

BT401 ANIMALS GENETICS RESOURCES AND CONSERVATION MIDTERM PAST MCQS AND SUBJECTIVE

1. Genetic resources are sometimes called the _____ "first resource"
2. Landraces is a _____ local variety of a domesticated plant species
3. Which is called the rosewood _____ Dalbergia Sissoo
4. Total area under the legume pulse crop in Pakistan _____ 1.5m hectares
5. Which one is the Extinct species _____ White rhino
6. Total remaining snow leopard in Pakistan _____ 200
7. GSPC program founded in _____ 1999
8. Microorganisms produce _____ Antibodies
9. According to world data base on protected area there are over _____ 210,000 protected areas around the world.
10. Rhino are hunted for _____ Horns
11. Natural selection will always result in the selection of allele that gives an advantage to its possessor.
12. Cryopreservation in liquid nitrogen _____ at -196 degree
13. How many categories of gene flow _____ 2
14. Breeding type that is not related to half sister half brother and cousins _____ Close Inbreeding
15. The strongest effect of genetic drift on _____ small population
16. Themes of genetic resources _____ 2
17. Himalayan Brown bear _____ 150-200
18. Pakistan in kinow production _____ 6th number
19. Triggers of migration _____ All
20. Gene flow blocked by physical barriers _____ Allopatric speciation
21. Plant genetic resources are the building blocks and fundamental not only in crop improvement program, but also for the very survival of the species in time and space.
22. Biologists suspect we're living through the sixth major mass extinction
23. Honey bee pollinate how much plants _____ 250,000 species of plants
24. Acacia nilotica _____ is a pioneer species, easily regenerated from seed.

25. sheep was domesticated by humans in 10,000 BC
26. phenylketonuria caused by mutation
27. Allele frequency affected by evolutionary mechanisms such as (• Mutation • Gene flow • Inbreeding • Natural selection, • Founder effect • Random genetic drift)
28. Population bottleneck in 1890s due to Overhunting
29. Reason for crustaceans migration? for breeding
30. Sterculia khasiana was endemic tree of ? Khasi Hills in Meghalaya in India
31. Which involves storage in low and non freezing temperature Cold storage
32. Which of the following is the earliest modern protected area Yellowstone National Park
33. Bees are the responsible for pollinating 250,000 species of plants
34. Mild form of breeding Line breeding
35. Migration involves following types of hazards 2 types (1. Natural Hazards 2. Anthropogenic hazards to migrants)
36. Type of inbreeding 3 (1-Close inbreeding 2-Mild inbreeding 3- Line inbreeding)
37. Gene bank is a type of Ex Situ conservation
38. Area of great genetic diversity are protected from human interference are known as Gene Sanctuary
39. Animal genetic resources referred as All given options
40. PGRFA Stands for Plant genetic resources for food and agriculture.
41. NCCP stands for National culture collection of Pakistan
42. Conservation of plant genetic resources is necessary for __ Food security and Agro biodiversity __ Both A & B
43. Peste de petits ruminants also known as Sheep and goat plague
44. According to FAO, species of Molluskus are 85000
45. GSPC was founded in 1999
46. Which disease was spread due to consuming mercury poisoned fishes by people MINAMATA

SUBJECTIVE PART:

2 Marks Short Questions:

1. Forest Genetic Resource? 2marks

Answer: FGR are the heritable materials maintained within and among tree and other woody plant species that are of actual or potential economic, environmental, scientific or societal value.

2. Sympatric Speciation? 2marks

Answer: Sympatric speciation is speciation that occurs when two groups of the same species live in the same geographic location, but they evolve differently until they can no longer interbreed and are considered different species.

3. What is plant domestication? 2 marks

Answer: "Plant domestication is the process whereby wild plants have been evolved into crop plants through artificial selection."

4. Which form is closest to inbreeding? 2 marks (NOT CONFIRMED)

Answer:

- Closest form of inbreeding in domestic animals involves mating between full brothers and sisters (full siblings).
- Second closest form of inbreeding involves mating between grand-parents and grand-offspring, half brothers and sisters (half siblings)

5. Inbreeding depression? 2marks

Answer: Inbreeding depression is the reduced biological fitness in a given population as a result of inbreeding, or breeding of related individuals.

6. Endemic species? 2marks

Answer: Any species whose range is restricted to a limited geographical area.

7. Name four causes of extinction? 2marks

Answer: The causes of extinction are as follows

1. Climate change
2. Habitat destruction
3. Lack of genetic diversity
4. Better-adaptive condition
5. Pollution
6. Human over-population
7. Poaching and hunting

8. Color moths mating? 2 marks

Answer: Populations of moths that are white in color migrate to a population of brown-colored moths and successfully mate to give rise to viable offspring. Here, we can say that there is a change in the allele frequency. Over time, the number of these white moths will increase.

9. AnGR stand for? 2marks

Answer: The term AnGR stand for Animal genetic resources.

10. Breeding lines? 2marks

Answer:

- These are lines/ populations developed in breeding programs have narrow genetic base and often contain valuable gene combination.
- This group nearly contain homozygous line or mutant lines and lines derived from biology programs, including transgenic lines.

11. Why Acalypha rubrinervis is called string tree? 2marks

Answer: calypha rubrinervis (string tree or stringwood) is an extinct plant in the spurge family (Euphorbiaceae), from the island of Saint Helena in the South Atlantic Ocean. It was called string tree on account of the thin pendulous inflorescences which resembled red strings.

12. Write the application of cryopreservation in medical science? 2marks

Answer: Low temperature have been used in medicine and to prevent food spoilage since ancient time. Now- a- days it is used in fertility treatment the transport of human organs and the long- term storage of biological specimens, either for future or simply as a record of biodiversity.

13. Genetic drift? 2 marks

Answer: "Random changes in gene frequency especially in small populations when leading to preservation or extinction of particular genes".

14. What is progenitor? 2 marks

Answer: a person or thing from which a person, animal, or plant is descended or originates; an ancestor or parent

15. What are aquatic genetic resources? 2 marks

Answer: "Aquatic genetic resources include all genetic resources living in water"
For Examples: Fish, cyclostomes, mussels, decapods, marine mammals.

