BT401 – GENETIC RESOURCES AND CONSERVATION

Mid Term MCQs

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Group link: https://chat.whatsapp.com/BjC6W0jZx8o9yaC2ISh1Gu

Lecture#1

1. Genetic material is any material of **plant**, **animal**, **microbial** or other origin containing functional units of heredity.
2. Animals, plants, micro-organisms and invertebrates which are used for Food, Agriculture and Forestry are called **Genetic Resources.**
3. Together with the components which fulfill agri-ecological functions, they are grouped under the concept **Agrobiodiversity.**
4. Genetic resources for Food, Agriculture and Forestry include both **wild species** and **domesticated forms.**
5. There are **two** important themes with regard to genetic resources.
6. The first important theme regarding genetic resources is **sharing of benefits.**
7. The second important theme regarding genetic resources relates to **food security.**
8. An **Access and Benefit Sharing Agreement (ABSA)** is an agreement that defines the fair and equitable sharing of benefits arising from the use of genetic resources.
9. The **Nagoya Protocol** focuses on the equitable sharing of genetic material including the traditional knowledge associated with the genetic resources, and the benefits that arise from their use.

Lecture#2

10. PGRFA stands for **Plant Genetic Resources for Food and Agriculture.**
11. **PGRFA** can be defined as any genetic material of plant origin of actual or potential value for food and agriculture.
12. AnGR stands for **Animal Genetic Resources.**
13. **Animal genetic resources (AnGR)** is used to include all animal species, breeds and strains that are of economic, scientific and cultural interest to humankind.
14. FGR stands for **Forest Genetic Resources.**
15. Genetic resources of micro-organisms means genetic material of actual or potential value from **microorganisms.**
16. **Invertebrates** include a great number of species that perform valuable functions in **agro-ecosystems.**

Lecture#3

17. Genetic resources are sometimes called the **first resource** of the natural resources on this planet.
18. **Genes** are the link from generation to generation of all living matter.
19. **Genetic resources** must be maintained as an investment for the future.
20. **Conservation** ensures that future generations will benefit from earth's biological resources.

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Lecture#4-5

21. Plant genetic resources are components of **biodiversity** which sustain the humankind.
22. Germplasm of a crop may be define as the **sum total of all hereditary material.**
23. PGR can be broadly divided into **two** types.
24. Plant Genetic resources or Germplasm of a crop consist of **5** types of material.
25. A landrace is a local variety of a domesticated plant species which has developed largely adaptation to the natural and cultural environment in which it lives.
26. **Landrace populations** are often variable in appearance, but they can be identified by their appearance and have a certain genetic.
27. **Obsolete varieties** are varieties developed since the advent of scientific agriculture in the late **nineteenth** century and that are no longer cultivated.
28. **Breeding Lines** are lines/ populations developed in breeding programs have narrow genetic base and often contain valuable gene combination.
29. **Genetic stocks**, broadly defined as plants or populations generated and/or selected for genetic studies, represent a unique and growing class of extremely valuable germplasm which, depending on crop, type of genetic stock and user community may represent genetic resources of either transient or long-lasting value.
30. Genetic stocks can be divided into **three** general groups.

Lecture#6

31. **Biodiversity** provides a valuable source of compounds to the medical, food and crop protection industries.

Lecture#7

32. **In Situ Conservation** involves protection of **endangered** species in their natural habitats.
33. National Parks, Biosphere reserves, Gene sanctuaries etc are example of **In Situ Conservation.**
34. **National park** may be define as an area declared by state for the purpose of protecting, propagating wildlife there in or its natural environment for their scientific educational and recreational value.
35. **Biosphere** reserves are internationally recognized, nominated by national governments and remain under sovereign jurisdiction of the states where they are located.
36. **Gene Sanctuary** are areas of great genetic diversity that are protected from human interference.
37. **Ex Situ Conservation** involves placing of threatened animals and plants in special care unit for their protection.
38. Seed Gene bank, Botanical gardens, zoological parks are examples of **Ex Situ Conservation.**
39. **Gene bank** refers to a place or organization where germplasm can be conserved in living state.
40. Gene banks are also known as **germplasm banks.**
41. **Seed Gene Bank** is a place where germplasm is conserved in the form of seeds.
42. **Seeds** are very convenient for storage because they occupy smaller space than whole plants.
43. Field gene banks also called **plant gene banks** are areas of land in which germplasm collections of growing plants are assembled.
44. A **botanical garden** or botanic garden is a garden dedicated to the collection, cultivation and display of a wide range of plants labeled with their botanical names.

Lecture#8

45. **Ex Situ 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.
46. **In Ex Situ Conservation,** issues such as predation and hunting can be monitored and managed more easily.

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47. 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.**

Lecture#9

48. GSPC stands for **Global Strategy for Plant Conservation.**
49. "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". It is vision of **GSPC.**
50. The **GSPC** highlights the importance of plants and the ecosystem services they provide for all life on earth, and aims to ensure their conservation.
51. The GSPC has **5** main objectives.

