Quadrant II- Transcript and Related Material

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Module Name : Dihybrid cross

Module Number : 3

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Notes

A cross between two Pure breed Individuals (yellow round /green wrinkled) having homozygous genotype and differ in two pairs of contrasting characters (Yellow Round /Green wrinkled) belonging to two traits (colour and shape of the seed). One parent is homozygous for two alleles, and the other parent is homozygous for the other two alleles (YYRR/yyrr) Or is a genetic mix between two homozygous individuals (YYRR/yyrr) of opposite phenotypes (Yellow/Green, Round / wrinkled) for a genetic trait (Colour and Shape of the seed),

The P (Parental) cross is between true-breeding yellow Round (YYRR) and green Wrinkled peas (yyrr). In the F1 offspring all are RrYy, and are all round and yellow. In forming the F1 gametes, the alleles at the two loci segregate independently. That is, the chance of getting an R allele and a Y allele is 1/2 x 1/2, of getting an R and a y 1/2 x 1/2, r and Y 1/2 x1/2 ,r and y is1/2x1/2.with an equal probability of 1/4, for both parents. four possible gamete types in each parent,

there are 4 x 4 = 16 possible F2 combinations, and the probability of any particular dihybrid type is 1/4 x 1/4 = 1/16.

The phenotypes and phenotypic ratios of these 16 genotypes can be determined by using Punnet Square.

For Gamete formation in F1 generation of Di hybrid YyRr heterozygous condition first add two first alleles of both the traits YR,the two outer alleles Yr, next two inner alleles yR and lastly add two last alleles yr,

Another method of gamete formation for F1 Dihybrid cross Since Alleles of different traits distribute equally..First take colour trait yellow Yy in heterozygous condition . Distribute to four gametes equally. Y Y y y Next take another trait Shape of the seed. Round Rr in heterozygous condition. Distribute to four gametes equally. YR,Yr,yR,yr

phenotypic ratio expected for each character is 3:1, either 3 "Y" : 1 "y", or 3 "R" : 1 "R". Then, the expected phenotypic ratios of the two traits together , can be calculated algebraically as a binomial distribution:

(3Y + 1y) x (3R + 1r) = 9YR + 3Yr + 3Ry + 1 ry

That is, we expect 9:3:3:1 phenotypic ratio of yellow- round : yellow- wrinkled : green-round : green- wrinkled pea seeds.

To guess the genotypic ratios, recall that for monohybrid the ratio is 1 : 2 : 1 Then, algebraically

(1YY + 2Yy + 1yy) x (1RR + 2Rr + 1rr) = 1 YYRR + 2 YYRr + 1 YYrr + 2YyRR + 4YyRr + 2 yyRR + 1yyRR + 2yyRr + 1yyrr. for Dihybrid . 1:2:1:2:4:2:1:2:1 ratio of the nine possible genotypes.

IN Guinea pigs, Black Short hair (BBSS) crossed with White Long hair (bbss) produce gametes BS, bs and result in di hybrid Black Short hair (BbSs) progeny in F1 generation, which on selfing Produce Black Short 9 : Black long 3:White short 3:White long 1 in a Genotypic ratio = BBSS 1:BBSs-2,BBss -1,BbSS-2,BbSs-4,Bbss 2,bbSS-1,bbSs-2,bbss-1.

In a cross between Black cat with Long fur (BBLL) and a Brown cat with short fur(bbll) produce gametes BL and bl and f1 progeny of heterozygous Black cat with Long fur (

(BbLl) .F1 progeny on selfing produce Black cat with Long fur (9) : Black cat with Short fur.

Wild Type Symbolism.

Mutant type are generally Rare and symbol is –initial letter lower case if recessive

and if dominant initial letter upper case. Wild Type is generally Common and Dominant

Mutant type initial letter lower case with (+) For example- mutant Black body colour – wild Normal Grey body colour Dominant – b+ Mutant vestigeal wings – vg Wild Normal wings – vg+

In Drosophila Normal Body Normal wings X Black body Vestigial wings produce Normal Body Normal wings ,which on selfing produces 9 Normal Body Normal Wings :3Normal Body Vestigial Wings:3Black Body Normal Wings:1Black Body Vestigial Wings.

TEST CROSS - Cross between F1 individual with recessive parent i.e. Yellow Round YYRR / YyRr crossed with Green wrinkled yyrr. In F2 generation all dominant character appears if it is in homozygous or both Dominant and recessive appear if it is in heterozygous condition.