DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

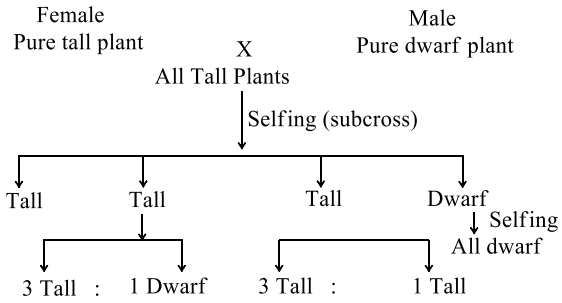
Subject : BIOLOGY
DPP No. : 3

Topic :- Principles of Inheritance & Variations

1 **(a)**

$\frac{1}{4}$ th and $\frac{3}{4}$th.

Mendel cross-pollinated a pure tall pea plant (100-120 cm hight) and a pure dwarf pea plant. (only 22 to 44 cm hight). He called them parental generation, expressed now-a-days by symbol P. This hybridization popularly called as monohybrid cross



This three generations of pea plants after crossing a pure tall plant with a dwarf one. The plants of F_1-generation are all tall, of F_2-generation three tall and one dwarf. One third of the tall plants are pure, while the remaining behave as hybrids

F_1-generation Seeds collected from the parental generation called first filial generation or F_1-generation

F_2-generation F_1-plants pollinated among them self (self breeding or inbreeding) and seed produced by F_1-plants called F_2-generation. They were in ratio 3:1 (three tall and one dwarf).

F_3-generation Mendel allowed F_2-plant to form seed by self-pollination called F_3-generation. Mendel observed that tall and dwarf plant behave differently

(i) Dwarf plant produced dwarf plant on self-pollinated

(ii) In tall plants one third plants breed true so they were pure

(iii) Other two third plant behave like parents and give tall to dwarf plants 3 : 1 indicate that their parents have dwarf genes also

2 **(b)**

Night blindness is nutritional deficiency disease generally happens due to deficiency of vitamin-A

3 **(a)**

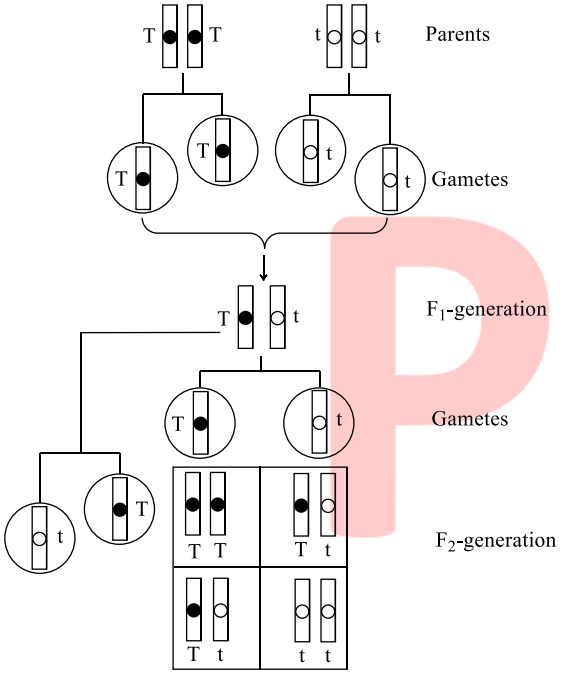
The genotypic ratio of monohybrid cross is 1 : 2 : 1, whereas the phenotypic ratio is 3 : 1.

9 : 3 : 3 : 1 is the phenotypic ratio of dihybrid cross (the cross made to study the inheritance of two pairs of factors or alleles of two genes).

4 **(c)**

Chromosomal Theory of Inheritance

Walter Sutton and Theodore Boveri noted that the behavior of chromosomes was parallel to the behaviour of genes and used chromosome movement to explain Mendel's laws.



Law of segregation interpreted on the basis of genes or factors (solid and hollow) situated on two homologous chromosomes.