Lecture#10

52. Article **9** refers to **Farmer's Rights.**
53. Countries and regions are **interdependent.**
54. **Article 6** refers Sustainable Use of Plant Genetic Resources.

Lecture#11

55. 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.
56. The **National Strategy** for **PGRFA** should also be complementary to other national, regional and global conservation strategies or initiatives.

Lecture#12

57. **Wild plant resources** refers to those that grow spontaneously in self-maintaining populations in natural or semi-natural ecosystems and can exist independently.
58. ***Acacia nilotica*** is a scientific name for **Prickly Acacia/Keekar.**
59. ***Acacia nilotica*** has a wealth of medicinal uses.
60. Gum produced by ***Acacia nilotica*** is used to treat **throat and chest complaints.**
61. The bright **red** distinctive flowers of the **coral tree** make it a pleasure to look at and a favorite among exotic gardens.
62. Because of the claw like spines that grow along the trunk and branches of the tree, another name for ***Acacia nilotica*** is **Tiger's Claw.**
63. Coral trees reach up to height of **80 feet.**
64. **Deodar Cedars** are the national tree of Pakistan.
65. Deodar Cedar is also called the **Himalayan Cedar.**
66. Gardens in Pakistan have some Deodar Cedar trees that are over **200** years old.
67. Deodar Cedar trees live in mountainous areas and can grow in altitudes as high as **10,000 feet.**
68. Dalbergia Sissoo is also known as **Indian Rosewood.**
69. Dalbergia Sissoo is the source of **Sheesham wood.**

Lecture# 13-14

70. **Legumes** are commonly known as beans and pulses.
71. Legume are plants of the family **fabaceae.**
72. Family fabaceae is also known as **leguminosae.**
73. **Legumes** are **second** to **cereals** in providing food for the world.
74. Legume seeds are rich in **protein.**
75. Total area under major pulse crops in Pakistan is about **1.5m** hectares.
76. **Mungbean** is the important **kharif** pulses of Pakistan.

77. **Punjab** is the major mungbean growing province that alone accounted for **88%** area and **85%** of the total mungbean production is from Punjab.
78. Pakistan covering **75%** of the total area under vegetables, accounting for **74%** of the total production.
79. The major share in the production of vegetables is of **Punjab (63%)** followed by **Sindh (14%), Baluchistan (12%)** and **KPK (11%).**
80. Maximum area of country is grown under potatoes and about **88%** occurs in Punjab.
81. About **46%** of onion is cultivated in Sindh and **25% in Punjab.**
82. **Chili** is at the third position of which **84%** is cultivated in **Sindh.**
83. Cereal grains contain **60%** to **70%** starch and are excellent energy rich food for humans.
84. A healthy human diet must include **20 to 30 g/day** of dietary fiber, which can easily achieved by eating whole grain cereal products.
85. Pakistan is the **sixth** largest producer of Kinow (mandarin) and oranges in the world, with 2.1 million tons.
86. Pakistan produces over **150** varieties of **mango.**
87. According to FAO production year book of **2001**, Pakistan stands **fifth** among mango growing countries of the World.
88. **Almonds** fall in the family of peaches, plums and nectarines.
89. **Almond** plants blossom into beautiful **pink** flowers in spring in addition to yielding fruits in summer.

Lecture#15

90. The term **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.
91. 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**".
92. Number of species of Animals:

Species	*No. of Breeds*	*Species*	*No. of Breeds*
Pig	350	**Alpaka**	02
Goat	320	**Chicken**	>300
Sheep	850	**Turkey**	>30
Cattle	815	**Duck**	>65
Buffalo	70	**Muscovy Duck**	None
Horse	350	**Domestic Goose**	>60
Donkey/Ass	70	**Guinea Fowl**	10 varieties
Dromedary	50	**Japanese Quail**	>6
Bactrian Camel	06	**Pigeon**	150
Llama	02	**Ostrich**	4 races

93. 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.**

Lecture#16-17

94. Hair from **goat and sheep** is used for making woolen clothing, shawls and blankets.
95. **Heparin** is an **anti-coagulant** used to control clots in blood.
96. Heparin is obtained from **ox lungs** and **pig intestines.**
97. **Dogs** were probably the first tame animals.
98. Dogs have accompanied humans for some **10,000 years.**

99. Some scientists assert that all **dogs**, domestic and wild, share a common ancestor in the small **South Asian wolf.**
100. Scientific name of Water buffalo and River buffalo is **Bubalus bubalis bubalis**.
101. Scientific name of Swamp buffalo is **Bubalus bubalis carabenesis.**
102. There are **74** breeds of domestic water buffalo numbering some **165** million animals.
103. Longevity of the domesticated water buffalo can be **40** years.
104. Water buffalo milk contains **8** percent butterfat.
105. Scientific Name of Horse is **Equus ferus.**
106. Horse was probably domesticated some **6,000** years ago.
107. A goat is a hoofed mammal in the genus **Capra.**
108. Altogether there are **nine** species of goat in the world.
109. Sheep were domesticated by humans around **10,000 BC.**
110. Selection for economically important traits like wool type resulted in more than **200** distinct breeds of sheep.
111. Scientific name of Domestic cat (also known as house cate) is **Felis catus.**
112. Fossil evidence found in China dating to approximately **5,300** years ago revealed that cats similar in size to modern domestic cats.
113. Cats are **digitigrades**, which means, **they walk on their toes.**
114. Chickens are able to remember and recognize over **100** individuals.

