''बेटी बचाओ, बेटी पढ़ाओ''

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

(Format for Preparing E Notes)

Faculty of FEM

Faculty Name- **JV'n Anupama Goyal (Associate Professor)**

Program- M. Sc BOTANY IST/Semester / 23

Course Name - Cytogenetics

Session No. & Name – 1.4/ 2023

Academic Day starts with –

- Greeting with saying **'Namaste'** by joining Hands together following by 2-3 Minutes Happy session, Celebrating birthday of any student of respective class and **National Anthem**.

Lecture Starts with-

Review of previous Session- …….

- Topic to be discussed today- Today We will discuss about ……MENDELS LAWS……...
- deliverance (ICT, Diagrams & Live Example)-
  - PPT (10 Slides)
  - DiagramsLessn

Introduction & Brief Discussion aboutthe Topic

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Mendels Laws

Mendel laid the foundation of the science of genetics through the discovery of basic principles of heredity. He conducted his experiments with garden pea (pisumsativum) in a small monastery garden for over seven years (1856-1864) and discovered two important laws of heredity, viz., 1. law of segregation, and 2. law of independent assortment. These are briefly presented below.

Law of Segregation:

This law states that alleles segregate or separate from each other during gamete formation and pass on to different gametes in equal number. In other words, when alleles for two contrasting characters come together in a hybrid, they do not blend, contaminate or affect each other while together.

Thus main features of this law are as follows:

i. When a dominant and a recessive allele of a gene come together in a hybrid after crossing between two plants having contrasting characters, they do not mix or blend together.

ii. They remain together in pure form without affecting each other. For this reason, law of segregation is also known as law of purity of gametes.

iii. They separate into different gametes in equal number. Each gamete has only one type of allele (say either A or a).

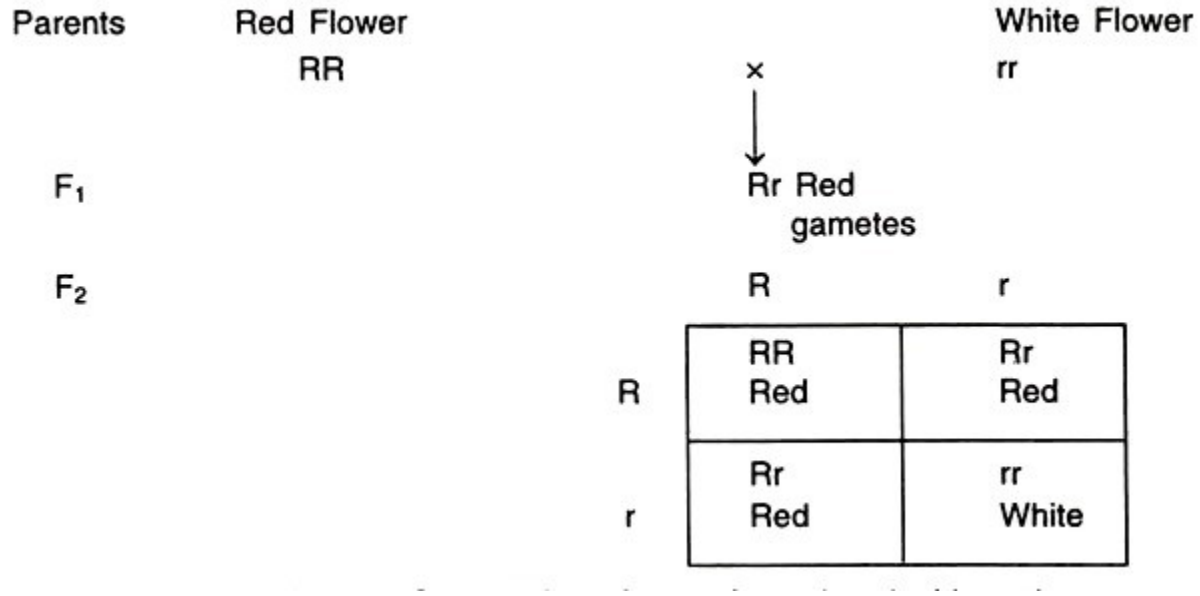
iv. Separation of two alleles of a gene during gamete formation takes place usually due to the separation of homologous chromosomes during meiosis (anaphase 1), because alleles are located in the chromosomes.

v. With complete dominance, segregation leads to phenotypic ratio of 3 : 1 in F_2 for characters governed by single gene, and 9:3:3:1 ratio for characters controlled by two genes.

Example:

When we make a cross between red (RR) and white (rr) flowered plants, we get red colour of flower in F_1. In the F_1 both the alleles R and r remain together without blending or mixing with each other, though only the effect of dominant allele is visible. In F_2, allele for red flower colour and white flower colour segregate during gamete formation and pass on to the gametes in equal number.

Thus two types of gametes, viz., R and r are formed. Each gamete has either R or r allele. When the F_1 is self-pollinated, individuals with three genotypes, viz., RR, Rr and rr are obtained in F_2. Here RR and Rr are all red and only rr individuals are white (Fig. 7.1). Thus a phenotypic ratio of 3 red: 1 white is obtained. The overall mechanism is represented below.



When selfed seeds of RR were grown in F_3, they all produced all the true breeding individuals for red flower colour. The Rr individuals showed segregation in F_3 similar to segregation in F_2 generation. Individuals with rr genotypes were found true breeding for white flower colour when their selfed seeds were raised in F_3 generation.

II. Law of Independent Assortment:

This is the second law of inheritance discovered by Mendel. This law states that when two pairs of gene enter in F_1 combination, both of them have their independent dominant effect. These genes segregate when gametes are formed, but the assortment occurs randomly and quite freely.

Thus main features of this law are given below:

(i.) This law explains simultaneous inheritance of two plant characters.

(ii.) In F_1 when two genes controlling two different characters, come together, each gene exhibits independent dominant behaviour without affecting or modifying the effect of other gene.

(iii) These gene pairs segregate during gamete formation independently.

(iv.) The alleles of one gene can freely combine with the alleles of another gene. Thus each allele of one gene has an equal chance to combine with each allele of another gene.

(v.) Each of the two gene pairs when considered separately, exhibits typical 3 : 1 segregation ratio in F_2 generation. This is a typical monohybrid segregation ratio.
(vi.) Random or free assortment of alleles of two genes leads to formation of new gene combinations.

Example:
When plants of garden pea with yellow round seeds are crossed with plants having green wrinkled seeds, we get yellow round seeds in F_1. Thus yellow colour of seed exhibits dominance over green and round seeds shape over wrinkled independently.
The F_1 produces four types of gametes, viz., yellow round (YR), yellow wrinkled (Yr), green round (yR), and green wrinkled (yr). Selfing of F_1 gives rise to all above four types of individuals in 9 : 3 : 3 : 1 ratio

Parents		Yellow Round YYRR	×	Green Wrinkled yyrr	
		↓			
F_1		YyRr Gametes		yellow round	
		YR	Yr	yR	yr
F_2	YR	YYRR	YYRr	YyRR	YyRr
	Yr	YYRr	YYrr	YyRr	Yyrr
	yR	YyRR	YyRr	yyRR	yyRr
	yr	YyRr	Yyrr	yyRr	yyrr

- University Library Reference-

➢ …….. Journal

➢ Online Reference if Any.

- Suggestions to secure good marks to answer in exam-

➢ Explain answer with key point answers

- Questions to check understanding level of students-
- Small Discussion About Next Topic-
- Academic Day ends with-

National song**' Vande Mataram'**