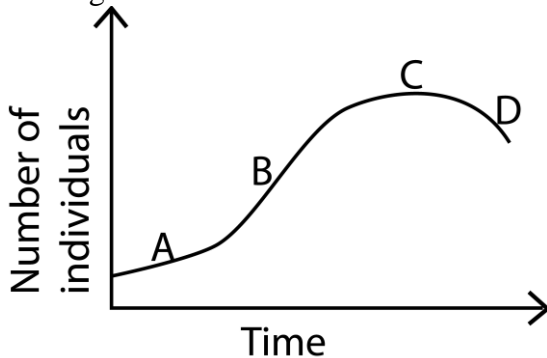
Curve A represents the pest because it has high number initially to provide food to the pest control agent

(ii) Control agent

Curve B because it initially starts with small number

- (b) Explain the changes in the population of the pest and the control agent
High population of the pest provided food and lead to the fast increase in the numbers of the pest control agent. Increase in the number of the control agent caused a reduction in the pest by feeding on them. Reduction in the number of the pest led to the reduction in the number of pest control agent due to starvation.
- (c) Suggest what would happen if the pest was completely wipe out
The pest control agent would die due to shortage of food
- (d) Outline the characteristics of a good biological control agent
- Good pest searching ability
 - High adaptability to local environment
 - High reproductive rate
 - Specifically feeding on the pest
 - Having no predator
 - Resistant to most agrochemicals

106. The figure below shows variation in the number of organisms in the population with time



- (a) Name each of the stages labeled A, B, C, and D.
- A. Lag phase
 - B. Log/exponential phase
 - C. Constant phase
 - D. Decline phase
- (b) Explain what is taking place in phases A to D
- A – Slow growth due very few dividing cells
 - B - Exponential growth due to presence of big number of dividing cell
 - C - Growth slows down and finally stops due rate of cell division equal to rate of cell death or cell division limited by the genotype of the animal and onset of environmental resistance.
 - D - the rate cell death is higher than the number of cells formed due to environmental resistance

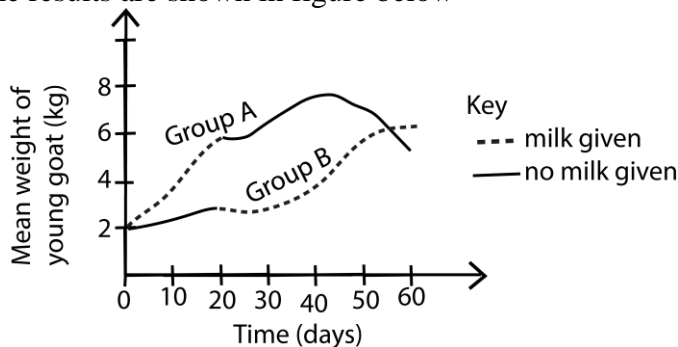
(c) Mention four examples of environmental resistance that may limit of the population shown in the figure above

- Diseases
- Predator
- Shortage of food
- Accumulation of toxic wastes
- Pollution
- Stress caused high population
- Limited space

107. In an experiment to investigate the effect of including milk in diet on the growth of young goat, two groups A and B each containing four young goats were fed on synthetic diet consisting of purified milk proteins, sucrose. Fats. Inorganic salts and water.

- Group A received the supplement of one litre of milk per day for the first 20 days and then no further milk was given.
- Group B received no milk supplement for the first 20 days then the one litre of milk supplement was introduced per day throughout the experiment

The results are shown in figure below



(a) From the graph, find the mean weight of each group of young goats at day 10

Mean weight for group A = 4kg

Mean weight for group B = 2.8kg

(b) Explain the changes in mean weight for each of the groups A and B up to day 20

For A: there was a significant increase in the mean weight because of the milk supplement given which was rich in nutrients required for growth.

For B: there was slight increase/low increase in the mean weight because the goats were denied milk thus lacked the required adequate nutrients for growth.

(c) Compare the changes in the mean weight of both groups of young goats from

(i) Day 20 to day 40

For A: the weight increased by 1 kg from 5.8kg to 6.5 kg while for B the mean weight increase by 2kg from 3kg to 5kg

(ii) The 40th day to the end of experiment.