Lecture#18

115. According to reports there are only **200** Snow Leopards left in Pakistan.
116. **Markhor** is the national animal of **Pakistan**.
117. The total global population of Markhors in estimated to be **2,500.**
118. About **1,500** Markhors are found in Pakistan.
119. **Asiatic Cobra** is the most venomous species of cobra in the world.
120. Person bitten by **Asiatic Cobra** suffers from severe neurotoxicity.
121. **Mugger crocodile** is also known as **Indus crocodile** and **Indian crocodile.**
122. Mugger can reach lengths up to **16 feet.**
123. **Mugger Crocodile** is the only species of crocodile found in Pakistan.
124. The estimated population of Mugger crocodile in Pakistan is between **400 and 450.**
125. **Himalayan Brown Bear** is the largest animal found in the **Himalayas.**
126. The population of this Himalayan Brown Bear is only **150 to 200** in Pakistan.

Lecutre#19

127. According to FAO, there are approximately: **31,000 species** of finfish, **85,000** species of mollusks, **47,000** species of crustaceans, and **13,000** species of seaweeds.
128. Famous example of effect of aquatic pollution is **Minamata disease.**
129. **Minamata** disease was spread due to consuming **mercury** poisoned **fishes** by people.
130. **Fisheries** can drastically lower the numerical abundance of individual stocks or even entire fish species by **overfishing.**

Lecutre#20-21

131. **Endangered Species** refer to species of plant or animal that is in immediate danger of becoming extinct and needs protection to survive.
132. **Threatened Species** are species is likely to become endangered if it is not protected.
133. **Extinct** species are species of plant or animal that is no longer living.

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134. A **Mutation** occurs when a **DNA** gene is damaged or changed in such a way as to alter the genetic message carried by that gene.
135. **Mutagen** is an agent of substance that can bring about a permanent alteration to the physical composition of a **DNA** gene such that the genetic message is changed.
136. **Natural Selection** means a natural process that results in the survival and reproductive success of individuals or groups.
137. **Gene Pool** is the combination of all the genes present in a given population.
138. **Genetic Diversity** is the variation in the amount of genetic information within and among individuals of a population, a species, an assemblage, or a community.
139. **Genetic Drift** are **Random** changes in gene frequency especially in small populations when leading to preservation or extinction of **particular** genes.
140. The **bottleneck effect** is a sharp lowering of a population's **gene pool** because of an environmental, or human-caused, change.
141. The effect on the resulting gene pool that occurs when a new isolated population is founded by a small number of individuals possessing limited genetic variation relative to the larger population from which they have migrated is called **Founder Effect.**
142. **Genetic resources** are the heritable characteristics of a plant or animal of real or potential benefit to people.
143. **Breeding** is the activity of keeping animals or plants in order to produce animals or plants that have particular qualities.
144. **Inbreeding** is the mating of individuals or organisms that are closely related through **common** ancestry.
145. **Outbreeding** is the intentional breeding of distantly related or unrelated individuals for the purpose of producing offspring of superior quality.
146. **Migration** is the relatively long-distance movement of individuals, usually on a **seasonal** basis.
147. **Antibiotic** is chemical substance produced by **microorganisms** that can kill or inhibit the growth of other microorganisms.
148. **Gene Flow** is the introduction of genetic material (by **interbreeding**) from one population of a species to another.
149. **Vertical Gene transfer** is the transfer of genes from **parents** to **offspring**.
150. **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.

Lecture#22

151. Numbers of species described and currently accepted in most groups of microorganisms worldwide are respectively **1, 43,000** & **18,500.**
152. The complexity and diversity of **microbial populations** is **highest** among all living organisms.
153. **120** new species of **bacteria** and **1,500** new species of **fungi** are added to science each year.

Lecture#23

154. **Antibiotic** is chemical substance produced by microorganisms that can kill or inhibit the growth of other microorganisms.
155. **Antibiotics** kill or inhibit other organisms by interfering the metabolic process in the **bacterium** that is not found in the host.

Lecture#24

156. **Genetic diversity** is the variation of all living forms at the genetic level.
157. The domestication of **wolves** into various breeds of **dogs** is example of **genetic diversity.**

158. The domestication of **wolves** into various breeds of **dogs** via selective breeding has greatly increased the genetic diversity of the **canine genome** as compared to its **lupine origins.**
159. **Anthropogenic** impact is apparent in the **coastal** zone.
160. Man-made activities **increases** the number of changes occurring to individual and populations.
161. **Anthropogenic** activities **reduce** the sum of genes available.
162. **Extinction** is not only the loss of whole species, but is also preceded by a loss of **genetic diversity** within the species.
163. The loss of **genetic diversity** within a species result in the loss of useful and desirable traits.

