



# LAKSHYA



## NEET 2026 BATCH

**Botany**

**Principles of Inheritance  
and Variation**

**Lecture No- 01**

**Rupesh Chaudhary Sir**



# Topics *to be covered*

1

BASIC concepts

RULE

- ★ Discipline
- ★ आज NCERT नहीं  
खोलेंगे
- ★ FOCUS.

2

3

4

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# BASIC TERMINOLOGY / CONCEPTS USED IN GENETICS

GENETICS : STUDY OF HEREDITY AND VARIATION.

HEREDITY : TRANSMISSION OF CHARACTER FROM PARENT TO OFFSPRING (ONE GENERATION TO ANOTHER)

VARIATION : THE DIFFERENCE SHOWN BY PROGENY / OFFSPRING WHICH WERE ABSENT IN PARENTS.

FATHER OF GENETICS: GREGOR JOHANN MENDEL.

TERM GENETICS : BATESON

INHERITENCE : PROCESS BY WHICH CHARACTER TRANSFER FROM PARENT TO OFFSPRING.

SPERM  
EGG } → DNA → CARRY CHARACTER.

DIPLOID :

HUMAN CELL (SKIN): 46 CHROMOSOME (23 PAIRS)

TWO COPY OF SAME CHROMOSOME

HAPLOID

ONE COPY OF EACH CHROMOSOME

eg: gametes (sperm/egg)

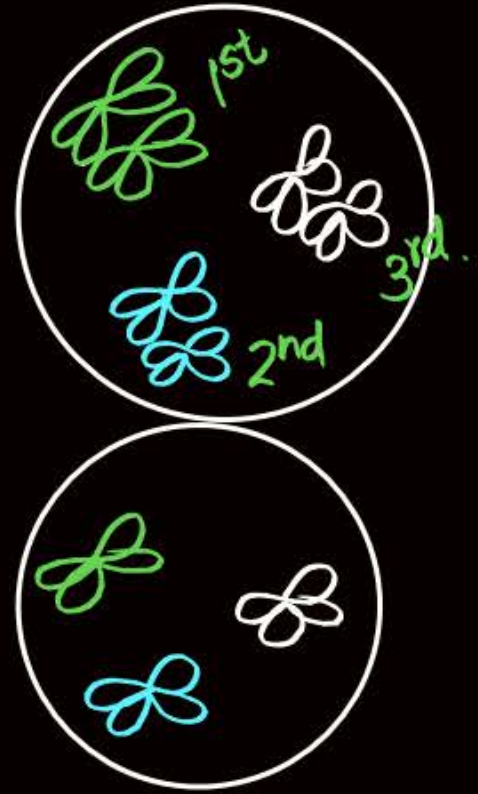
CHROMOSOME NO. BECOMES HALF: (23)

HOMOLOGOUS CHROMOSOME

\* CHROMOSOME OF SAME PAIR

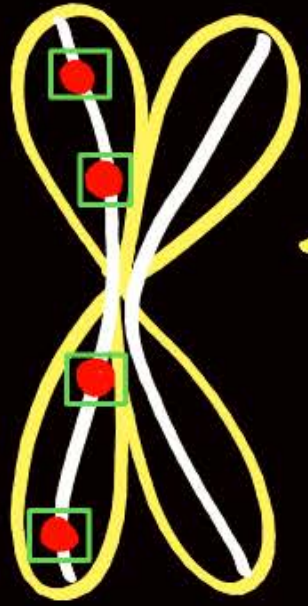
NON-HOMOLOGOUS CHROMOSOME

\* CHROMOSOME OF DIFFERENT PAIR



## GENE:

SEGMENT OF DNA WHICH CONTROL  
ONE PARTICULAR CHARACTER.



4 GENE :  
4 CHARACTER.

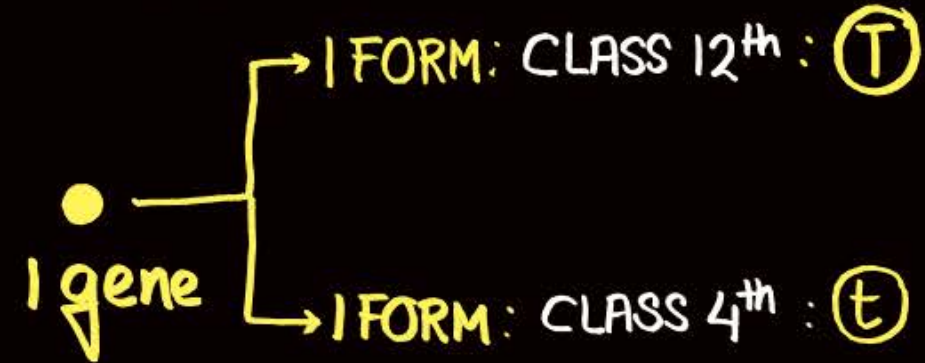
TERM GENE: JOHANSENN.