Comparison between the Behaviour of Chromosomes and Genes

Chromosomes	Genes
Segregate at the time of gamete formation such that only one of each pair is transmitted to a gamete	Segregate of gamete formation and only one of each pair is transmitted to a gamete
Independent pairs segregate	One pair segregates

independently of each other	independently of another pair

Sutton and Boveri argued that the pairing and separation of a pair of chromosomes would lead to the segregation of a pair of factors they carried. Sutton united the knowledge of chromosomal segregation with Mendelian principles and called it the chromosomal theory of inheritance. Experimental verification of chromosomal theory of inheritance was given by Thomas Hunt Morgan. Morgan worked with tiny fruitfly (*Drosphila melanogaster*)

5 **(b)**

The females have **homozygous** XX sex chromosomes, while males have **heterozygous** XY-chromosome. Y-chromosome is shorter than X-chromosome.

6 **(b)**

The **Down's syndrome** (Mongolian idiocy) arises due to **trisomy** of **21st chromosome**, *i.e.*, total 47 chromosomes will present in such person. The main features are mental deficiency, short stature, round face, flaccid muscles, protruding tongue, etc.

7 **(a)**

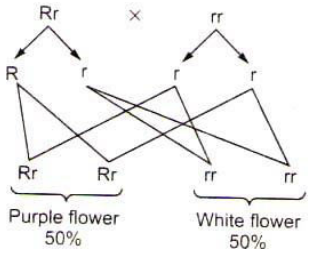
ZW-ZZ system of sex determination occurs in certain insects (gypsy moth) and vertebrates such as fishes, reptiles and birds and plants such as *Fragaris elatior*.

8 **(a)**

The Sudden and heritable change in the genetic make up of an individual is called **mutation**. The term mutation was introduced by Hugo de Vries.

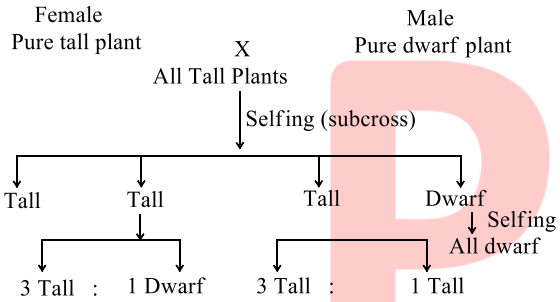
9 **(c)**

According to law of purity of gametes, when the gametes are formed, they carry only one allele of the gene considered.



10 **(d)**

The recessive trait shown by F_2 and F_3-generation both but firstly it was observed in F_2-generation. Mendel cross-pollinated a pure tall pea plant (100-120 cm hight) and a pure dwarf pea plant. (only 22 to 44 cm hight). He called them parental generation, expressed now-a-days by symbol P. This hybridization popularly called as monohybrid cross



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11 **(a)**
A-A; B-Genetic disorders

12 **(a)**
Heredity (L. *Hereditas* – Heirship or inheritance) is the transmission of genetically based characters from parents to their offspring.
The process by which characters are transferred from one generation to the next generation is called inheritance

13 **(c)**
Huntington's chorea is a fatal disease of man. It is characterized by uncontrolled jerking of body and progressive degeneration of central nervous system. The mean age for the onset of these symptoms is between 35 to 40. This disease is caused by an autosomal dominant gene.

14 **(d)**
Movement of chromosomes towards poles requires centromere.

15 **(a)**
Klinefelter's syndrome is represented by 44 autosomes + XXY.

17 **(a)**
Man has only one X-chromosomes that is inherted to has daughter. Therefore, a heredftary disease, which is X-chromosomal linked, is never passed on from father to son.

19 **(a)**
Chromosomal theory of linkage states that
(i) Linked gene present on same chromosome
(ii) They lie in linear sequence in chromosome
(iii) There is tendency to maintain the parental combination
(iv) Strength of linkage between two gene is inversely proposal to the distance of two gene and *vice-versa*

20 **(c)**

In the diploid organism (plants and animals) the chromosome or DNA number becomes double just before the cell division

ANSWER-KEY										
Q.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A.	**A**	**B**	**A**	**C**	**B**	**B**	**A**	**A**	**C**	**D**
Q.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A.	**A**	**A**	**C**	**D**	**A**	**A**	**A**	**C**	**A**	**C**