Lecture#25-27

164. The **Northern** Areas of Pakistan provide a habitat for a number of globally significant wildlife species.
165. **Indus River Dolphin** is **second** most endangered freshwater river dolphin.
166. Approximately **1,100** specimens Indus River Dolphin exist today in a small fraction of their former range.
167. It was discovered in early **2015** that population of **Markhor** has increased by **20%.**
168. Total remaining population of Snow Leopard is **7,000** to **10,000** worldwide.
169. Approximately, **300** Snow Leopards are found in Pakistan.
170. Scientific name of Marco Polo sheep is ***Ovis ammon.***
171. In Pakistan, Marco Polo Sheep are mostly found in the **Khunjerab National Park** and adjoining areas.
172. Scientific name of White-headed duck is ***Oxyura leucocephala.***
173. It is estimated that only **50** White-Headed Ducks are remaining.
174. The deadly drug **Diclofenac Sodium**, which is used in the feed for cattle is a chemical compound that kills these **vultures** at a rapid rate.

Lesson#28-30

175. **Gene–environment** interaction is when **two** different **genotypes** respond to environmental variation in different ways.
176. There are **two** main methods to analyze gene environment interaction
177. **Adoption** studies have been used to investigate how **similar** individuals that have been adopted are to their biological parents with whom they did not share the same environment with.
178. Using **monozygotic** twins, the effects of different environments on **identical genotypes** could be observed.
179. **Single nucleotide polymorphisms (SNP's)** are compared with single binary exposure factors to determine any effects.
180. Since the same environmental factor could interact with multiple genes, a polygenic approach can be taken to analyze **GxE interactions**.
181. GEWIS is abbreviated as **GEnome Wide Interaction Scan.**
182. **Mean bristle number** on **Drosophila** could vary with changing **temperatures**.
183. In plants, **seven** genetically distinct **yarrow** plants were collected and three cuttings taken from each plant.
184. In the absence of **Phenylketonuria**, an amino acid known as **phenylalanine** does not get converted into the next amino acid in a biochemical pathway.
185. In **Phenylketonuria**, too much **phenylalanine** passes into the blood and other tissues.
186. Lowering **Phenylalanine** consumption can affect the **phenotype** of a particular trait, demonstrating a gene-environment interaction.

Lecture#31-32

187. The combination of all the genes present in a given population is called the **gene pool** of that population.
188. Populations with **larger** gene pools tend to have **more** genes, hence, **more** genetic diversity.
189. Populations with a **lesser** number of genes in their gene pool will be susceptible to problems.
190. A population with a **larger** genetic diversity will be better prepared to deal with disease outbreaks or extreme environmental changes.
191. Populations with a **large** gene pool will have more chances of survival.
192. The Gene Pool System is classified in **three** types.
193. The **allele frequency** in a population's gene pool can be affected by **evolutionary mechanisms.**

Lecture#33

194. Genetic Drift may result in the loss of some alleles (including beneficial ones) and the fixation, or rise to **100%** frequency.
195. **Genetic drift** is the phenomenon of change in the frequency of alleles in a population of organisms due to chance or random events.

Lecture#34

196. **Natural selection** shows the positive changes in the genome that may give its possessor an adaptive advantage.
197. **Natural selection** is response to an organism's **environmental** challenges.
198. **Natural selection** will always result in the selection of **allele** that gives an advantage to its possessor, while **genetic drift** causes advantageous genes to be removed in the following generations.
199. **Natural selection** will always result in introducing **more** genetic variations in a population.
200. **Genetic drift** shows changes in the genome that may be advantageous, deleterious or may have no effect.
201. **Genetic drift** is completely random and is solely based on **luck**.
202. **Genetic drift** is largely influenced by the population size, whereas natural selection is not.
203. **Genetic drift** leads to the reduction of genetic variations, or may sometimes be responsible for introducing genetic variation in a population.
204. **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.
205. **Genetic drift** takes place between **two generations** whereas gene flow takes place between **two populations.**
206. **Genetic drift** occurs in only **one** species while gene flow could take place between either **two** populations or **two** species.
207. **Physical barriers** matter for the **gene flow** but not for the **genetic drift.**

Lecture#35-38

208. The **bottleneck effect** is a sharp lowering of a population's gene pool because of an environmental, or human-caused, change.
209. Few tens of thousands of years ago the population of **Homo sapiens** was reduced for a period to a few thousand or tens of thousands of people.
210. All Cheetah shared a small number of alleles like less than **1%** diversity.
211. Bottleneck effect occurred **10,000** years ago in **Ice age.**
212. Population of **Northern Elephant Seal** bottleneck in **1890s** due to **overhunting.**
213. Hunting reduced the population size of Northern Elephant Seal to as few as **20** individuals at the end of the **19th century.**