TERM FACTOR: MENDEL.



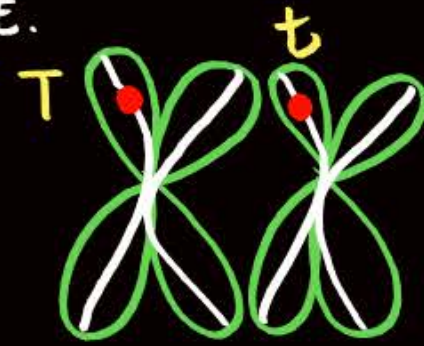
## ALLELE

ALTERNATE FORM OF ONE GENE/SAME GENE.



★ ONE GENE HAS TWO ALLELE

CASE - ①



HOMOLOGOUS CHROMOSOME  
(ALLELE PRESENT ON SAME LOCUS/SAME SITE/HOMOLOGOUS SITE ON HOMOLOGOUS CHROMOSOME.)

$$2n = Tt$$

(T) : DOMINANT ALLELE  
(ताकनवर)

(t) : RECESSIVE  
(कमजोर)

(T) : TALL TRAIT

(t) : DWARF TRAIT

$$2n : Tt$$

TALL ✓

ONLY 'T' WILL EXPRESS AND 't' WON'T EXPRESS

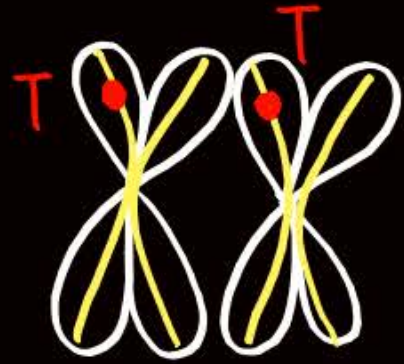
★ IF BOTH ALLELE ARE DISIMILAR/DIFFERENT ON HOMOLOGOUS CHROMOSOME: **HETEROZYGOUS CONDITION.**

$$2n : Tt$$

★ ONE GENE: ONE CHARACTER (PLANT HEIGHT), TWO TRAIT (TALL & DWARF)

★ SEED COLOUR (1 CHARACTER) — { YELLOW  
GREEN (TRAIT)

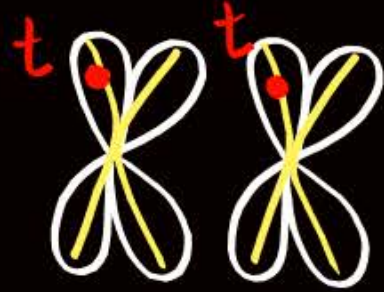
### CASE-(2)



$2n: TT$  TALL TRAIT

IF BOTH ALLELE ARE  
SAME ON HOMOLOGOUS  
CHROMOSOME :  
HOMOZYGOUS  
CONDITION.

### Case-(3)



$2n: tt$  DWARF TRAIT

IF BOTH ALLELE ARE  
SAME ON HOMOLOGOUS  
CHROMOSOME :  
HOMOZYGOUS  
CONDITION.

NOTE: TERM ALLELE, HOMOZYGOUS, HETEROZYGOUS :

**BATESON**



## CONCLUSION FROM CASES.

		EXPRESSION	TRAIT
① $2n: TT$	HOMOZYGOUS	DOMINANT ALLELE	TALL
② $2n: tt$	HOMOZYGOUS	RECESSIVE ALLELE	DWARF
③ $2n: Tt$	HETROZYGOUS	DOMINANT ALLELE	TALL