For A: there was a decrease in weight from 6.5kg to 4kg while for B there was na increase in mean weight from about 5.8kg to about 6.3 kg.

(d) Why was there a slight decline in mean weight from the 20th to about the 25th of group B goats yet they received the milk supplement.

Because the goats were getting acclimatized to the milk, i.e. synthesis of the necessary enzymes for utilization of milk nutrients.

- (e) Using evidence from the graph, suggest the best advice to a goat regarding introduction of milk supplements to young goats for best result in the first one and a half months of growth,
Advice: goats require milk supplements in the first one and half months in order to grow fast/properly

Evidence: goats grew fast during the period they received milk supplements.

- (f) One of the mineral salt found in the milk supplement is calcium. Outline the importance of calcium in animals

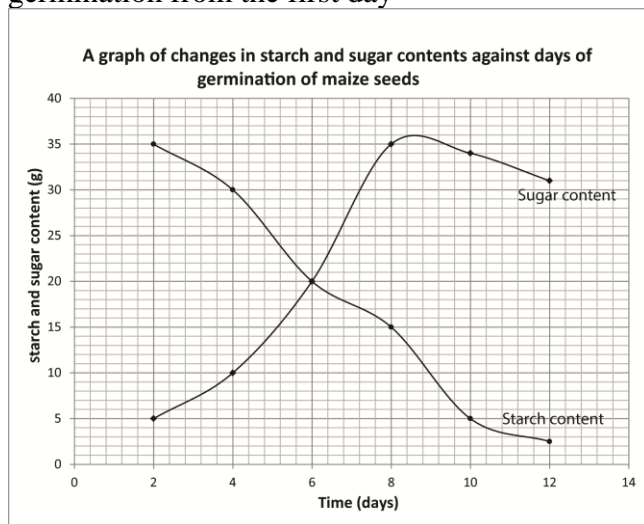
- Leads to the formation of strong bones and teeth
- Helps in milk formation i.e. is a major constituent of milk.
- Required for blood clot formation
- required in muscle contraction
- required for formation of body parts like egg shells, horns, hooves, body shell line in reptiles

108. An experiment was carried out on maize seeds to find changes in starch and sugar contents of the seeds during germination in darkness. The results of the experiment are shown in the table below

Study the table and answer the questions that follow

Days from the start of experiment	Sugar content (g)	Starch content (g)
2	5	35
4	10	30
6	20	20
8	35	15
10	34	5
12	31	2.5

- (a) On the same axis, plot a graph of changes in starch and sugar content against the days of germination from the first day



- (b) Describe the shape of the shape of each on your graph
- The sugar content increase exponentially from 5g of the 2nd day of germination to 35g of sugar on the 8th of germination, then gradually decreased to 31g on the 12day of germination
 - Starch content gradually decreased from 35g on the 2nd day of germination to 2.5g on the 12th day of germination
 - The starch and sugar contents are equal on the 6th day of germination.
- (c) Explain the relationships between the two curves
Starch content decreased because it was being converted to sugars whose contents increased. From the 8th the sugar contents gradually decrease because respiration was faster than the rate of formation of sugars from starch.
- (d) What is the role of water in germination?
- Dissolves the stored substances in the endosperm
 - Hydrolyses starch to sugars
 - Is a medium of transport of sugars and dissolved nutrients
 - Medium of cellular reactions
 - Component of tissues formed.

109. An experiment was carried out to investigate the behavior plant tissues in sucrose solution. Five different plant tissues of the same length (5cm) were each placed in a different concentration of sucrose solution. After equilibrium was reached, the lengths of the tissues were measured. The results are shown in the table below. Study the results and answer the questions that follow

Plant tissue	Sucrose concentration (mol dm ⁻³)	Initial length (cm)	Final length (cm)
A	0.1	5.0	5.0
B	0.2	5.0	3.0
C	0.3	5.0	7.0
D	0.4	5.0	6.0
E	0.5	5.0	4.0

- (a) Describe the behavior of each of the plant tissues in their respective sucrose solutions.
- A – did not change in length
 - B – decreased in length from 5.0 cm to 3.0 cm.
 - C – increased in length from 5.0 cm to 7.0cm
 - D - increased in length from 5.0 cm to 6.0cm
 - E - decreased in length from 5.0 cm to 4.0cm
- (b) Explain the behavior of each tissue of the plant is (a)
- A - did not change in length because the sucrose solution was isotonic to the plant tissues, i.e. the rate of loss of water from the plant cells were equal to the rate of uptake of water.
 - B - Decreased in length because the external solution was hypertonic to the plant tissue leading to a net loss of water from plant tissue.
 - C - Increased in length because the external solution was hypotonic to the plant tissues leading to a net gain of water into plant tissue.