16. What does it mean "functionally extinct"? 2 marks

Answer: A species may become functionally extinct when only a handful of individuals survive, which are unable to reproduce due to; • Poor health, • Age, • Sparse distribution over a large range, • A lack of individuals of both sexes.

17. What is the major objective of cryopreservation? 2 marks

Answer: The objective of cryopreservation is to minimize damage to biological materials, including tissues, mammalian cells, bacteria, fungi, plant cells, and viruses, during low temperature freezing and storage.

18. Define pure breeding? 2 marks

Answer: Pure-breeding is the mating of rams and ewes of the same breed or type. A purebred flock can be managed as a single flock because all ewes and rams are of the same breed.

19. How to identify Gene Environment interaction? 2marks

Answer: There are two main methods to analyze gene environment interaction

1. Traditional Genetic Designs
2. Molecular Analyses

20. Define wild plant resources? 2 marks

Answer: Wild plant resources refer to those that grow spontaneously in self-maintaining populations in natural or semi-natural ecosystems and can exist independently."

21. What is genetic material? 2 marks

Answer: Genetic material is any material of plant, animal, microbial or other origin containing functional units of heredity.

22. Define varieties in cultivation? 2 marks

Answer: Varieties in cultivation are the easiest to use in the breeding program. And they form a major part of working collections. They are good source of gene for yield, quality etc. they can be introduced in a new area and directly released for cultivation.

23. Define protected areas? 2 marks

Answer: "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values"

24. How hart's tongue fern become threatened? 2 marks

Answer: Quarrying, recreation and residential development have all destroyed these plants and their habitat. Canadian populations are threatened by lumbering and the development of land for ski resorts and country estates, among other activities

25. Differentiate b/w close and line inbreeding. 2marks

Answer:

Close inbreeding	Line inbreeding
Animals are very closely related and can be traced back to more than one common ancestor.	Mating animals that are more distantly related which can be traced back to one common ancestor
e.g. full brothers and sisters	e.g. Cousins Grandparents to grand offspring, Half-brother to half-sister

26. Types of in situ conservation? 2 marks

Answer: There are three types of in situ conservation.

1. National park
2. Biosphere reserve
3. Gene sanctuary

27. Define breed? 2marks

Answer: A breed is a group of domestic animals with a homogeneous appearance, behavior, and other characteristics that distinguish it from other animals.

28. Ultrarapid Freezing? 2 marks

Answer: Ultrarapid Freezing: In this technique serial equilibration of embryos in high concentration of DMSO (3-5 M) supplemented with sucrose (0.3 to 0.5 M). The embryos are then plunged into liquid Nitrogen.

29. Gene sanctuary? 2 marks

Answer: The genetic diversity is sometimes conserved under natural habitat. In other words, areas of great genetic diversity are protected from human interference. These protected areas in natural habitat are referred to as gene sanctuaries.

30. Grading up? 2 marks

Answer: Breeding of animals of two different breeds where the animal of an indigenous breed/genetic group is mated by an improved pure breed for several generations towards attaining the superior traits of the improved breed.

31. Anthropogenic hazards to migration.? 2 marks

Answer: . Anthropogenic hazards to migrants

- Barriers (fences, dams & skyscrapers)
- Water, air craft and fishes practices
- Telegraphic wires, towers and light houses
- Illegal hunting

32. How genetic drift change the frequency of gene?? 2 marks

Answer: Genetic drift is the phenomenon of change in the frequency of alleles (variants of a gene) in a population of organisms due to chance or random events.

3 MARKS SHORT QUESTIONS:

1. Enlist extinct animals of Pakistan? 3 marks

Answer: Extinct animals of the Pakistan are:

- | | | |
|----------------------------------|------------------------|-----------------------|
| 1. West African Black Rhinoceros | 2. Pyrenean Ibex | 3. Passenger Pigeon |
| 4. Quagga | 5. Caribbean Monk Seal | 6. Sea mink |
| 7. Tasmanian Tiger | 8. Tecopa Pupfish | 9. Great Auk |
| 10. Javan Tiger | 11. Bubal Hartebees | 12. Steller's sea cow |
| 13. Dodo | | |

2. Difference between allopatric and sympatric speciation? 3 marks

Answer:

Allopatric speciation	Sympatric speciation
Allopatric speciation is speciation that results when a population is separated by a physical barrier.	Sympatric speciation is speciation that occurs without physical separation of members of the population.
It is geographical isolation that doesn't allow population of the same species to exchange genetic material	The speciation that occurs when two groups of the same species live in the same geographic location, but they evolve differently until they can no longer interbreed and are considered different species
e.g. Darwin finches	e.g. In Apple Maggot Flies

3. Differentiate of ex situ and in situ conservation? 3 marks

Answer:

Ex situ conservation	In situ conservation
It involves placing of threatened animals and plants in special care unit for their protection	This method involves protection of endangered species in their natural habitats
There are two types of ex situ conservation <ol style="list-style-type: none">1. Gene bank2. Botanical garden	There are three Types of in situ conservation <ol style="list-style-type: none">1. National park2. Biosphere reserve3. Gene sanctuary
It helps in recovering populations or preventing their extinction under stimulated conditions that closely resemble their natural habitats.	It helps in recovering populations in the surroundings where they have developed their distinct features.

4. Define migration and its causes? 3 marks

Answer: Migration is the relatively long-distance movement of individuals, usually on a seasonal basis. It is found in all major animal groups, including birds, mammals, fish, reptiles, amphibians, insects, and crustaceans. Migration is a behavioral adaptation that helps animal's survival.

Causes of Migration

- Shortage of food supply on the breeding ground
- Environmental factors
- Internal factors
- Photoperiodism
- Fat deposition

5. Local migration? 3 marks

Answer: Local migration occurs because of heavy rain, flood, excessive cold & hot. Return to that area when crisis is over. Flowering of certain plants and ripening of fruits also cause local migration

6. Vertical and horizontal gene transfer? 3 marks

Answer:

Vertical gene transfer: The transfer of genes from parents to offspring. It may be through sexual or asexual reproduction

Horizontal Gene Transfer: Horizontal gene transfer is basically the transfer of genes between organisms via methods other than asexual or sexual reproduction. Genes and the characteristics code for are passed down from parent to progeny.

There are three ways for bacteria to transfer their DNA horizontally

1. Conjugation
2. Transformation
3. Transduction

7. What are endanger species explain with examples? 3 marks

Answer: "A species of plant or animal that is in immediate danger of becoming extinct and needs protection to survive."