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214. The **founder effect** is the loss of genetic variation that occurs when a new population is established by a very small number of individuals from a **larger** population.
215. A **founder effect** occurs when a new colony is started by a **few** members of the original population.
216. Around **200** German immigrants settled in **Pennsylvania** within community marriages.
217. The **German immigrants** developed syndrome named **Ellis-van Creveld** syndrome.
218. Hemophilia, Dwarfism (**1/14** carry the gene), still births/infant deaths and physical deformities are symptoms of **Ellis-van Creveld** syndrome.
219. The average life span for a Sickle Cell Disease sufferer in the US in **1973** was only **14 years.**
220. The average life span for a Sickle Cell Disease sufferer in the US is now **40-60** years.
221. **Sickle Cell disease** was genetically developed to protect against **Malaria.**
222. A relatively unassuming island among the **Adriatic islands** of **Croatia**, **Mljet** is home to one of the rarest diseases in the world.
223. Formally known as **Meleda,** the island was used by the **Republic of Ragusa** from **1358** to **1808** as a quarantine for those suffering from ailments such as **leprosy** or plague.
224. Huntington's disease is also known as **Huntington's chorea.**
225. Huntington's disease is a genetic disorder which results in slowly progressing **brain cell death.**
226. **Retinitis pigmentosa** often results in difficulty seeing at night as well as other forms of partial blindness.
227. Retinitis pigmentosa effects the cells in the **retina**.
228. Retinitis pigmentosa affects as many as **1** in **4,000** people.
229. For years, a remote **Brazilian** town was held up as an example of research conducted by the notorious **Dr. Josef Mengele.**
230. **Candido Godoi** has a twin rate nearly **1,000** percent higher than the rest of the world.
231. The small town of around **6,000** was formed by a small number of families, specifically German immigrants.
232. For the general population, Ellis-van Creveld only occurs in **1** in 60,000 to 200,000 births.
233. Around **200** German immigrants formed the initial settlement in the **18th century.**

Lecture#39

234. **Animal breeding** is a branch of animal science that addresses the evaluation of the genetic value of domestic livestock.
235. A **breed** is a group of domestic animals with a homogeneous appearance, behavior, and other characteristics that distinguish it from other animals.
236. **Pure-breeding** is the mating of rams and ewes of the same breed or type.
237. The goal of **purebred sheep production** is to provide superior genetics to the commercial sheep industry.
238. **Out-breeding** is the mating of animals of the same breed but which have no closer relationship than at least **4 to 6** generations.
239. **Inbreeding** is a system of breeding in which closely related animals are mated.
240. **Linebreeding** is a system of breeding in which the degree of relationship is less intense than in inbreeding and is usually directed towards keeping the offspring related to some highly prized ancestor.
241. **Line breeding** is a mild form of inbreeding.
242. **Crossbreeding** is the mating of rams and ewes of different breed compositions or types.
243. **Crossbreeding** is used extensively in the commercial **sheep** industry and the majority of slaughter lambs are crossbred.
244. **Heterosis** or **hybrid vigor** is the superiority of the crossbred offspring.
245. **Heterosis** is the difference in performance between the crossbred and the average performance of its purebred parents.

Lecture#40

246. **Inbreeding** is the mating of individuals or organisms that are closely related through common ancestry.
247. There are **3** types of Inbreeding.
248. In **Close Inbreeding**, animals are very closely related and can be traced back to **more** than **one** common ancestor.
249. Closest form of inbreeding in domestic animals involves mating between **full brothers and sisters.**
250. **Second closest** form of inbreeding involves mating between **grand-parents** and **grand-offspring**, **half** brothers and sisters.
251. **Mild Inbreeding** involves mating of relatives beyond **2nd** generation and upto **6th** generation.
252. **Line Breeding** means mating animals that are more distantly related which can be traced back to **one** common ancestor.
253. **Line breeding** increases genetic purity amongst the animals of progeny generations.
254. **Inbreeding depression** is the reduced biological fitness in a given population as a result of inbreeding, or breeding of related individuals.

Lecture#41

255. The **intentional breeding** of distantly related or unrelated individuals for the purpose of producing offspring of superior quality is called **out breeding.**
256. There are **three** types of out breeding.
257. **Crossbreeding** is the mating of **two** animals of **different** breeds.
258. Superior traits that results in the crossbred progeny from crossbreeding are called **hybrid vigor** or **heterosis.**
259. **Grading up** is breeding of animals of **two** **different** breeds where the animals 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.
260. **Grading up** is continuous use of purebred sires of the same breed in a grade herd. By **fifth** generation, the graded animals may reach almost purebred levels.
261. Zebra + Any other Equine = **Zebroid**
262. Lion + Tiger = **Liger**
263. Domestic Cattle + American Bison = **Beefalo**
264. **Out Breeding** accidently produce traits that are damaging to the health of the animal.

Lecture#42

265. **Animal migration** is the relatively long-distance movement of individuals, usually on a **seasonal basis.**
266. Some animals may navigate by the position of the **sun and stars.**
267. The **Atlantic Salmon** begins its life in a river and migrates downstream to the ocean.
268. In many species of **crabs**, the females will move into shallow coastal waters to mate and lay her eggs and then they return to deeper ocean waters.
269. **Frogs and toads** often move very short distances to breeding ponds and lakes to lay their eggs.