D - Increased in length because the external solution was hypotonic to the plant tissues leading to a net gain of water into plant tissue.

E - Decreased in length because the external solution was hypertonic to the plant tissue leading to a net leading loss of water from plant tissue

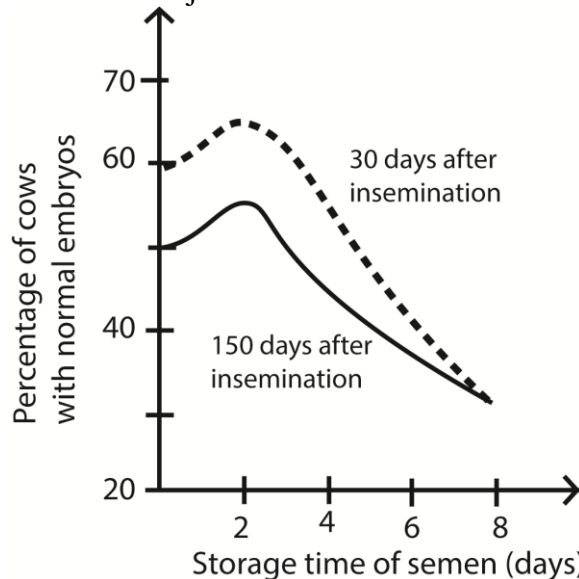
(c) Suggest what would happen to tissue A if it is transferred to a sucrose solution of 0.3mol dm^{-3} .

It will reduce in length because, 0.3mol dm^{-3} is hypertonic solution, and plant tissue A would experience a net loss of water.

(d) What conclusion can you draw from above results regarding water movement into and within a plant?

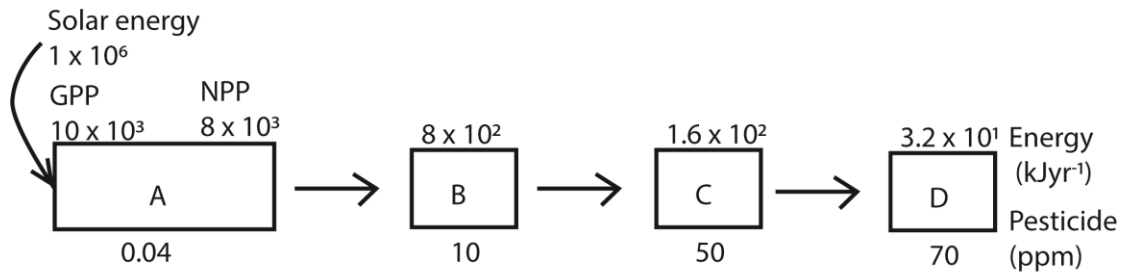
Water moves from a region of its high concentration (low concentrated solution) to a region of its high concentration (highly concentrated solution)

110. Bull semen can be stored at 40°C but the viability of sperm cells changes with time. The viability can be determined by calculating the percentage of cows with normal embryo 30 days and 150 days after insemination
The figure below shows the effect of storing semen at 40°C on viability of different length of time after ejaculation.



- (a) (i) Describe the relationship between storage time of semen and the production of normal embryos at 30 and 150 days
In both, at 30 days and 150 days, production of normal embryos increases and reaches a peak on the second day and then decrease steeply to the 8th day. However, the sperms stored for 150 days produces lower normal embryos than those stored for 30 days.
- (ii) Give an explanation for the relationship between storage time of semen and production of normal embryos.
The longer sperms are stored the lower the chances of producing normal embryos because they use up their energy reserves required to fertilized the ova.