For Examples:

- The Indus River dolphin
- Markhor
- Asian Black Bear
- Snow Leopard
- Marco Polo sheep
- Marbled Teal
- White-Headed Duck
- Musk Deer

8. Nagoya Protocol? 3 marks

Answer: The Nagoya Protocol focuses on the equitable sharing of genetic material (plant, animal, microbial, and other) including the traditional knowledge associated with the genetic resources, and the benefits that arise from their use.

9. How overhunting cause to extinction of animals? 3 marks

Answer: Human hunters are responsible for wiping out the population of large animals. Researchers found that most of the animals that time died because of increased hunting. Horn of Rhino ivory of elephants, the fur and organs of tigers, the deliciousness of tuna and the supposedly medicinal effect of shark's fin etc are some reasons for over-hunting

10. Names of wild Animal genetic resources of Pakistan? 3 marks

Answer: Some most important wild animal resources in Pakistan are as follow:

- Snow Leopard • Alpine Markhors • Asiatic Cobra • Mugger Crocodile • Himalayan Brown Bear • Indus River Dolphin • Asian Black Bear • Fishing Cat

11. Types of cryoprotectants? 3 marks

Answer: There are two types of cryoprotectants.

1. Membrane permitting which can freely diffuse the membrane such as glycerol (G), ethylene glycol (EG) and dimethyl sulfoxide (DMSO)
2. Non Membrane permitting which cannot permeate the cell membrane such as sugars

12. What are the triggers for migration? 3 marks

Answer: The trigger for the migration may be:

1. local climate
2. local availability of food
3. the season of the year
4. for mating reasons

13. Seasonal migration? 3 marks

Answer: Respond to change in the season tropical & sub tropical countries area, this occurs at the beginning or end of the warm season. This type of migration is for food or breeding. They migrate from the south to the north during summer. e.g. snow bunting, red wing, shore lark.

14. Compare insitu conservation and exsitu conservation demerits? 3 marks

Answer:

Demerits of insitu conservation:

- Genetic diversity may have already been dramatically decreased
- Conditions that threatened the organisms in the area may still be present, e.g. disease or interspecific competition

Demerits of exsitu conservation:

- Usually only a small number of individuals can be cared for.
- It can be difficult and expensive to create and sustain the right environment.

15. Passenger pigeon? 3marks

Answer: The passenger pigeon may have once constituted 25 to 40 percent of the bird population. The 19th century brought widespread hunting and trapping of the birds, which severely diminished their populations. The last passenger pigeon, named "Martha" died at age 29 at the Cincinnati Zoo in 1914.

16. Vegetables growth ratio in Pakistan? 3 marks

Answer: 74% of the total production

17. Causes of migration? 3

Answer:

- Shortage of food supply on the breeding ground
- Environmental factors
- Internal factors
- Photoperiodism
- Fat deposition

18. What is horizontal gene transfer? 3 marks

Answer: Horizontal gene transfer is known to occur between different species, such as between prokaryotes and eukaryotes, between the three DNA-containing organelles of eukaryotes, the nucleus, the mitochondrion and the chloroplast."

19. Bottleneck effect with example? 3 marks

Answer: The bottleneck effect is a sharp lowering of a population's gene pool because of an environmental, or human-caused, change."

It is an extreme example of genetic drift that happens when the size of a population is severely reduced. Events like natural disasters (earthquakes, floods, fires) can decimate a population, killing most individuals and leaving behind a small, random assortment of survivors.

20. Cryopreservation? 3 marks

Answer: Cryo is Greek word. (kayos – frost). It literally means preservation in "frozen state."

Cryo-preservation or cryo-conservation is a process where organelles, cells, tissues, extracellular matrix, organs or any other biological constructs susceptible to damage caused by unregulated chemical kinetics are preserved by cooling to very low temperatures (typically -80 °C using solid carbon dioxide or -196 °C using liquid nitrogen).

21. Endangered species in Pakistan? 3 marks

Answer: "A species of plant or animal that is in immediate danger of becoming extinct and needs protection to survive."

Some most endangered species in Pakistan are:

- The Indus River dolphin • Markhor • Asian Black Bear • Snow Leopard • Marco Polo sheep
- Marbled Teal • White-Headed Duck • Musk Deer

22. How plant genetic resources are important? 3 marks

Answer:

- Plant genetic resources are the building blocks and fundamental not only in crop improvement program, but also for the very survival of the species in time and space.
- Plant genetic resources include all our agricultural crops and even some of their wild relatives because they too often have valuable traits.
- Plant genetic resources are components of biodiversity which sustain the humankind

23. Effect of over fishing on aquatic genetic resources? 3 marks

Answer:

- The large numbers of many marine fish species and the wide ranging habitats seems virtually impossible that one fish species could be eradicated through overfishing.
- Fisheries can drastically lower the numerical abundance of individual stocks or even entire fish species by overfishing. For example, various cod and herring stocks in the North Atlantic

24. Types of genetic stock? 3 marks

Answer: Genetic stocks can be divided into three general groups:-

1. Cytological stocks
2. Mutants stock
3. Germplasm set

25. Importance of domestic animal resources? 3 marks

Answer:

Domesticated animal resources are important as follow:

- Animals provide milk
- Hair from goat and sheep is used for making woolen clothing, shawls and blankets
- Some drugs are especially obtained from animals. Ex. Heparin an anti-coagulant is used to control clots in blood, is obtained from ox lungs and pig intestines
- Animal's meat is the part our of diet
- Animals are a great source of leather which is used for making foot wear, belts, wallets bags, furniture

26. Differ b/w outbreeding and inbreeding? 3 marks

Answer:

Outbreeding	Inbreeding
"The intentional breeding of distantly related or unrelated individuals for the purpose of producing offspring of superior quality."	"Inbreeding, the mating of individuals or organisms that are closely related through common ancestry."
There are 3 types of out breeding. <ol style="list-style-type: none">1. Cross breeding2. Grading up3. Species cross	There are 3 types of inbreeding <ol style="list-style-type: none">1. Close inbreeding2. Mild inbreeding3. Line inbreeding

27. Describe Number & Richness Genetic Resources of Microorganism? 3marks

- **Answer:** Numbers of species described and currently accepted in most groups of microorganisms worldwide are respectively 143,000 & 18,500. 120 new species of bacteria and 1,500 new species of fungi are added to science each year • This clearly demonstrating that knowledge of these groups is grossly inadequate

28. Difference between Wild form and wild relatives? 3 marks

Answer:

Wild form: Wild forms are wild species from which crop species are directly derived. They are easy to cross with the concerned crop species.