Lecture#43

270. Many birds make daily movements from their nest in response to environmental forces such as light, darkness temperature, humidity etc. This is called **Daily Migration.**
271. **Local migration** occurs because of heavy rain, flood, excessive cold & hot.
272. **Seasonal migration** is in response to change in the season **tropical & sub-tropical** countries area.

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273. **Seasonal migration** occurs in the **beginning** or **end** of the **warm** season.
274. Birds migrate from the south to the north during **summer** known as **summer visitors.**
275. Most ducks, males and juveniles birds migrate short distances **northward** for moulting leaving behind the females and young birds in breeding ground. This is called **Moult Migration.**
276. In **Cyclic migration**, migration of birds is **seasonal**, but do not occur at regular intervals.
277. **Snowy owl** in search of lemming in US in winter is occurs in **3 – 5** years.
278. All the birds of migratory bird do not leave the native land and hence are always represented by certain individuals. This is called **Partial Migration.**
279. **Finch** and **titmouse** do **Partial Migration.**
280. Sometimes some birds disperse for a short or long distance for the sake of food and safety. The birds can also swept away by powerful wind and hurricanes to very long distance. This is called **Irregular Migration.**
281. **Black stork (*Ciconia nigra*)** and **Glossy ibis (*Plegadis falcinellus*)** do **Irregular Migration.**
282. The birds living at high altitude descends at lower altitude in **winter** to save themselves from intense cold of high altitude. They return again to high altitude with advent of summer. This is called **Altitudinal** or **Vertical Migration.**
283. Resident birds of east Europe and west Asia migrate towards the **Atlantic coast.**
284. Birds living in northern temperate and subarctic zones during summer (getting facilities for nesting and feeding) move towards **south** during **winter**.
285. Some tropical birds migrate during **rainy season** to the outer tropics to breed and return to the central tropics in **dry season.**

Lecture#44

286. Causes of Migration include **Shortage of food** supply on the breeding ground, **Environmental factors**, **Internal factors**, **Photoperiodism** and **Fat deposition.**
287. Change in climate provide **greater** variety in birds' diet.

Lecture#45

288. 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.**
289. One of the largest and most ecologically important migrations occurs along the eastern coast of **South Africa**, the **Sardine Run.**
290. In July, after spawning in the cold waters of the Cape of South Africa millions of sardines migrate north to warmer waters in the **KwaZulu-Natal** coast.
291. During the rainy season October/November millions of **red crabs** living in **Christmas Island** migrate from inland to the coast in order to spawn.
292. The longest migration of all is undertaken by the **Artic Tern bird** which flies between its **Artic and Antartic** breeding grounds each year, a distance of at least **12000 miles/19000 kilometers.**
293. Over the course of its lifetime an Artic Tern can migrate up to **2.4 million** kilometers which is equivalent to around **three** journeys to the **moon** and back.
294. **Monarch butterflies** are not able to survive the cold winters of most of the **United States** so they migrate south and west each **autumn** to escape the cold weather.

Lecture#46

295. In **human beings** gene flow usually comes about through the **actual migration** of human populations.
296. **Gene flow** is the exchange of genes between two **separate** populations.
297. Any time a gene is introduced into a population where that gene once did not exist, **gene flow** has occurred.

298. **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.**
299. Some birds with shorter beaks enter into a population of birds with much longer beaks, resulting in the hatching of birds with **in-between** sized beaks.
300. A bunch of women from **West Africa**, where **malaria** is present, mate with a group of **Europeans.** Their children are less susceptible to contracting malaria due to the presence of **antibodies** from their **West African** mothers.
301. In **vertical gene transfer**, the transfer of genetic material is from **parents** to **offspring**.
302. **Horizontal gene transfer** is known to occur between **different** species, such as between prokaryotes and eukaryotes.
303. There are **three** ways for bacteria to transfer their **DNA** horizontally.
304. **Conjugation** is the transfer of **DNA** directly from one cell to another through cell-cell contact often involving **plasmids**.
305. In, **Transformation**, Bacteria are capable of taking up **DNA** directly from their environment and incorporating it into their genomes known as natural transformation.
306. **Transduction** is the transfer of **DNA** from one cell to another by a virus.

Lecture#47-48

307. **Allopatric speciation** is geographical isolation that doesn't allow population of the **same** species to exchange genetic material.
308. Artificial physical barriers are man-made barriers such as "**The Great Chine Wall".**
309. Gene flow blocked by physical barriers results in **Allopatric speciation.**
310. **Adaptive radiation** in **Darwin Finches** are example of **Allopatric Speciation.**
311. **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.
312. **Maggot Flies** in apple are example of **Sympatric Speciation.**
313. **Allopatric speciation** is speciation that results when a population is separated by a **physical barrier.**
314. **Allopatric Speciation** is also referred to as **geographic speciation.**

