

# Department of Plant Breeding & Genetics

Answers to the questions asked by the students online

## **What is the key difference between selection response and selection differential...?**

The selection differential is the difference of the base population mean and the mean of the selected parents. The selection response is how much gain you make when mating the selected parents.

## **Why total general combining effect is zero ..?**

GCA is estimated for inbreds/parental lines to be used as parents in hybridization programme/heterotic breeding. It is the overall average performance of a parental line in a series of hybrid combinations. Hence a set of lines may have positive or negative GCA values. A high positive GCA indicates a better general recombiner which can yield better recombinants and superior segregants in subsequent generation. Since, GCA is expressed as deviation and parental lines have +ive as well as -ive GCA values, their sum may be equal to zero or nearly equal to zero. As it is the property of deviation that sum of deviation is always equivalent to zero.

## **What is the key difference between genetic advance and genetic gain ..? Can genetic advance be calculated from segregation population or not ....?**

Genetic advance or response to selection is a measure of how much gain you may get from phenotypic selection for a trait. It mainly depends on selection intensity  $I$  ( $i=2.06$  at 5% level), broad sense heritability ( $h^2$ ) of character and phenotypic standard deviation of trait (measure of phenotypic variability). It is valid for single generation only as variability and heritability changes from generation to generation.  $F_2$  is having maximum segregation and plants are widely differing from one another calculation of genetic advance will not provide you a realistic estimate unless and until a large sample of 30 to 40 plants are observed for stabilising mean of  $F_2$  population. It should be avoided as far as possible.

## **What is the key difference between D square analysis and Cluster analysis..?**

In Cluster analysis, population of plants can be classified based on their phenotypic mean performances and plants having more or similar range of characters can be grouped into one cluster. Different clusters will be formed based on their mean phenotypic behaviour. Similar clustering can be done on population of students or population of patients. D<sup>2</sup> analysis is entirely different than Cluster analysis. In D<sup>2</sup> analysis, all the characters are considered together for all the genotypes/varieties. It is a second degree statistics where correlated variables/characters are transformed into uncorrelated variables by Wilk's criteria. D<sup>2</sup> analysis not only provides different clusters based on their genetic divergences but it also gives information on intra-cluster distances and inter-cluster distances. Greater the divergence between genotypes, higher is the possibility of achieving superior heterotic combination resulting to better recombinants. Apart from that D<sup>2</sup> analysis also provides percent contribution of each trait towards genetic divergence.

## **What is the key difference between developmental homeostasis and physiological homeostasis ..?**

Homeostasis is a phenomenon that operates in every living organisms to bring stability and equilibrium status to adopt itself in changing environmental conditions. Homeostasis is a dynamic phenomenon which is in operation throughout the life span of an organism at developmental stage called developmental homeostasis. Since, physiology plays an active role in growth/development/metabolic activities/release and activation of hormones/enzymes at cellular level, it may be called physiological homeostasis. Homeostasis operates in living system at every cell level to stabilise the living system against changing/fluctuating environments.

**If  $GCV > PCV$ , then what is the inference we can draw.?**

In general, phenotypic values will be greater than their corresponding genotypic values.  $P=G$  if there is zero environmental influence. In any circumstances phenotypic values can surpass their corresponding genotypic values. Hence, question of  $PCV\%$  more than  $PCV\%$  doesn't arise. Such situations are mainly due carelessness in recording data on individual plants.

**What is quasi-quantitative traits and 4\_5 examples of it ...?**

Traits/characters are largely classified as qualitative and quantitative traits. However there are some traits which has been called quasi-quantitative traits. Best example is inheritance of grain colour of wheat on which Nelson Ehle (1908) proposed multiple factor hypothesis. Other examples of such trait is human hair and blood.