Wild relatives: The wild relatives include all other species. Which are related to the crop species by descent during their evolution.

29. Difference between genetic drift and gene flow? 3 marks

Answer:

- Gene flow occurs via mixing of genes with other populations while genetic drift takes place when the allele frequency is changed between two generations of a population.
- Genetic drift takes place between two generations whereas gene flow takes place between two populations
- Genetic drift occurs in only one species while gene flow could take place between either two populations or two species.
- Physical barriers matter for the gene flow but not for the genetic drift.

30. Note on Nut trees? 3 marks

Answer: Nut Trees in Pakistan are as follow:

- Almonds • Walnut • Tree Nuts

Almonds fall in the family of peaches, plums and nectarines. Seeds of these plants are edible as Almond.

Almond plants blossom into beautiful pink flowers in spring in addition to yielding fruits in summer.

31. What is Out breeding? 3 marks

Answer: "The intentional breeding of distantly related or unrelated individuals for the purpose of producing offspring of superior quality."

Types of Out breeding:

There are 3 types of out breeding.

1. Cross breeding
2. Grading up
3. Species cross

32. In which population Huntington's diseases often occur? 3 marks

Answer: Huntington's disease (aka Huntington's chorea) is a genetic disorder which results in slowly progressing brain cell death. There are two distinct populations in which the disorder occurs much more often.

1. The first group is the Afrikaner population of South Africa.
2. The second group is the residents of the Lake Maracaibo region of Venezuela.

5 MARKS LONG QUESTIONS:

1. Reproductive isolation? 5 marks

Answer: The mechanisms of reproductive isolation are a collection of evolutionary mechanisms, behaviors and physiological processes critical for speciation. They prevent members of different species from producing offspring, or ensure that any offspring are sterile. These barriers maintain the integrity of a species by reducing gene flow between related species.

Types Reproductive isolation • Pre-zygotic isolation • Post-zygotic isolation

2. Detail note on global strategy for plant Conservation(GSPC)? 5 marks

Answer:

The Global Strategy for Plant Conservation (GSPC) is a program of the UN's Convention on Biological Diversity founded in 1999

Vision of GSPC:-

"Without plants, there is no life. The functioning of the planet, and our survival, depends on plants. The Strategy seeks to halt the continuing loss of plant diversity"

Objectives:

The GSPC has 5 main objectives:

1. Plant diversity is well understood, documented and recognized
2. Plant diversity is urgently and effectively conserved
3. Plant diversity is used in a sustainable and equitable manner
4. Plant diversity is used in a sustainable and equitable manner
5. The capacities and public engagement necessary to implement the strategy have been developed.

3. Merits and demerits of ex situ? 5 marks

Answer:

Merits:-

- It can be used to protect individual animals in a controlled environment. This means that issues such as predation and hunting can be monitored and managed more easily.
- It can be used to reintroduce species that have left an area.

Demerits:-

- Usually only a small number of individuals can be cared for.
- It can be difficult and expensive to create and sustain the right environment.
- The animals that are habituated (used to) human contact may be less likely to exhibit natural behaviors and may be more likely to catch a disease from humans.
- This type of conservation is usually less successful as many species can't breed successfully in captivity or don't adapt to their new environment when moved to a new location.

4. Write down the Threats on AnGR? 5 marks

Answer: Threats to AnGR:-

- Despite the importance of animal genetic resources and their diversity, their diversity has been continually decreasing over time.
- One of the greatest threats to livestock diversity is pressure from large-scale commercial production systems to maintain only high-output breeds.
- Changes in climate will have an impact on livestock and food production in many ways.
- Some major disease threats that livestock currently face include, rinderpest, foot and mouth disease, and Peste des petits ruminants (PPR), also known as sheep and goat plague.

5. Different freezing methods in Cryopreservation? 5marks

Cryopreservation is based on the ability of certain small molecules to enter cells and prevent dehydration and formation of intracellular ice crystals, which can cause cell death and destruction of cell organelles during the freezing process.

The sensitivity of cells to low temperature depends on the plant species. There are four different types of methods :

1. **Slow freezing method** - the tissue or plant material is slowly frozen at slow cooling rate. The advantage is the plant cells are partially dehydrated and survive better.
2. **Rapid freezing method** - it involves plunging the vials in liquid nitrogen. The temperature decreases from -300 to -1000 degree rapidly.
3. **Combined freezing method** - this is combination of both slow and rapid freezing method. The process is carried out in step wise like manner.
4. **Dry freezing method** - in this method dehydrated cells and seeds are stored.

6. **Purpose of National strategy of PGRFA? 5 marks**

Answer: A National Strategy for PGRFA is the blueprint for the management of a country's PGRFA as a continuum of interventions in order to achieve clearly defined time bound goals.

- A well-designed National Strategy needs to be tailored to the particular circumstances and needs of the country
- should be amenable to review and updating as country situations change.
- The National Strategy for PGRFA should also be complementary to other national, regional and global conservation strategies or initiatives.

7. **Note on Indus Dolphin? 5marks**

Answer: .

The Indus River Dolphin

The Indus River dolphin is one of the world's rarest mammals. It is second most endangered freshwater river dolphin. Approximately 1,100 specimens of this species exist today in a small fraction of their former range. Population of this species has gradually declined due to various factors e.g. water pollution, poaching, fragmentation of habitat due to barrages and dolphin stranding in the irrigation canals.

8. **Write five types of genetic resources? 5 marks**

Answer:

Types of Genetic Resources

1. Plant genetic resources

Plant Genetic Resources for Food and Agriculture (PGRFA) are the raw material that farmers and plant breeders use to improve the quality and productivity of crops.

2. Animal genetic resources

Animal genetic resources (AnGR) is used to include all animal species, breeds and strains that are of economic, scientific and cultural interest to humankind in terms of food and agricultural production for the present or the future.