Lecture#49

315. In recent years, gene flow has been observed between the **Caucasian** population and the **African-American** population.
316. **African-Americans** are descendants of the natives of **West Africa**, whereas the **Caucasians** are descendants of the natives of **Europe**.
317. The **African-American** population is inherently resistant to **malaria**.
318. **American soldiers** mated successfully with **Vietnamese women**, in the **1960s** and **1970s**, and altered the allele frequency of the **Vietnamese** population.
319. 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.
320. When the **gray wolf** mates with a **coyote**, this may give rise to viable **red wolves.**

Lecture#50

321. In biology, **Extinction** is the dying out or termination of a species.
322. Extinction Rate according to IUCN is: Mammals **(20%)**, Birds **(10-15%)**, Reptiles **(5%)**, Fishes, insects, mollusks, plants **(0-5%)**, Amphibians **(2530%).**
323. **Mass extinction** or **biotic crisis** is a widespread and rapid decrease in the biodiversity on Earth.
324. Biologists suspect we're living through the **sixth** major mass extinction.

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325. Earth has witnessed **five** mass extinctions.
326. Southern white rhinos were thought to be extinct in the late **19th** century.
327. In **1895** a small population of less than **100** individuals was discovered in **KwaZulu-Natal**, **South Africa.**
328. **Sudan**, the "**gentle giant**" who lived in the **Ol Pejeta** conservancy in Kenya, was put down on **Monday 19 March 2018** after the pain from a degenerative illness became too great.
329. There are only **two** female Rhinos left behind on this planet.
330. The passenger pigeon may have once constituted **25 to 40** percent of the bird population.
331. The last passenger pigeon, named "**Martha**" died at age **29** at the **Cincinnati Zoo** in **1914.**

Lecture#51

332. Known causes of extinction since 1600 are: Species introductions **39%**, Hunting **23%**, Habitat Destruction **36%**.
333. Almost half of plant and animal species have experienced local extinctions due to **climate change.**
334. **Rainforest** can disappear in the next **100** years if **deforestation** is not stopped.
335. **13 million hectares** of forest have been converted or destroyed.
336. Coral reefs are also threatened Reefs are home to **25%** of **marine** animal.
337. To date, **27%** of coral reefs have been destroyed.
338. **Marine animals** are exquisitely sensitive to traces of toxic chemicals in lakes, oceans and rivers.
339. **Human hunters** are responsible for wiping out the population of large animals.
340. **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** are some reasons for over-hunting.

Lecture#52

341. **Extinction** of one species can affect other by effecting food chain.
342. The **grizzly bear** is a keystone species.
343. The toxins produced by **dart-poison frogs** in the rain forest have yielded information about how **alkaloid** compounds behave in living organisms.
344. **Bees** are responsible for pollinating more than **250,000** species of plants.
345. "**Colony collapse disorder**" is wiping out entire populations of the insect.
346. From all species, humans rely upon for food **87** rely on pollinators mainly **honeybees**. Only **28** different crops could survive without such assistance.

Lecture#53 – 54

347. More than **99** percent of all species, amounting to over **five billion** species that ever lived on Earth are estimated to be extinct.
348. Estimates on the number of Earth's current species range from **10 million** to **14 million**, of which about **1.2 million** have been documented and over **86 percent** have not yet been described.
349. According to the Center for Biological Diversity, nearly **20,000** species of plants and animals are at a high risk of extinction and if trends continue, Earth could see another mass extinction event within a few centuries.
350. The **West African black rhinoceros** (***Diceros bicornis longipes***) was a subspecies of the **black rhino** that was declared extinct in **2011.**
351. The **Pyrenean ibex (*Capra pyrenaica pyrenaica*)** was a subspecies of the Iberian wild goat that went extinct in **2000.**
352. The passenger pigeon may have once constituted **25 to 40 percent** of the bird population.
353. The last passenger pigeon, named "**Martha,**" died at age **29** at the **Cincinnati Zoo** in **1914.**
354. Known for its **unique stripes**, the **Quagga** was hunted for its hide and killed by ranchers.

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355. The last known **Quagga** died at the **Amsterdam Zoo** in **1883.**
356. Caribbean Monk Seal was last seen in the early **1950s.**
357. The **sea mink (*Neovison macrodon*)** was prized for its **fur** and was hunted to extinction in the second half of the **19th century.**
358. Known as Tasmanian tigers due to their stripes, **thylacines (*Thylacinus cynocephalus*)** were the largest modern **carnivorous marsupial** according to the **Smithsonian Institution**.
359. The Tecopa pupfish was native to the **Mojave Desert** in California and could survive in waters as warm as **108 degrees Fahrenheit.**
360. The **Javan** tiger was a tiger subspecies that likely became extinct in the mid-**1970s.**
361. The last known **Bubal** hartebeest was killed in **Algeria** sometime between **1945** and **1954.**
362. **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**.
363. The first recorded mention of the Dodo bird was by **Dutch** sailors in **1598.**