- (b) Semen can be deep-frozen and stored at -196°C . When semen is stored at this temperature for 12 months, the percentage of cows with normal embryos 30 days after insemination is about 66%.
- (i) Suggest three reasons why regardless of the method of storage, insemination does not result in 100% of cows with normal embryos.
- The sperms may not be 100% viable from the bull
 - Sperm incompatibility in the cow
 - Destruction of sperms during the process of insemination.
 - Poor insemination techniques
 - Low sperm count in the bull's semen
- (ii) Suggest why the two methods of storage have different effects on normal embryo production 30 days after insemination.
At high temperature (4°C) sperms have high metabolism and use up their energy stores earlier than when stored at -196°C and thus sperms stored at 4°C produce fewer normal embryos than those at -196°C for the same storage time.
- (c) Before being stored, bull semen is diluted using a buffer solution. Suggest advantages of storing semen in this way.
- Dilution increases the volume of semen which allows more cows to be inseminated.
 - The buffer solution provides favorable conditions for the survival of sperms
- (d) Describe the procedure that would be used to artificially inseminate a cow with stored semen
- Restrain the cow
 - Put the catheter in warm water to activate the semen and load on the insemination gun.
 - Put on hand gloves and lubricate then.
 - Insert the left hand to the vagina to locate and hold the cervix.
 - Gently push the pipette containing the semen into the cow's vagina and cross the cervix.
 - Press the plunger on the catheter to release the semen.
111. The figure below shows the transfer of energy in kJyr^{-1} (on top) and the amount of pesticide in parts per million (at the bottom) at different levels in the food chain in an ecosystem. Study the figure and answer the questions that follow:



Key: GPP = Gross primary production
 NPP = Net primary production

(a)(i) What organisms occupy A on the diagram?
 Producers

(ii) What is the percentage of incident energy absorbed by the organisms at level A?

$$\text{Percentage} = \frac{\text{GPP}}{\text{solar energy}} \times 100\%$$

$$= \frac{10 \times 10^3}{1 \times 10^6} \times 100\% = 1\%$$

(iii) Where does the rest of the energy which is not absorbed at level A Go?

It is reflected into the atmosphere as heat or absorbed by non-living organism

(b) Calculate the percentage of energy of the net primary production in the organism at level A which is transferred to organism at

(i) Level B

$$\frac{8 \times 10^2}{8 \times 10^3} \times 100\% = 10\%$$

(ii) Level C

$$\frac{3.2 \times 10^1}{8 \times 10^3} \times 100\% = 0.4\%$$

(c) What conclusions can be made from your answer in (b) about the transfer of energy along trophic levels?

The energy transfer from producers along the trophic levels reduces

(d) Explain why all the energy at one trophic level is not transferred to the next trophic level

- Energy is lost through respiration, excretion, egestion death and decomposition
- Not all materials ingested is digested.

(e) (i) Describe the trend of the pesticide concentration from organisms at level A to those of level D.

In pesticide concentration in organisms increases with the increase in trophic levels from A to D.

(ii) Explain the trend of the concentration of pesticide in e(i)

The consumer at high trophic eats several organism and accumulates the pesticide in its tissues

(iii) Suggest one property of the pesticides. Explain your answer

It is non-biodegradable because it accumulates in the organisms along the trophic levels.

(f) What is meant by pesticide resistance

It is a situation where the pest population remains relatively unaffected by application of a recommended pesticide in the right quantities and concentrations. Or it is a situation where pests acquire characteristics/traits that enable them to survive despite the recommended levels of pesticides.

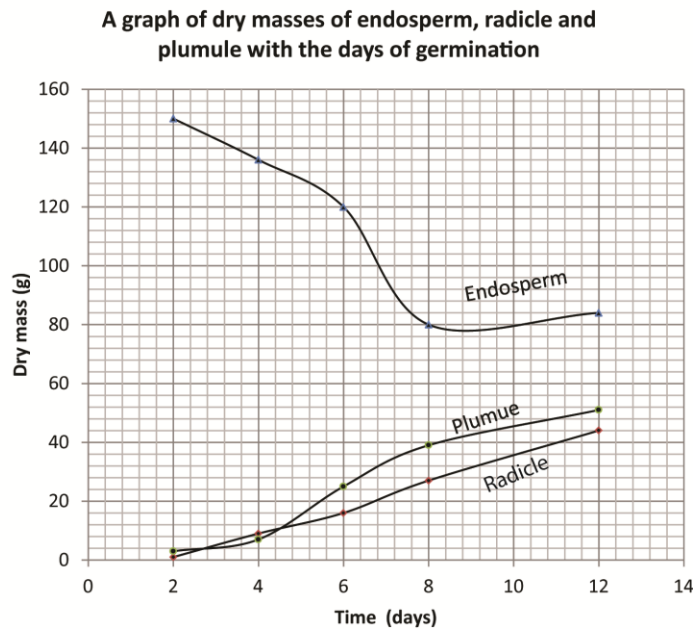
(g) Describe the factors that promote pesticide resistance in pest populations