3. Forest genetic resources

Forest genetic resources (FGR) are the heritable materials maintained within and among tree and other woody plant species that are of actual or potential economic, environmental, scientific or societal value.

4. Aquatic genetic resources

Aquatic genetic resources also comprise all water-dwelling genetic resources.

5. Genetic resources of micro-organisms

Genetic resources of micro-organisms mean genetic material of actual or potential value from micro- organisms.

6. Invertebrates Genetic Resources

Invertebrates include a great number of species that perform valuable functions in agro-ecosystems

9. **Advantages and disadvantages of out breeding? 5 marks.**

Answer: Out breeding: "The intentional breeding of distantly related or unrelated individuals for the purpose of producing offspring of superior quality."

Advantages of Out breeding:

- Out breeding often produces offspring of superior quality because it increases homozygosity (the occurrence of two alleles for the same trait at corresponding positions on homologous chromosomes)
- sharply reduce the risk of deleterious recessive genes being expressed
- One of the benefits of out breeding is less chance of genetic abnormalities
- The ability to make a breed stronger

Disadvantages of out breeding:

- Introduction of new genes into population
- Animal discomfort: accidentally produce traits that are damaging to the health of the animal.

10. What are the obstacles of cryopreservation? 5 marks**Answer:**

- Actually the freezing point of water is 0 degree centigrade while the cryoscopy temperature can be as low as -90 degree centigrade.
- Very expensive Technique
- Ice formation can result in the needle shaped crystals resulting in the damage to cell membrane.
- Unequal distribution or over distribution of cryoprotectants.
- Moreover, thermal gradients can induce mechanical stress due to uneven expansion or contraction in the biomaterial.
- The cooling rate required for optimal survival varies by several orders of magnitude between different cell types.
- Mass transfer limitations

11. Why National strategy for PGRFA needed? 5 marks

Answer: In practical terms, a National Strategy for PGRFA may help a country in setting priorities, assigning budgetary and other resources, building capacity, and designing the seamless dovetailing of all aspects of national PGRFA management in service of its own goals. As a result, a country will be in a position to safeguard its PGRFA assets; facilitate access to needed genetic materials and govern the sharing of the accruing benefits; add value to them through crop improvement; and sustainably intensify crop production as may be needed

12. How the climate change cause the extinction? 5 marks

Answer: Almost half of plant and animal species have experienced local extinctions due to climate change. Global warming could trigger not just local but global extinctions of animals and plants. Species already threatened by habitat destruction, pollution, alien invasion and overhunting are more vulnerable to climate change. Diversity of species in any one ecosystem could be affected by rises in average temperatures or a shift of climate regime

13. How wildebeest related to migration? 5 marks

Answer: The Great Migration isn't called great by chance. Every year in the Great Rift Valley of Tanzania and Kenya, which are located in Africa, more than 1.5 million wildebeest migrate northwest across the grassy plains of the Serengeti. Zebras and other grazing animals also take part in this migration. These animals are constantly on the search for food, following the grasses that flourish during the rainy season.

14. Explain the term "animal genetic resources for food and agriculture"? 5 marks

Answer: The term "animal genetic resources for food and agriculture" is often shortened to "farm animal genetic resources" or simply "animal genetic resources" and sometimes referred to as "livestock biodiversity" or simply "livestock diversity".

Values of animal genetic resources: • Direct use value • Indirect use value • Option value • Bequest value • Existence value

List of animal species for food and agriculture:

List of animal species used for food and agriculture

Widespread species	
Species	No. of breeds
Pig	350
Goat	320
Sheep	850
Cattle	815
Buffalo	70
Horse	350
Donkey/Ass	70
Dromedary	50
Bactrian Camel	6

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15. Biometric gene environment interaction? 5 marks

Answer

- The biometric (or statistical) conception has its origins in research programs that seek to measure the relative proportions of genetic and environmental contributions to phenotypic variation within populations.
- Biometric gene–environment interaction has particular currency in population genetics and behavioral genetics. Any interaction results in the breakdown of the additivity of the main effects of heredity and environment, but whether such interaction is present in particular settings is an empirical question.
- Biometric interaction is relevant in the context of research on individual differences rather than in the context of the development of a particular organism.

16. Future for cryopreservation? 5 marks

Answer: Vitrification method of cryopreservation may bring new opportunities to research protocols. It is still an experimental procedure. There are two major concern about vitrification - toxicity of high concentration of cryoprotectants used and microbial contamination of liquid nitrogen. Several IVF programs have adopted the vitrification method as the sole procedure for day-3 human embryos and for human blastocysts, with excellent survival and pregnancy rates. The challenge now is to find a protocol to successfully vitrify human oocytes for which the slow freezing method has yet to produce acceptable

17. How climate change effect species extinction? 5marks

Answer: Almost half of plant and animal species have experienced local extinctions due to climate change. Global warming could trigger not just local but global extinctions of animals and plants. Species already threatened by habitat destruction, pollution, alien invasion and overhunting are more vulnerable to climate change. Diversity of species in any one ecosystem could be affected by rises in average temperatures or a shift of climate regime



BT401 Current File

MCQs

- 1; Longest migration was observed in _____ **Artic Tern Bird**
- 2; Cryopreservation can be done _____ -196c
- 3; Calypha belongs to family _____ **Spurge family(Euphorbaceae)**
- 4; Cause behind extinction of steller sea cow _____ **Hunting**
- 5; Rhino were hunt for _____ **Horn**
- 6; Darwin finch is example of _____ **Adaptive radiation**
- 7; Result of environmental and human change _____ **Bottle neck effect**
- 8; Types of inbreeding _____ **3**
- 9; Genetic diversity is the variation of individual in _____ **Amount of genetic information**
- 10; Example of extinct species _____
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- 12; Which specie is easily regerated _____ **Acacia nilotica**
- 13; Sigillaria was a tree _____. **Spore bearing**
- 14; The tecopa pupfish was native to the _____ **mojava desert**
- 15; Extinction rate of mammals _____ **20%**
- 16; Wild beest are the part of _____ **Great migration**
- 17; Whichh of the following approach can be taken to analyze G×E interaction _____ **Polygenic**
- 18; Northern areas of Pakistan are serving _____ **Habitat**

Subjective

2 marks

Q.1 What is out breeding?

