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## UNIT VII: Genetics

## Chapter 2

## Classical Genetics

### 1. What are the Contrasting Traits Studied by Mendel in Pea?

| S.No | Characters | Contrasting Traits |
|---|---|---|
| 1 | Stem height | Tall/dwarf |
| 2 | Flower colour | Violet/white |
| 3 | Flower position | Axial/terminal |
| 4 | Pod shape | Inflated/constricted |
| 5 | Pod colour | Green/yellow |
| 6 | Seed shape | Round/wrinkled |
| 7 | Seed colour | Yellow/green |

### 2. Define Genes?

Functional Units of inheritance: The basic unit of heredity (biological information) which transmits biochemical, anatomical and behavioural traits from parents to off springs.

### 3. Short notes on Variation?

The organisms belonging to the same natural population or species that shows a difference in the characteristics is called variation.

Variation is of **two** types

(i) Discontinuous variation and (ii) Continuous variation.

### 4. Different between the continuous and Discontinuous variation?

| Continuous variation | Discontinuous variation |
|---|---|
| This variation may be due to | Discontinuous variation, the |

| | |
|---|---|
| the combining effects of environmental and genetic factors. | characteristics are controlled by one or two major genes which may have two or more allelic forms. These variations are genetically determined by inheritance factors. |
| Inheritance of phenotype is determined by the combined effects of many genes, (polygenes) and environmental factors. | The phenotypic expression is unaffected by environmental conditions. |
| **Example**: Human height and skin colour. | **Example**: Style length in *Primula*, plant height of garden pea. |

**5. What are the Importance of variations?**

• Variations make some individuals better fitted in the struggle for existence.

• They help the individuals to adapt themselves to the changing environment.

• It provides the genetic material for natural selection

• Variations allow breeders to improve better yield, quicker growth, increased resistance and lesser input.

• They constitute the raw materials for evolution.

**6. Explain the Principles or Laws of Inheritance?**

Based on his observations on monohybrid crosses Mendel proposed two general rules to consolidate his understanding of inheritance in monohybrid crosses. Today these rules are called the **Principles or Laws of Inheritance.**

**7. List out the Law of Dominance?**

(i) Characters are controlled by discrete units called **factors**.

(ii) Factors occur in pairs.

(iii) In a dissimilar pair of factors one member of the pair dominates (dominant) the other (recessive).

The law of dominance is used to explain the expression of only one of the parental characters in a monohybrid cross in the F1 and the expression of both in the F2. It also explains the proportion of 3:1 obtained at the F2.

**8. Define alleles?**

Mendel noticed two different expressions of a trait – Example: Tall and dwarf.

Traits are expressed in different ways due to the fact that a gene can exist in alternate forms (versions) for the same trait is called **alleles.**

**9. Short notes on the Gene interaction?**

A single phenotype is controlled by more than one set of genes, each of which has two or more alleles. This phenomenon is called Gene Interaction.

**10. Short notes on the Trihybrid cross?**

The trihybrid cross demonstrates that Mendel's laws are applicable to the inheritance of multiple traits.

Mendel Laws of segregation and independent assortment are also applicable to three pairs of contrasting characteristic traits called trihybrid cross.

**11. Explain the Cytoplasmic male sterility?**

- Male sterility found in pearl maize (*Sorgum vulgare*) is the best example for mitochondrial cytoplasmic inheritance. So it is called **cytoplasmic male sterility**.
- In this, male sterility is inherited maternally.
- The gene for cytoplasmic male sterility is found in the mitochondrial DNA.

**12. Short notes on homozygous and heterozygous?**

An individual has two identical alleles of a gene, it is called as **homozygous (TT)**.

An individual with two different alleles is called **heterozygous (Tt)**.

**13. Short account on Gene interaction?**

A single phenotype is controlled by more than one set of genes, each of which has two or more alleles. This phenomenon is called Gene Interaction.

**14. What is Trihybrid cross?**

The trihybrid cross demonstrates that Mendel's laws are applicable to the inheritance of multiple traits.

Mendel Laws of segregation and independent assortment are also applicable to three pairs of contrasting characteristic traits called trihybrid cross.

(Or)

A cross between homozygous parents that differ in three gene pairs (i.e. producing trihybrids) is called trihybrid cross.

**15. Define Lethal genes?**

An allele which has the potential to cause the death of an organism is called a "Lethal Allele".

**16. Explain the Pleiotropic gene?**

In Pleiotropy, the single gene affects multiple traits and alter the phenotype of the organism.

The Pleiotropic gene influences a number of characters simultaneously and such genes are called pleiotropic gene.

**17. What is Mitochondrial Inheritance or cytoplasmic male sterility?**

Male sterility found in pearl maize (*Sorgum vulgare*) is the best example for mitochondrial cytoplasmic inheritance.

So it is called **cytoplasmic male sterility**.

In this, male sterility is inherited maternally.

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