- Genetic factors; high genetic variation promote resistance
- Mutation
- Prolonged use of a single pesticide
- Unwarranted use of pesticides
- Use of broad spectrum pesticides such as DDT that kill natural enemies of the pests.
- Use of sub-lethal concentration of pesticides
- High population of pesticide
- Non-uniform application of pesticides in the field

112. An experiment was carried out on maize seeds to investigate the changes in dry mass of endosperm and that of different parts of the seedling during germination. The results are shown in the table below. Study the table and answer the question that follow:

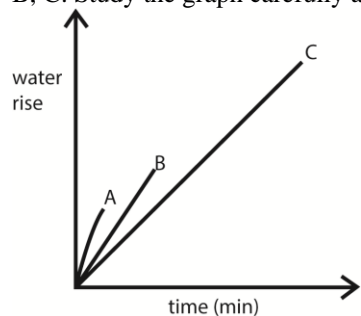
Days of germination	Dry mass		
	Endosperm (g)	Radicle (g)	Plumule (g)
2	150	1	3
4	136	9	7
6	120	16	25
8	80	27	39
10	54	44	51

(a)(i) Plot a graph of the dry masses of endosperm, plumule and radical of the seedling with the time of germination



- (ii) Describe the relationship between the dry mass of the endosperm and that of the radicle and plumule.
The dry mass of endosperm decreases as the dry masses of radicle and plumule increase with the number of days of germination of the seedling
- (iii) Account for the relationship between the dry mass of the endosperm and that of the radicle and plumule
The dry mass of endosperm decreased because part of its food reserves were removed and used for the growth of the radicle and plumule whose dry masses increased.
- (b) State other physiological processes investigated in the experiment apart from germination
- Respiration
 - Enzymatic hydrolysis of food reserves
- (c) Describe the role of each of the following in seed germination
- (i) water
- Dissolves the stored food substances
 - Activates enzyme
 - Provided a medium of cellular reaction
 - Is a reagent in hydrolysis.
- (ii) temperature
- Activates enzymes
 - Breaks seed dormancy
- (iii) oxygen
- Promotes respiration and break down of food reserves
- (iv) Light
- Provide energy for photosynthesis
- (d) Suggest the ways of ensuring uniform germination of crop seeds
- Proper selection of seeds before planting
 - Adequate provision of moisture or uniform irrigation
 - Planting seed at uniform depth
 - Avail growth promoter/hormones

113. An experiment was carried out to test the relative capillarity in various soil samples represented by curves A, B, C. Study the graph carefully and answer the questions that follow.



- (a) Describe the trend of water rise in the three soil sample on the graph above
Water rose fastest in soil sample A, followed by B and then C. however water rose highest in C than in B and A
- (b) Explain the cause of differences in water rise in the 3 soil samples
The difference in water rise is due to the differences in the sizes of soil particles in the soil samples. Soil A has the largest soil particles and air spaces that allowed water to rise fast. Soil sample B has medium

soil particles while soil sample C has the smallest soil particle and air spaces that provide high cohesion and adhesive force to allow maximum water rise

(c) Of what importance is the information in (b) above to the farmer?

- Helps the farmer to select the crop to grow.
- Helps the farmer on the choice of farming practice such as mulching to retain moisture in the soil

(d) Explain the factors that influence soil moisture content

- Soil organic matter increase water retention in the soil
- Mulching increase water retention in the soil
- Irrigation increases the amount of water in the soil
- Cover crops reduce evaporation maintaining soil moisture
- Tillage removes soil cover thereby promoting evaporation and reduction of soil moisture.

Thanks

Dr. Bbosa Science