Ans; Out-breeding is the mating of animals of the same breed but which have no closer relationship than at least 4 to 6 generations. Outbreeding is the recommended breeding practice for most purebred sheep breeders.

Q.2; Types of wild plant

Ans; • Prickly Acacia/Keekar • Coral Tree • Deodar Cedar • Dalbergia Sissoo /Sheesham Tree • Calotropis procera/Giant milkweed • Alovera • Marijuana

Q.3; When founder effect occur?

Ans; A founder effect occurs when a new colony is started by a few members of the original population. This small population size means that the colony may have:

- Reduced genetic variation from the original population.
- A non-random sample of the genes in the original population.

Q.Reproductive isolation?

Ans; The mechanisms of reproductive isolation are a collection of evolutionary mechanisms, behaviors and physiological processes critical for speciation. They prevent members of different species from producing offspring, or ensure that any offspring are sterile. These barriers maintain the integrity of a species by reducing gene flow between related species

Q. Gene flow in Moths ?

Ans; A population of moths that are white in color migrate to a population of brown-colored moths and successfully mate to give rise to viable offspring. Here, we can say that there is a change in the allele frequency. Over time, the number of these white moths will increase.

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Q.1;Write Uses of Sheesham tree?

Ans; Dalbergia Sissoo, also known as Indian Rosewood, is the source of Sheesham wood. The tree is native to India and Pakistan and grows all over the Sub-Himalayan Regions.

- Its leaves are compound, and produces pink-white flowers that resemble a pea flower.
- It gives a dry fruit that is a thin and papery pale brown pod.
- The tree mainly offers timber.

Q.2; Why do we need to conserve plant genetic resources?

Ans; we need to conserve plant genetic resources for....

- Selection of target taxa
- Project commission
- Eco geographic survey/preliminary survey mission
- Conservation objectives
- Field exploration
- Conservation strategies
- Conserved product deposition and dissemination • Characterization/ Evaluation
- PGR utilization
- Utilization products

Q.3; What is heterosis?

Ans; Heterosis or hybrid vigor is the superiority of the crossbred offspring. Mathematically, heterosis is the difference in performance between the crossbred and the average performance of its purebred parents.

Q.4; Article 6 for agriculture genetic resources?

Ans; Sustainable Use of Plant Genetic Resources:

The Contracting parties shall develop and maintain appropriate policy and legal measures that promote the sustainable use of plant genetic resources for food and agriculture.

Q.5; Meaning of crop preservation progenitor?

Ans;

Q.6; Characteristics of gene pool?

Ans; It includes all the variants or alleles of every gene.

- It includes all the genes present in the population.
- In most cases, the population includes individuals of the same species.
- A gene pool includes even those genes whose effects are not visible in an individual.

5 marks

Q.1; Effect of Bottleneck effect on Allele frequency?

Ans; Allele frequencies in a group may be very different from those of the population prior to the event,. even some alleles may be missing entirely. The smaller population will also be more susceptible to the effects of genetic drift for generations (until its numbers return to normal). Effect potentially causing even more alleles to be lost.

Q.2; How animal figure out that where they are going?

Ans; Scientists aren't really sure exactly how some animals figure out how to get to where they are going. They think that:

- Some animals use landmarks like rivers and streams to find their way.
- Some animals may navigate by the position of the sun and stars.
- Some animals use smell to figure out where they are going.
- Some species that may use the Earth's magnetic field to navigate.

Q.3 Reproductive isolation? Both in 2 and 5 marks

Ans; The mechanisms of reproductive isolation are a collection of evolutionary mechanisms, behaviors and physiological processes critical for speciation. They prevent members of different species from producing offspring, or ensure that any offspring are sterile. These barriers maintain the integrity of a species by reducing gene flow between related species

Q; Difference between gene flow and genetic Drift?

Ans• Gene flow occurs via mixing of genes with other populations while genetic drift takes place when the allele frequency is changed between two generations of a population.

Genetic drift takes place between two generations whereas gene flow takes place between two populations •

Genetic drift occurs in only one species while gene flow could take place between either two populations or two species.

Physical barriers matter for the gene flow but not for the genetic drift.

BT401 MIDTERM PAST FILE NO 2

1. Write two derived resources? (Question is not correct) I think it's (write two themes)

There are two important themes with regard to genetic resources.

- First one is sharing of benefits
- The second relates to food security

2. ABSA stands for _____

Access and Benefit Sharing Agreement

3. How to check viability of cryopreservation?

There is possibility of death of cells due to storage stress. Thus viability can be found at any stage. It is calculated by formula :

$$\left(\frac{\text{No of cells growing}}{\text{No of cells thawed}} \right) \times 100$$

4. How gene conservation help to maintain ecosystem?

Genes are the link from generation to generation of all living matter. Therefore, attention to genetic resources means attention to the vast diversity among and between species of animals, plants, and microorganisms. It is essential for maintaining and enhancing the efficiency and the resilience of production systems, as well as contributing to sustainable diets and to the delivery of ecosystem services, such as pest and disease regulation.

5. How a species figure out how they get of any place?

Scientists aren't really sure exactly how some animals figure out how to get to where they are going. They think that:

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- Some animals may navigate by the position of the sun and stars.
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- Some species that may use the Earth's magnetic field to navigate.

6. When West African Black Rhinoceros were be extinct?

The West African black rhinoceros (*Diceros bicornis longipes*) was a subspecies of the black rhino that was declared extinct in 2011.

7. What is Gene Pool?

"The combination of all the genes present in a given population is called the gene pool of that population."

8. What is indigenous breed?

Genetic group is mated by an improved pure breed for several generations towards attaining the superior traits of the improved breed.

9. How many ways bacteria have transfer their DNA horizontally?

There are three ways for bacteria to transfer their DNA horizontally

1. **Conjugation:** The transfer of DNA directly from one cell to another through cell-cell contact often involving plasmids
2. **Transformation:** Bacteria are capable of taking up DNA directly from their environment and incorporating it into their genomes known as natural transformation
3. **Transduction:** Transduction is the transfer of DNA from one cell to another by a virus.

3marks short question

10. What are the criteria for any National Park?

National park may be define as a area declared by state for the purpose of protecting, propagating wildlife there in or its natural environment for their scientific educational and recreational value

11. Disadvantage of inbreeding?

It often results in decreased vigour, size, and fertility of the offspring because of the combined effect of harmful genes that were recessive in both parents.

