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In a homozygote (SS), the probability of producing a S gamete is 1.

In a heterozygote (Ss), the probability of producing a S gamete is $\frac{1}{2}$ and s gamete is also $\frac{1}{2}$.

Now consider F₂ generation.

Here the probability of getting SS is $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ i.e. 25% are homozygous dominant.

The probability of getting ss is $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ i.e. 25% homozygous recessive.

Adding probabilities: Pro. What is the probability of getting Ss and sS?

Probability of Ss (S from sperm & s from egg) = $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

Probability of sS (s from sperm & S from egg) = $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

Both Ss & sS are heterozygotes having same phenotype. Hence added probability is $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$ i.e. 50% will be heterozygotes.

DIHYBRID CROSS

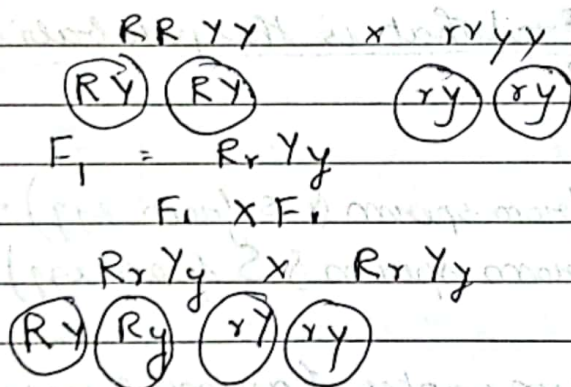
- Mendel crossed a pea plant producing round yellow seeds with one producing green and wrinkled seeds of pure breed variety.
- In F₁ generation plants so obtained producing only round yellow seeds.
- F₁ were allowed for self-pollination to get F₂

- In F_2 , 4 different types of plants were produced: a) Round yellow b) Round green c) Wrinkled yellow d) Wrinkled green.
- Phenotype ratio of 4 types were 9:3:3:1

Dihybrid cross: examination of 2 separate traits in a single cross.

- for example: $RRYY \times rryy$

The F_1 generation of a dihybrid cross ($RrYy$) shows only the dominant phenotypes of each trait.



$AABB \times aabb$

↓
 $AaBb$ F_1 generation

	AB	Ab	aB	ab	
AB	AABB	AABb	AaBB	AaBb	F ₂ Generation
Ab	AABb	AAbb	AaBb	Aabb	
aB	AaBB	AaBb	aaBB	aaBb	
ab	AaBb	Aabb	aaBb	aabb	

Now what is the probability of getting an
 SS homozygote? i.e. $\frac{1}{4}$
 heterozygote (Ss or sS) is $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$.

The added probability (i.e. spherical seed) = $\frac{3}{4}$

The probability of yellow seed = $\frac{3}{4}$

The probability of spherical yellow seed = $\frac{3}{4} \times \frac{3}{4}$
 = $\frac{9}{16}$

(Since both events are independent).

Probability of yellow seed = $\frac{3}{4}$

Probability of wrinkled seed = $\frac{1}{4}$

Hence added probability = $\frac{3}{4} \times \frac{1}{4} = \frac{3}{16}$

Wrinkled yellow = ~~3/16~~ $\frac{3}{16}$

Wrinkled green = $\frac{1}{16}$

PRINCIPLE OF INDEPENDENT ASSORTMENT (MENDEL'S 2nd Law)

The factors for two or more pairs of
 contrasting characters are distributed independently
 of one another at the time of gamete formation.

In a dihybrid cross, the alleles of each gene
 assort independently.

DIHYBRID TEST CROSS

A dihybrid test cross involves crossing of F1
 dihybrid with a double recessive parental
 type. $RrYy (F_1) \times rryy (P)$

	YR	yr	Yr	yR
yr	YyRr	yyrr	Yyrr	yyRr

Genotypic and Phenotypic ratio is 1:1:1:1

Q. Pure strain of mice with brown fur X grey fur. F₁ we got only brown colour. Then F₁ X F₁. What is dominant trait? Phenotypic, genotypic ratio?

Ans: Dominant - Brown
Phenotypic - 3:1
Genotypic - 1:2:1

Q. Mice having Black, Long X White, short
F₁ - Black short.

F₂ - 9:3:3:1

↓ ↓ ↓ ↓
 Black Black ~~Black~~ White
 short long ~~short~~ long
 white short