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I'm going to explain di hybrid cross from the unit Mendelian genetics and its extension. Outlines of this module di hybrid cross examples, law of independent assortment. Test cross.

At the end of this module you can explain dihybrid cross state and illustrate law of independent assortment. Understand the concept of test cross..

Dihybrid cross is a cross between two purebred individuals having homozygous genotype and differ in two pairs of contrasting characters belonging to two traits. One parent is homozygous for two alleles and the other parent is homozygous for other two alleles. For example capital, Y capital Y, capital R Capital R small y small y small r and small r or dihybrid cross is a genetic mix between two homozygous individuals of opposite phenotypes for two genetic traits that is, a cross between yellow, green and round wrinkled.

Or dihybrid cross is a cross between two individual parents that differ in two pairs of contrasting characters For the gamete formation In a di hybrid heterozygous condition, follow the mnemonic FOIL

F stands for the First Capital Y and Capital R. In red colour, O stands for the outside capital. Y and small r in the green colour, I stands for the inside small y and capital R in orange. and L stands for the last that is y and small r factors in a locus .or another method for gamete formation in a F one di hybrid cross is.

Since alleles of different traits distribute equally .First take colour trait yellow capital Y small y in heterozygous condition distribute to 4 gametes. equally that is capital Y capital Y small y small y .

Next take another trait the shape of the seed round capital R small r in heterozygous condition.

Distribute to four gametes equally that is capital. Y capital R, capital Y small r small y capital R

Small Y small r. This is the easy way of making the gametes of F one di hybrid cross.

Coming to examples of dihybrid cross.

Mendel performed a cross between yellow round and green wrinkled pea plants; in F1 progeny he received all the plants with yellow and round characters. So yellow is dominant over the green

Round is dominant over the wrinkled. For the Genotype, Mendel has taken capital Y capital Y capital

R Capital R as a Genotype for yellow round, small y small y small r smaller r as Genotype for green wrinkled. And in F2 progeny To get the phenotypic ratio it is expected that for each character in monohybrid cross it is 3 to one that is 3 yellow and one green or three red and one wrinkled.

Then the expected phenotypic ratios of these two traits together in Dihybrid cross can be calculated algebraically as a binomial distribution. 3 capital Y plus 1 small y multiplied with three capital R Plus one

Small r which results in nine capital. y capital R , Three capital Y small r , three small y capital R and one small y small r. that is we expect 9 is to 3 is to 3 is to 1 (9:3:3:1) phenotypic ratio in di hybrid

cross of yellow round nine, yellow wrinkled.3, 3 green round three green wrinkled one pea seeds.

For genotypic ratios, recall the monohybrid ratio. 1;2;1 then algebraically. One capital Y Capital Y + 2 Capital Y small y + 1 small y small y. multiplied with one capital R Capital R + 2 Capital R small r plus one small r small r . it results in one capital Y capital Y Capital R Capital R, 2 Capital Y capital Y capital R small r, one capital Y capital Y small r small r plus 2 capital Y small y capital R Capital R Plus four capital. Y small y capital R small r + 2 capital y small y small r small r plus one small y small y capital R Capital R + 2 small y small y capital R small R plus one small y small y Small y for dihybrid that is one is to two is to one is to two is to 4 is to 2 is to 1 is to 2 is to 1 ratio of nine .Possible genotypes.

See this is the punnett square and you can record all the possible phenotypes and genotypes. The phenotypic ratio of F 2 di hybrid cross is 9 yellow round , 3 yellow wrinkled 3 3 green round and one green wrinkled.

law of independent assortment states. Factors of different traits. can be assorted or segregated independently during the formation of gametes or it can also be defined or it can also be stated inheritance of one pair of factors is independent from other pair of factors in a cross between parents differ in two or more pairs of contrasting characters.

A cross between black, Short, hair and White. Long haired Guinea pigs. F1 progeny results all with the black and short hair when they are. Inbred in F2 generation the phenotypic ratio will be. 9 black short is to 3 black long is to 1 white Short is to 1 white long and the genotypic ratio will be one capital B Capital B Capital S Capital S two Capital B Capital B Capital S and small s , One Capital B Capital B small s small s 2 Capital B small, b Capital S and Capital S 4 Capital B small b Capital S and small s 2 Capital B small b small s small s one small b small b capital S capital S 2 small b small b capital S and small s one small b small b small s small s.

Another example of di hybrid cross is between Black Cat with a long fur and Brown cat with the short fur all the F1 progeny were with a black cat and long fur indicating that black colour is dominant over the Brown and long fur is dominant over short fur. In the F2 progeny you get. 9 black cat with long fur. 3 black with short fur 3 Brown with long fur and one Brown with short fur.

Coming to the wild type symbolism. Wild type is very common. Mutant type is rare. Mutant type suddenly appears in the progeny and if the mutant type is recessive, the symbol used is the initial letter in lower case. If it is dominant, the symbol used is initial letter in uppercase. For the wild type, the mutant type initial letter in lowercase with super subscript plus is the symbol and for the dominant.

Wild character the mutant type initial letter uppercases with superscript plus is the symbol.

For example, mutant black body colour, this is recessive. The symbol is small b.

And it's wild normal Grey body colour which is dominant. The symbol is B superscript plus.

Mutant vestigial wings. The symbol is VG and wild normal wings the symbol is VG with superscript plus coming to an example of Drosophila normal body with normal wings, is crossed with a black body with vestigial wings. Here the Genotype is $b^+ b^+ VG^+ VG^+$ plus VG plus, which is the. Wild variety.

And small b small b vg vg for mutant variety. In the F1 progeny, all the individuals appeared normal body with normal wings. The Genotype is $b^+ b vg^+ vg^+$. When they

are allowed further inbreeding in F₂ generation, the phenotypic ratio appear 9 normal body normal wings, three normal body, vestigial wings, 3 black body, normal wings and one. Black body vestigial wings.

coming to the di hybrid testcross test cross is the cross between F₁ individual with recessive parent

to know the F₁ individual is in homozygous condition are heterozygous condition when yellow round is crossed is crossed with a green wrinkled , if the progeny produce only yellow round it indicates the Genotype is capital. Y capital Y capital R Capital R that is the. Yellow round is in homozygous condition. When Yellow round is crossed with the Green wrinkled If the progeny gets all the four possible phenotypes, that is yellow round yellow wrinkled Green round green wrinkled in equal ratio.

It indicates yellow round is in heterozygous condition.

Thank you.