## TRUE / FALSE

- Q. DOMINANT ALLELE EXPRESS IN HOMOZYGOUS COND<sup>N</sup>: TRUE
- Q. DOMINANT ALLELE EXPRESS ONLY IN HOMOZYGOUS COND<sup>N</sup>: FALSE
- Q. DOMINANT ALLELE EXPRESS BOTH IN HOMO & HETRO COND<sup>N</sup>: TRUE
- Q. RECESSIVE ALLELE EXPRESS IN HOMOZYGOUS COND<sup>N</sup>: TRUE
- Q. RECESSIVE ALLELE EXPRESS ONLY IN HOMOZY COND<sup>N</sup>: TRUE
- Q. RECESSIVE ALLELE EXPRESS BOTH IN HOMO & HETRO COND<sup>N</sup>: FALSE
- Q. DOM. ALLELE EXPRESS IN PRESENCE OF ITS IDENTICAL ALLELE: TRUE
- Q. DOM. ALLELE EXPRESS<sup>ONLY</sup> IN PRESENCE OF ITS IDENTICAL ALLELE: FALSE
- Q. DOM. ALLELE EXPRESS IN PRESENCE OF BOTH IDENTICAL & NON IDENTICAL ALLELE (TRUE)
- Q. RECESSIVE ALLELE ONLY EXPRESS IN PRESENCE OF IDENTICAL ALLELE (TRUE).
- Q. RECESSIVE ALLELE EXPRESS IN PRESENCE OF NON-IDENTICAL ALLELE (FALSE).



# MENDELISM

- ① GREGOR JOHAN MENDEL WORKED ON GARDEN PEA (PISUM SATIVUM).
- ② 20 JULY 1822, AUSTRIA AUGUTINIAN MONASTERY.
- ③ HE WORKED FOR 7 YEARS (1856-1863).
- ④ HE STUDIED SEVEN CHARACTER OR 14 TRAITS / 7 PAIR OF TRAIT

WHY DID HE WORK ON PEA PLANT

- ① EASY TO CULTIVATE
- ② ANNUAL PLANT / SHORT LIFESPAN.
- ③ CAN PRODUCE MORE OFFSPRING IN SHORT TIME
- ④ SO MANY CONTRASTING / OPPOSITE TRAIT IN PEA WHICH HELPS TO UNDERSTAND CONCEPT OF DOMINANT & RECESSIVE ALLELE
- ⑤ BISEXUAL (NATURALLY SELF POLLINATION PRESENT.
- ⑥ CROSS POLLINATION CAN BE PERFORM BY USING EMASCULATION & BAGGING TECHNIQUE.

CHARACTER	DOMINANT TRAIT	RECESSIVE TRAIT
① PLANT HEIGHT	TALL (T)	DWARF. (t)
② SEED COLOUR	YELLOW (Y)	GREEN. (y)
③ SEED SHAPE	ROUND (R)	WRINKLED (r)
④ FLOWER COLOUR	VIOLET	WHITE
⑤ POD COLOUR	GREEN	YELLOW
⑥ POD SHAPE	FULL / INFLATED 	CONstricted 
⑦ FLOWER POSITION	AXILIARY	TERMINAL



~~T~~ Tall, ~~T~~ Terminal position, ~~R~~ Round shape,  
~~D~~ yellow colour seed, ~~D~~ Dwarf,  
green seed colour, ~~R~~








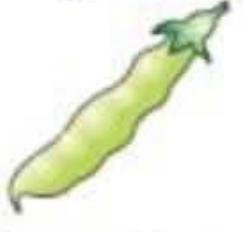

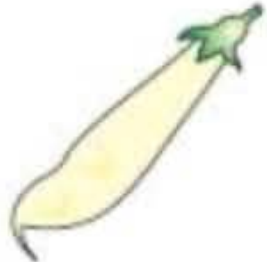



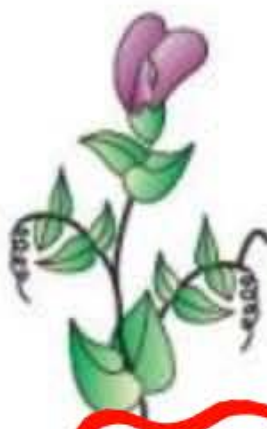
Q. How many Trait express **ONLY** IN Homozygous CONDITION.

Recessive: **(3)**

Q. How many Trait express in Homozygous Condition.

**All**

Q. How many TRAIT express in HETEROZYGOUS  
Dominant: **(3)**

Character	Dominant trait	Recessive trait		
Seed shape	 <u>Round</u> ✓	 <u>Wrinkled</u> ✓		
Seed colour	 <u>Yellow</u>	 <u>Green</u>		
Flower colour	 <u>Violet</u>	 <u>White</u>		
Pod shape	 <u>Full</u>	 <u>Constricted</u>		
Pod colour	 <u>Green</u>	 <u>Yellow</u>		
			Flower position	
			 Axial	 Terminal
			 <u>Tall</u>	 <u>Dwarf</u>
			Stem height	

**Figure 4.1** Seven pairs of contrasting traits in pea plant studied by Mendel



**THANK**  
*You*

