RAMA UNIVERSITY

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FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES

OVER DOMINANCE

In case of some genes, the intensity of character governed by them is great in heterozygotes than in the two concerned homozygotes. This situation is known as over dominance. e.g. Drosphila - eye pigments.

Ww - White eyed

WW Ww - Normal dull red eyed

Ww - Highher concentration of there two pigments than the two homozygotes.

Overdominance is the consequence of the heterozygous state of the concerned gene.

LETHAL GENE ACTION

A Lethal gene causes the death of all the individuals carrying this gene in the approximate genotype before there individuals reach addulthood.

Lethal genes may grouped into the following five categories;

i. Recessive lethal
ii. Dominant lethal
iii. Conditional lethal
iv. Balanced lethal
v. Gametic lethals.

Recessive lethal

1. e.g. Coat colour in mice.

YY - Die Lethality

Yy - Yellow

yy - Gney

Yy x Yy

↓

2 yellow : 1 grey

YY die Yy : yy

'Y' gene in mice has a dominant phenotypic effect on coat, colour, but is a recessive lathel.

i. Recessive lethals are always present in the heterozygous state since their homozygotes do not surivie.

ii. A cross between the hetero zygotes for a recessive lethal gene yields a 2:1 ratio (instead of 3:1 ratio).

2. e.g. Albino leaf in barley

AA & Aa - Green leaf

Green Green

Aa x Aa

3 green : 1 albino.

aa- albino - It will die, not able to carry out photosynthesis.

The lethal grenes reduces the survival of zzygotes are known as zygotic lethal.

DOMINANT LETHAL

Some lethal genes reduce viability in the heterozygous state as well. Such genes are known as dominant lethals.

e.g. Epiloia gene is human being causes abnormal skin growths, severe mental defect, multiple tumours in the heterozygote, so that they die before reaching adulthood. Dominant lethals, cannot the maintained in the population, while recessive lethals are maintained in the heterozygour state.

CONDITIONAL LETHAL

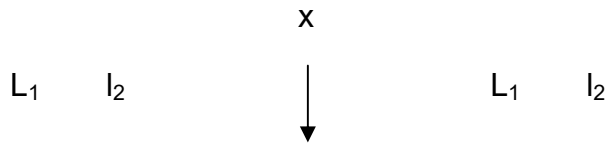
Lethal genes that require a specific condition for their lethal action are termed as " Conditional lethal.

e.g. Chlorophyll mutant of Barley permits normal Chlorophyll development at a temperature of 19^{o}C. or above but produces albino seedlings at temperature below 8^{o}C. This conditional lethal is barely requires a lower temperature to exert its lethal effect.

Some conditional lethal requires light, nutrition. So depending upon the genetic background in which lethal gene is present.

BALANCED LETHAL

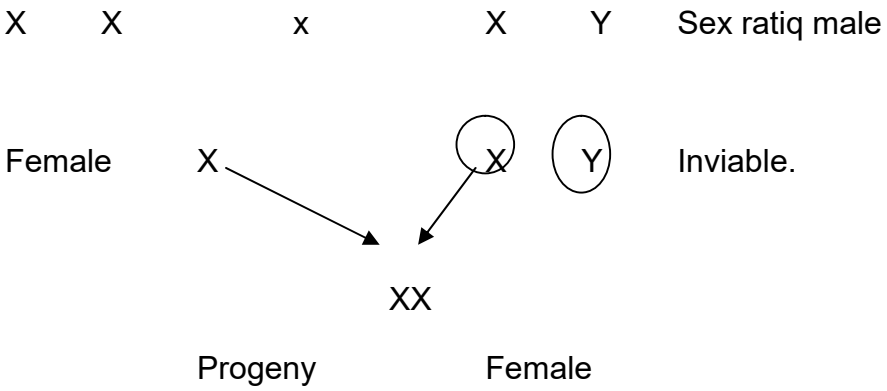
l_1 L_2 l_1 L_2



A balanced lethal system involving two recessive lethal genes (l_1 and l_2). Only two of the four heterozygotes survive. They are heterozygous for both the lethal genes (l_1 L_2 / L_1 and l_2). Thus a balanced lethal system maintains the genes closely linked to the lethal gene in a perpetual heterozygous state.

GAMETIC LETHAL

Some genes lead to the inviability of a class gametes or make them in capable of fertilization. Such genes are called gametic lethals. This phenomenon in commonly known as "Segregation distortion " (SD) or "Meiotic drive". E.g. Drosophila.



SEMI LETHAL GENES

Do not lead to the death of all the individual that carry them in appropriate genotype. They cause death of more than 90% of individuals. Only less than 10% of the individuals survive. Certain Dantha mutants of many plants are semi lethal in homozygours state.

SUBVITAL GENES

Such genes kill less than 90% of the individuals .e.g. miniatue wings in Drosophila viridis mutants of barely etc.,

VITAL GENES

Do not affect the survival of the individuals.

SUPERVITAL GENES

Some mutant alleles enhance the survival of those individuals. Genes for resistance l tolerance to the various abiotic stresses e.g., salinity, alkalinity, high temperature, drought which enhances the fitness of the plants in the presence of concerned stress.