12. Uses of sheesham?

Dalbergia Sissoo, also known as Indian Rosewood, is the source of Sheesham wood. The tree is native to India and Pakistan and grows all over the Sub-Himalayan Regions. Its leaves are compound, and produces pink-white flowers that resemble a pea flower. It gives a dry fruit that is a thin and papery pale brown pod. The tree mainly offers timber.

13. Define tertiary gene pool?

Tertiary Gene Pool (GP3):

The genetic material which leads to production of sterile hybrids on crossing with primary gene pool is termed as tertiary gene pool or gene pool three (GP3). It includes material which can be crossed with GP1, but the hybrids are sterile. Transfer of gene from such material to primary gene pool is possible with the help of special techniques.

14. How pollution is a threat to many species?

Marine animals are exquisitely sensitive to traces of toxic chemicals in lakes, oceans and rivers. Drastic changes in oxygen levels, caused by industrial pollution, can suffocate entire populations. Large bodied animal and rare species are more prone to the changes caused by humans to the planet. Constant exposure to pollution can render plants and animals more susceptible to dangers including starvation, loss of habitat and disease

15. Pollution is the main cause of threat to large no. of species proves this argument?

Aquatic pollution:

- Pollution caused by industrial effluents and wastewater of private households has severely damaged the habitats of many fish species.

16. How bottleneck effect on gene frequency?

"The bottleneck effect is a sharp lowering of a population's gene pool because of an environmental, or human-caused, change."

Allele frequencies in a group may be very different from those of the population prior to the event, even some alleles may be missing entirely. The smaller population will also be more susceptible to the effects of genetic drift for generations (until its numbers return to normal). Effect potentially causing even more alleles to be lost.

17. Steller's sea cow and Dodo?

Steller's sea cow: The largest mammals, other than whales, to have existed in the holocene epoch, the Steller's sea cow reached up to nine metres in length but was hunted to extinction in 1768, within 27 years of its discovery by Europeans.

Dodo: Perhaps the most famous extinct species, the dodo - endemic to Mauritius - was wiped out in just a few decades. The first recorded mention of the flightless bird was by Dutch sailors in 1598; the last sighting of one in 1662. It owes much of its fame to its appearance in Alice's Adventures in Wonderland.

18. How gene flow occur in human?

In human beings gene flow usually comes about through the actual migration of human populations, either voluntary or forced. Gene flow is the exchange of genes between two separate populations.

For example: Blue-eyed people from Sweden move to a small town in Mexico where people all have brown eyes. When they mate, some of their children now have blue eyes.

19. What is low oxygen and low pressure storage?

Low-pressure and Low-oxygen Storage:

For conservation of cultured plant materials low-pressure storage (LPS) and low-oxygen storage (LOS) have been developed. These are alternative methods of cryopreservation and cold storage.

20. Effects of lesser genes in a population?

Populations with a lesser number of genes in their gene pool will be susceptible to problems. This may cause them to become endangered or even perish altogether, i.e., become extinct.

Populations with a large gene pool will have more chances of survival; those with small gene pools are in danger of acquiring genetic diseases, deformities, and infertility.

21. **why it is necessary to take precautionary measure to prevent genetic diversity?**

- The loss of genetic diversity is difficult to see or measure. In contrast, the reduction and extinction of populations is far easier to see.
- Extinction is not only the loss of whole species, but is also preceded by a loss of genetic diversity within the species.
- This loss reduces the species ability to perform its inherent role in the whole ecosystem.
- The loss of genetic diversity within a species result in the loss of useful and desirable traits (e.g. resistance to parasites).
- Reduced diversity eliminate options to use untapped resources for food production, industry, medicine.

22. **One example gene interaction in plants?**

Seven genetically distinct yarrow plants were collected and three cuttings taken from each plant. One cutting of each genotype was planted at low, medium, and high elevations, respectively. When the plants matured, no one genotype grew best at all altitudes, and at each altitude the seven genotypes fared differently. For example, one genotype grew the tallest at the medium elevation but attained only middling height at the other two elevations. The best growers at low and high elevation grew poorly at medium elevation. The medium altitude produced the worst overall results, but still yielded one tall and two medium-tall samples. Altitude had an effect on each genotype, but not to the same degree nor in the same way.

23. **Explain the factors which result the extinction of species?**

Some major effects of extinction are as follow;

- Destruction of Ecosystems
- Upsetting the balance of nature
- Medical study
- Bees and pollination
- **Destruction of Ecosystems**

Species of animals cannot live away from each other. They work together to form an ecosystem. Extinction of one species can effect other by effecting food chain .They depend upon each other and their environment to survive. So in this way it can destroy whole ecosystem

- **Upsetting the balance of nature**

A keystone species is an important to an ecosystem. The grizzly bear is a keystone species. It catch and eat salmon. As the bears move from rivers and streams back to the land, they bring nutrients from the fish to the land in their waste. These nutrients keep the forest healthy so the many animals and plants can live. Without grizzly bears, the forest ecosystem could collapse. But the grizzly bear is now listed as a threatened species. Its extinction can upset the whole balance of the nature.

- **Medical study**

Many different species have unique bodily processes that can cure human diseases. e.g. the toxins produced by **dart-poison frogs** in the rain forest have yielded information about how alkaloid compounds behave in living organisms. Scientists also study bears for clues about how they recycle blood toxins during hibernation to find potential solutions to kidney disorders. Plants from forests are useful for medicinal purposes.

- **Bees and pollination**

Bees are responsible for pollinating more than 250,000 species of plants. "Colony collapse disorder" is wiping out entire populations of the insect. Scientists have yet to discover its true cause. Continued losses could threaten the supply of crops like almonds, apples and cucumbers. From all species, humans rely upon for food 87 rely on pollinators mainly honeybees. Only 28 different crops could survive without such assistance.

24. What is 6 article of agriculture genetic resources?

Article 6: Sustainable Use of Plant Genetic Resources:

The Contracting parties shall develop and maintain appropriate policy and legal measures that promote the sustainable use of plant genetic resources for food and agriculture.

