

Processes subvital 4.  
vital 5. super vital in



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Processes that increase the rate of changes in DNA are called mutagenic. These chemicals promote errors in DNA replication, often by interfering with the structure of base pairing while U V radiation induces mutations by causing damage to DNA structure. Mutation: Sudden heritable changes in the characters of organism. Mutants: Individual showing mutational changes. Mutant allele: The allele producing the changed phenotype variant. Mutation is the ultimate source of all the Genetic variation.

Historical: Seth Wright (1791): Male lamb with unusually short legs. Hugo de vries (1900): The term mutation was introduced sudden heritable changes observed by him is another contribution. Morgan (1910): White eye mutant of drosophila. H. J. Muller (1927): Mutagenic action of X-rays in drosophila.

Characteristics: i. Generally mutant alleles are recessive. ii.

Random events. iii. Most have harmful effects. iv.

Recurrent in nature. v. Occurs at very low frequencies.

vi. Mutable genes. vii. Mutable genes. viii. Highly mutable sites within a gene - hot spots. ix.

Rate of induced mutation varies from one gene to the other. x. Most Mutant alleles are pleiotropic. xi. Occurs in both forward and reverse directions.

Classification: a.

The direction of Mutation 1. Forward 2. Reverse b. Cause of Mutation 1.

Spontaneous 2. Induced c. Dominance Relationship 1. Dominance Mutation 2. Recessive Mutation 3. Co dominant (blood group) 4. Partially dominant.

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d. Tissue of Origin 1. Somatic Mutation (bud mutation) 2. Germinal Mutation  
e. Effect on survival 1.

Lethal 2. Sublethal 3. Subvital 4. Vital 5.

Super vital In crop improvement > Vital and Super Vital f. Type of Trait  
Affected 1. Visible Mutation 2. Character Mutation g. Intensity of Character  
Expression 1. Amorphic 2. Hypomorphic 3. Isoallelic 4.

Hyper morphic h. Quantum of Morphological Effect Produced 1. Macro  
mutation 2. Micro Mutation i. Effect on the Expression of Neighbouring genes  
1. Polar Mutation 2. Non polar Mutation j. Cytological Basis 1.

Chromosomal Mutation 2. Gene Mutation 3. Cytoplasmic Mutation k.  
Molecular basis 1. Base substitution 2. Deletion 3. Addition l. Type of Amino  
Acid Replacement in the polypeptide 1.

Missense 2. Non sense 3. Frame shift Change in base sequence of DNA  
molecule occurs in two ways: 1. Base substitution 2. Base addition and  
deletion Base Substitution: When one base in DNA molecule is replaced by  
another one.

2 types: (i) Transition (ii) Transversion (i) Transition: Purine is replaced by  
another purine e. g. Adenine is replaced by Guanine. A <-----> G One  
base substitution affects the base sequence of only one codon as a result  
only amino acid is altered in the concerned protein. (ii) Transversion:  
Pyrimidine (Thymine and Cytosine) is replaced by a purine (adenine and  
guanine) A <---> T are base substitution affects the base sequence of only  
one codon as a result, only one amino acid is altered in the concerned

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protein. Base Addition and Deletion Base Addition: Insertion of one or more bases in a DNA molecule. Base Deletion: Loss of one or more bases in a DNA molecule.

Mutator Gene: Some genes increase the frequency of spontaneous mutation of other genes located in the same cell. Anti Mutator Gene: Some genes decrease the frequency of spontaneous mutation of other genes located in the same cell. Mutagens: Also, Refer to Chapter 4, Article No.

4. 3. 4 Applications in Crop Improvement: 1. Development of Improved Varieties: Wheat - Sarbati Sonora, Pusa Lerma Rice - Jagannath Tomato - Pusa Lal, Meeruti Cotton -MCU7, MCU10 Sugarcane - Co8152, 8153 2.

Induction of Male Sterility: Genetic male sterility has been induced in durum wheat using radiations. 3. Production of haploids: Use of X rays radiated pollen in production of haploids in many crops.