

- Mussels
- Decapods
- Marine mammals
- Aquatic plants
- All other water dwelling organisms

2: What is the major objective of cryopreservation? 2M

Ans: Cryo is Greek word. (krayos – frost). It literally means preservation in “frozen state.” It is a process where tissues, organelles, cells, extracellular matrix, organs or any other biological constructs susceptible to damage caused by unregulated chemical kinetics are preserved by cooling to very low temperature.

3: What is the criteria for any National Park? 3Mans:

Ans: National park is an area which is strictly reserved for the betterment of the wildlife & biodiversity, and where activities like developmental, forestry, poaching, hunting and grazing on cultivation are not permitted.

Ø In these parks private ownership rights are not allowed.

Ø Their boundaries are well marked and circumscribed.

Ø They are usually small reserves spreading in an area of 100 sq. km. to 500 sq. km.

Ø In national parks, the emphasis is on the preservation of a single floral or faunal species.

4: What is horizontal gene transfer? 3M

Ans: “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.”

5: Write a note on any five types of genetic resources? 5

Ans: Genetic resources are the heritable characteristics of a plant or animal of real or potential benefit to people.

1. Plant Genetic Resources
2. Animal Genetic Resources
3. Forest Genetic Resources
4. Aquatic Genetic Resources
5. Genetic Resources of Microorganism

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6. Invertebrates 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.

qThey can be defined as any genetic material of plant origin of actual or potential value for food and agriculture, e.g. seeds, tubers, mature plants etc.

6: Differentiate between Out breeding and in breeding? 5M

Ans: “**Inbreeding**, the mating of individuals or organisms that are closely related through common ancestry.”

“**Outbreeding**, the intentional breeding of distantly related or unrelated individuals for the purpose of producing offspring of superior quality.”

BT401 12pm

1. Difference between gene pool and genetic drift.

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

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

2. Merits and demerits of ex situ conservation

Ans: 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

Ø Usually only a small number of individuals can be cared for.

Ø It can be difficult and expensive to create and sustain the right environment.

3. Three main wild animal genetic resources

Ans:

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1. Zoological garden
2. Wildlife Sanctuaries
3. Game reserve

4. Facts about passenger pigeon

Ans: The passenger pigeon may have once constituted 25 to 40 percent of the bird population.

Ø The 19th century brought widespread hunting and trapping of the birds, which severely diminished their populations.

Ø The last passenger pigeon, named “**Martha**” died at age 29 at the Cincinnati Zoo in 1914.

5. What is Inbreeding

Ans: Answer above

6. Biosphere reserve

Ans: Biosphere reserves are areas of terrestrial and coastal ecosystems promoting solutions to reconcile the conservation of biodiversity with its sustainable use.

They are internationally recognized, nominated by national governments and remain under sovereign jurisdiction of the states where they are located.

Long

Reproductive isolation

Ans: 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. This is often result of Reproductive isolation.

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

Ø **Pre-zygotic isolation**

Ø **Post-zygotic isolation**

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Why we use precautionary measures to save genetic resources?

Ans: attention to genetic resources means attention to the vast diversity among and between species of animals, plants, and microorganisms.

Ø Genetic resources must be maintained as an investment for the future.

Ø 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.

Ø 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.

Ø Conservation ensures that future generations will benefit from earth's biological resources.

Ø 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.

Types of cryoprotectants

Ans: There are two types of cryoprotectants:

(a) Membrane permeating which can freely diffuse the membrane such as

glycerol (G), ethylene glycol

(EG) and dimethyl sulfoxide

(DMSO);

(b) Non membrane permeating which cannot permeate the cell membrane such as sugars

Richness of microorganisms species number?

Ans: Ø Numbers of species described and currently accepted in most groups of microorganisms worldwide are respectively 143,000 & 18,500

Ø 120 new species of bacteria and 1,500 new species of fungi are added to science each year

Ø This clearly demonstrating that knowledge of these groups is grossly Inadequate

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Why genetic resources are conserved 2

Ans: Answer above

Varieties of cultivation 2

Ans: 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.

Difference between natural selection and genetic drift 3

Ans: Natural selection

A natural process that results in the survival and reproductive success of individuals or groups

Antibiotics with example 3

Ans: Antibiotic is chemical substance produced by microorganisms that can kill or inhibit the growth of other microorganisms

Antibiotics kill or inhibit other organisms by interfering the metabolic process in the bacterium that is not found in the host.

Example: Penicillins, Tetracyclines

Advantages and disadvantages of ex situ conservation 5

Ans: Merits

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ØIt can be used to reintroduce species that have left an area.

Demerits

ØUsually only a small number of individuals can be cared for.

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- Ø 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.
- Ø 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.

Why national strategy of PGRFA needed 5

Ans: 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 to 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.

Bt401....26-6-2018 10:30 am

Symaptic speciation 2

Ans:

Cultivation vareities 2

Ans: Answer above

Huntington disorder 3

Ans: 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.

Ratio of vegetables in Pakistan 3

Ans: Ø Pakistan covering 75% of the total area under vegetables, accounting for 74% of the total production.

Ø The major share in the production is of Punjab (63%) followed by Sindh (14%), Baluchistan (12%) and KPK (11%).

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- Ø Maximum area is grown under potatoes and about 88 % occurs in Punjab.
- Ø About 46% of onion is cultivated in Sindh and 25% in Punjab.
- Ø Chili is at the third position of which 84% is cultivated in Sindh.