25. What are the advantages of germplasm storage?

Conventional seed storage offers several advantages:

1. Seeds of many valuable species can survive long-term storage
2. Good storage facilities are now available in most of the world, and they are used extensively for tree seed storage for various regeneration purposes
3. Seed storage is a relatively cheap method for conserving a broad range of germplasm
4. Large land areas are not tied up in conservation
5. International exchange of genetic material is facilitated by seed storage

26. 4.Conservation of genetic resource is important for saving of life? comment on it.

Genetic resources are sometimes called the "first resource" of the natural resources on this planet - the others being land, air, and water. **The diversity of genetic resources for food and agriculture (i.e. plants/crops, animals, aquatic resources, forests, micro-organisms and invertebrates) plays a crucial role in meeting basic human food and nutritional needs.** Genes are the link from generation to generation of all living matter. Therefore, attention to genetic resources means attention to the vast diversity among and between species of animals, plants, and microorganisms. **It is essential for maintaining and enhancing the efficiency and the resilience of production systems, as well as contributing to sustainable diets and to the delivery of ecosystem services, such as pest and disease regulation.**

Genetic resources must be maintained as an investment for the future. Genetic resources are of tremendous practical and historical significance for human life from daily survival to generating the wealth of nations, yet their crucial role in supporting human society is frequently overlooked and undervalued. Genetic conservation is an integral part of a much broader activity concerned with protecting the many plants, animals, microorganisms, and communities of organisms that help to mold and stabilize the environment and maintain the quality of air, water, and soil. Conservation ensures that future generations will benefit from earth's biological resources. Conserving genetic resources is a means of safeguarding the living materials exploited by agriculture, industry, forestry, and aquaculture to provide food, feed, medicines, fiber for clothing and furnishing, fuel for cooking and heating, and the food and industrial products of microbial activity.

27. State the new approaches followed by developing and developed countries to increase food supply and protecting the resources on which they depend?

28. What are the approaches for preservation?

Why preservation is important?

Until two decades ago the genetic resources were getting depleted owing to the continuous depredation by man. It was imperative therefore that many of the elite, economically important and endangered species are preserved to make them available when needed. Many methodologies have been devised for long term preservation of material.

Methodologies

There are various methods of storage :

1. **Cryopreservation** - generally involves storage in liquid nitrogen.
2. **Coldstorage** - it involves storage in low and non freezing temperature.
3. **Lowpressure** – it involves partially reducing the atmospheric pressure of surrounding.
4. **Lowoxygenstorage** - it involves reducing the oxygen level but maintaining the pressure.

29. Ecosystem is facing massive destruction extinction species. How?

Mass Extinction:

Extinction event (also known as a **mass extinction** or **biotic crisis**) is a widespread and rapid decrease in the biodiversity on Earth.”

Biologists suspect we're living through the sixth major mass extinction. Earth has witnessed five, when more than 75% of species disappeared. Paleontologists spot them when species go missing from the global fossil record.

“We don't always know what caused them extinct but most had something to do with rapid climate change”

MCQs

1. Longest migration was observed in _____ **Artic Tern Bird**
2. Cryopreservation can be done _____ -196c
3. Calypha belongs to family _____ **Spurge family(Euphorbaceae)**
4. Cause behind extinction of steller sea cow _____ **Hunting**
5. Rhino were hunt for _____ **Horn**
6. Darwinfinch is example of _____ **Adaptive radiation**
7. Result of environmental and human change _____ **Bottle neck effect**
8. Types of inbreeding _____ **3**
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17. Whichh of the following approach can be taken to analyze G×E interaction _____
Polygenic
18. Northern areas of Pakistan are serving _____ **Habitat**
19. Land race is known as (weed, mutant, cultivar, primitive)
20. which is used to protect individual in protected environment **insitu**
21. which is use at large scale for food and agriculture **sheep,**
22. Phenyl ketonuria is a genetic condition caused by **Mutant**
23. Example of founder affect? (Hemophilia, dwarfism, infant death, all)
24. triggers of migration **4**
25. PGR are components of _____
26. genetic resolution are sometimes called _____
27. according to FAO species of mollusks are _____ **85000**
28. Which is hazard of migration **All**
29. are link from generation to generation of all living matter.. **Genes**
30. plant genetic resources are building and fundamental not only in, but also for the very survival of the species in time and space. **Crop improvement program**
31. which is example of in situ A. national park B. Biosphere C. Gene bank D. **All**
32. is known as indian rosewood **Dalbergia Sissoo,**
33. Pakistan is largest produces of kinow. **6th**
34. ABSA is stands for **Access and Benefit Sharing Agreement**
35. in 19 th century only individuals of elephant seals were present _____ **20**

36. Reef are home to -----% marine animals. 25
37. gene pool types .3
38. crow follow migration. Daily
39. dwarf lake iris appearance. Deep blue
40. cooling process in which water of tissue become glass instead of crystal. Vetrification
41. cryopreservation is applicable to. fishery. medical .añimalhusbundry all
42. yellow stone natnl park designated in .1872
43. .honey bee pollinate plants. 250000
44. .causes of extinction. climatechange. hunting. pollution. all
45. sea cow hunted to extinction in. 1768
46. extinct plant still cultivated in captivity is. Cyneasuperba
47. .cryopreservation is done in low temp and deep freezer at -80dgree
48. .breeding line have .narrow genetic base
49. animal closely related .close inbreeding.
50. .transfer of gene from parent to offspring. Vertical transfer of gene
51. species in danger of extinction . Endangered
52. GEWIS stands for _____. A Genome Wide Interaction Scan
53. Microorganisms are _____ diversity than other living organisms. Highest
54. Variation in genetic information of within of same individual of a population. Genetic diversity
55. The population of bottleneck in 1980 is reduced by _____. Over-Hunting
56. How many animal species are in danger _____. 20,000 not confirm
57. For which purpose the crustaceans can migrate _____. Mating
58. Wildebeest are the part of _____. Migration
59. Allele frequency is affected by _____. All given
60. Phenyl-alkaptonuria is the genetic disease caused by _____. Mutation
61. _____ is a local variety of a domesticated plant species. Landrace
62. Dart poison frog have compound __ Alkaloid

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Q.7 Why hart tongue farn threatened?

Ans; Quarrying, recreation and residential development have all destroyed these plants and their habitat. Canadian populations are threatened by lumbering and the development of land for ski resorts and country estates, among other activities.

5 marks

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