Lecture#55-56

364. ***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.**
365. ***Adiantum lianxianense*** was a fern species in the subfamily ***Vittarioideae*** of the ***Pteridaceae***. It was endemic to **Guangdong.**
366. **Sterculia khasiana** was a species of plant in the **Sterculiaceae** family. It was an endemic tree of the **Khasi Hills** in **Meghalaya** in **India.**
367. ***Madhuca insignis*** is a species of plant in the ***Sapotaceae*** family. It is endemic to **India.**
368. ***Madhuca insignis*** population has been rediscovered along the banks of the river **Kumaradhara**, in **Dakshina Kannada** region of **Karnataka state, India.**
369. ***Myrcia skeldingii*** was a species of plant in the ***Myrtaceae*** family. It was endemic to **Jamaica.**
370. ***Kokia cookei*** was presumed extinct in the **1950s** when the last seedling died, until **1970** when a single specimen was found.
371. The last specimen of Kokia cookei died **eight** years later in a fire.
372. The **Sigillaria tree** is a tree that doesn't reproduce via seeds, like todays deciduous and coniferous trees do.
373. **Sigillaria** was a spore-bearing, tree-like plant that flourished in the late **Carboniferous period.**
374. ***Araucarioxylon arizonicum*** became extinct between **200** and **250** million years ago.
375. ***Araucarioxylon arizonicum*** could grow as tall as **60** meters.
376. **Saint Helena Olive tree** became increasingly rare in the **19th** century when only **12-15** specimens were recorded on the island.
377. The final wild specimen of Saint Helena Olive Tree died in **1994**, while the last in cultivation died in **2003.**
378. **Wood's Cycad** is endemic to the **oNgoye Forest** of **KwaZulu-Natal**, **South Africa.**
379. Only a cluster of four specimens of Wood's Cycad was ever found (**1895**), and that number fell to a single **three** meter high tree in **1916.**
380. It was that year the Wood's Cycad was removed and sent to the Government Botanist in **Pretoria**, where it later died in **1964.**
381. The last known sighting of Franklinia in its native range was in **1803.**
382. The date of extinction of ***Cyanea superba*** is complicated, as different subspecies of the plant became extinct at varying dates between **1932** and **2002**.

Lecture#57 – 58

383. **Hart's Tongue Fern** is a rare treat for the **eyes.**
384. **Dwarf lake iris** is a miniature iris with showy, deep **blue** flowers.
385. Eastern prairie fringed orchid is **8 to 40** inches tall and has an upright leafy stem with a flower cluster called an **inflorescence**. The **3 to 8** inch lance-shaped leaves sheath the stem.
386. In September **1999** a recovery plan was completed by the **U.S.**
387. Fassett's locoweed is a **4 to 12** inch tall perennial herb of the **pea** family.
388. **Houghton's goldenrod** is a showy goldenrod found only on the northern Great Lakes shoreline of **Lakes Huron** and **Michigan**.
389. Lakeside daisy is a small **herbaceous**, **perennial** plant in the **Aster** family.
390. Northern wild monkshood is noted for its very distinctive, **blue** hood-shaped flowers.
391. **Pitcher's thistle** grows for **five to eight** years before it flowers.

Lecture#59

392. **Cryopreservation** generally involves storage in **liquid nitrogen.**
393. **Cold storage** involves storage in low and **nonfreezing** temperature.
394. Low pressure it involves partially reducing the **atmospheric** pressure of surrounding.
395. Low oxygen storage involves reducing the **oxygen** level but maintaining the pressure.
396. Temperature for Cryo-preservation is typically **-80°C** using solid carbon dioxide or **-196°C** using **liquid nitrogen.**
397. Cryopreservation can be done at: Over solid carbon dioxide **(at -79 degree)** or Low temperature deep freezer **(at -80 degree)** or in vapor phase nitrogen **(at -150 degree)** or in liquid nitrogen **(at -196 degree)**.

Lecture#60

398. A **cryoprotectant** is a substance used to protect **biological tissue** from freezing damage.
399. In **Slow Freezing-Slow thawing** method, organs are labeled into vials after equilibration with a **cryoprotectant** solution and then cooled at rate of **0.5-2°C** per minute down to **-1°C.**
400. Seeding is then induced and a holding period of **5 to 15** minutes allows equilibration of the temperature.
401. In Slow Freezing-Slow thawing method, embryos are cooled to **-60°C** or lower at a rate of **0.3** to **0.5°C** per minute before being transfer to **liquid nitrogen.**
402. Frozen embryos must be slowly thawed at a rate of less than **25°C** per minute to prevent osmotic shock.
403. In Rapid cooling and rapid thawing technique, cooling is terminated at **-30 to -40°C** and embryos are then plunged into liquid nitrogen for rapid cooling to **-196°C.**
404. Thawing is therefore performed rapidly **(200 to 500°C per minute)** to prevent **recrystallization**.
405. **Vitrification** is the process of cooling where the water in the tissue becomes **glass** rather than **crystals.**
406. In **Ultra rapid Freezing** technique, serial equilibration of embryos in high concentration of **DMSO (3-5 M)** supplemented with **sucrose (0.3 to 0.5 M).**
407. In Ultra rapid Freezing technique, thawing is then done with warm water bath **(approximately 500°C per minute).**