Reproductive isolation 5

Ans: Answer above

Preventive measures for the lost of genetic diversity 5

Ans: Answer above

Mcq's

Types of inbreeding

Gpsc stands for

Extinct specie OHSS

stands for

Geneflow types?

Pulse crop cultivated area..

Genetic diversity is measurement of

1 gene 2 allele 3 both

Best of luck

BT401

What is ultrarapid freezing?

Ans: In this technique serial equilibration of embryos in high concentration of DMSO (3-5 M) supplemented with sucrose (0.3 to 0.5 M).

What special about agriculture genetic resources?

Ans: Agricultural resources have been shared and exchanged over thousands of years. Mostly it is impossible to identify a single country of origin.

Countries and regions are “interdependent”: they all depend for their food and agriculture on crops that originated elsewhere. conservation and sustainable use, fair and equitable benefit-sharing, for sustainable agriculture and food security

What the term of animal genetic resource of food and agriculture?

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Ans: 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".

Enlist causes of migration?

Ans: 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
- Ø Some animals travel relatively short distances to find food or more favorable living or breeding conditions.

Write two types of ex situ conservation?

Ans: Ø Gene bank
Ø Botanical garden

Write about special of wildebeest for migration?

Ans: 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.

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Mcqs answers

- 1- both wild and domestic
- 2- 1.5 M
- 3- 5 to 10 years (modern varieties life)
- 4- 13000 (seaweeds)
- 5- ex situ conservation
- 6- cryopreservation (all of the given)
- 7- types of inbreeding (3)
- 8- Meleda disease (example of founder effect)
- 9- Acalypha rubrinervis family (spurge)
- 10- asian bear population (150) not sure

Short qstnz

1- define progenitor

Ans: Progenitor of the horse as we know it no longer exists in the wild, though it likely resembled the related przewalski's horse.

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2- Why *Acalypha rubrinevis* tree is said to be a string tree?

Ans: *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.

3- migration causes

Ans: Answer above

4- Danger of aquatic pollution on aquatic species

Ans:

- Ø Pollution caused by industrial effluents and wastewater of private households has severely damaged the habitats of many fish species
- Ø Nutrient input through farming has resulted in algal blooms
- Ø Oil tanker disasters causing oil spills destroyed entire coastal areas
- Ø Above issues can cause a loss of general fitness of the animals, remain stunted in growth and become less fertile
- Ø Famous example of effect of aquatic pollution is “MINAMATA Disease.” This disease was spread due to consuming mercury poisoned fishes by people

Long qsntz

1- Define microbial genetic resources programs working in Pakistan

Ans: ØTo establish a long term microbial preservation facility as “National Culture Collection of Pakistan (NCCP)” for collection and preservation of microbial genetic resources from Pakistani ecology for basic and applied microbiology and biotechnology research following the Best Practice Guidelines of OECD (2001).

ØTo distribute the economically important strains to scientific community, institutions and industry on commercial basis for research or utilization in industrial processes as a regular activity of the NCCP by following national and international laws and regulations.

2- Advantages and disadvantages of outbreeding

Ans: Advantages:

Ø 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)

Ø Sharply reduce the risk of deleterious recessive genes being expressed

ØOne of the benefits of out breeding is less chance of genetic abnormalities

Ø The ability to make a breed stronger **Disadvantages:**

ØIntroduction of new genes into population

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ØAnimal discomfort accidentally produce traits that are damaging to the health of the animal

BT401 (Genetics Resources & Conservation)

Total Q 26 (40 marks)

20 Mcqs

4 short Q (2 and 3 marks)

1. What is special about Agricultural genetic resources? (2 marks)

Ans: Answer above

2. What happen when population of moths of white colour migrate to another population brown colored moths and mate? (2)

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.

3. Why Hart's Tongue Ferns threatened? 3 marks

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.

4. Write demerits of in situ and ex situ conservation? 3 marks

Ans: Answer above

Long Q (5 marks)

1. Write any five types of genetic resources?

Ans: Types of Genetic Resources

ØPlant Genetic Resources

ØAnimal Genetic Resources

ØForest Genetic Resources

ØAquatic Genetic Resources

ØGenetic Resources of Microorganism

ØInvertebrates Genetic Resources

- 1) 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. They can be defined as any genetic material of plant origin of actual or potential value for food and agriculture, e.g. seeds, tubers, mature plants etc.
- 2) 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.

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- 3) **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** also comprise all water-dwelling genetic resources.
- 5) **Genetic resources of micro-organisms** means genetic material of actual or potential value from micro-organisms.

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

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

Ø 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.

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What is migration with an example ?

Ans: Migration is the relatively long-distance movement of individuals, usually on a seasonal basis.”

e.g. Some crustaceans migrate for breeding

When west african black rhinos became extinct?

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

What is 6 articles of agriculture genetic resources?

Ans: 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.

What is cryopreservation?

Ans: Answer above

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Write note on the indus dolphin?

Ans: Ø The Indus River dolphin is one of the world's rarest mammals

Ø It is second most endangered freshwater river dolphin

Ø Approximately 1,100 specimens of this species exist today in a small fraction of their former range

Ø 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

How many ways bacteria have transfer their DNA horizontally?

Ans: Ø There are three ways for bacteria to transfer their DNA horizontally

- Conjugation

The transfer of DNA directly from one cell to another through cell-cell contact often involving plasmids

- Transformation

Bacteria are capable of taking up DNA directly from their environment and incorporating it into their genomes known as natural transformation

- Transduction

Transduction is the transfer of DNA from one cell to another by a virus

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Ans: Answer above

Long Q (5 marks)

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