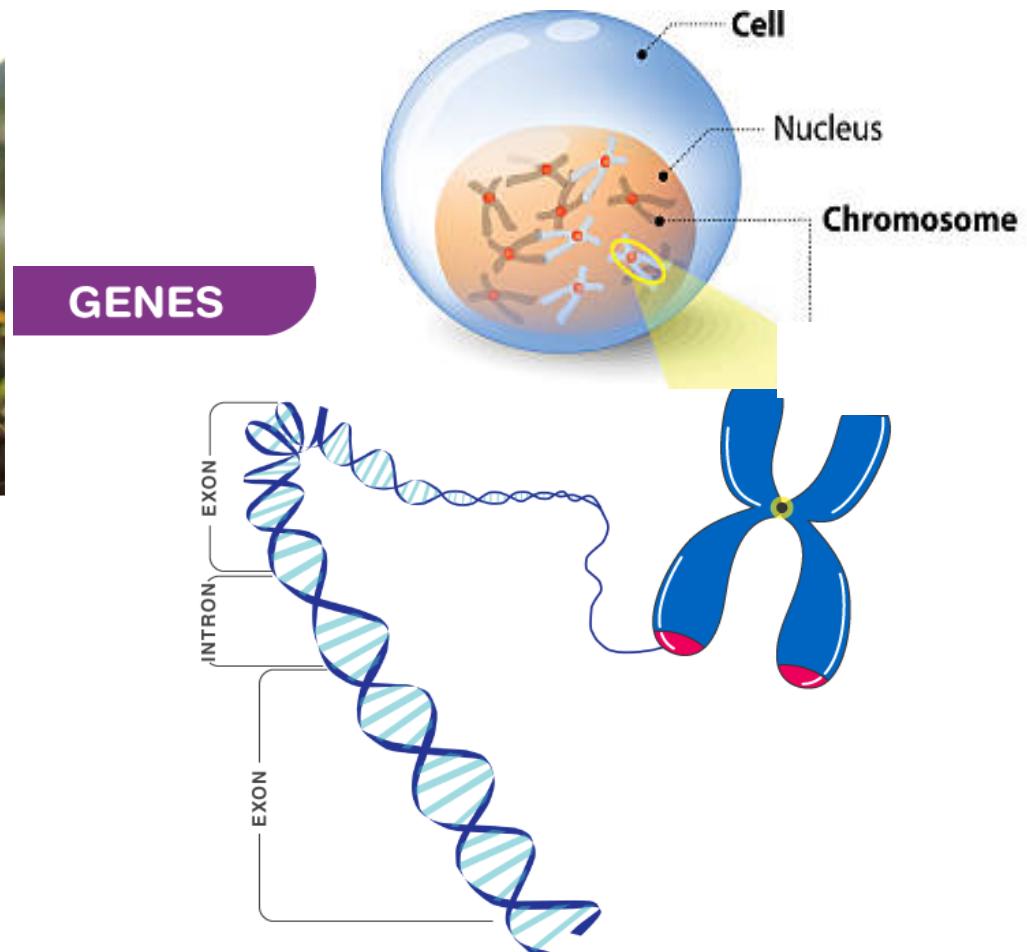


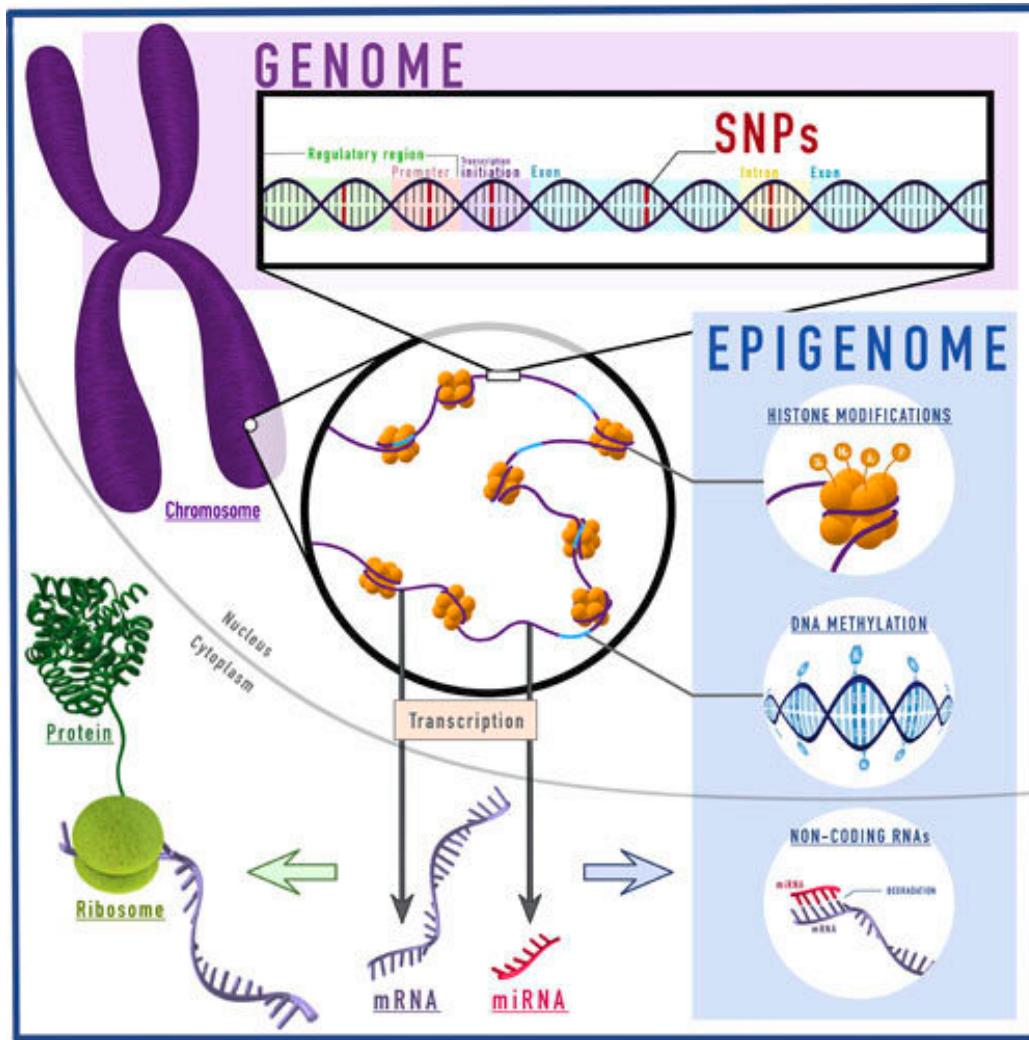
# Why understanding gene function is important ?



**Genetic variations** are there in the crop plants' wild cousins, or in less-improved or heirloom varieties. These relatives can be a **reservoir of genetic diversity** - plant breeders just need to figure out **how to get the right genes into the crop plant**



# Genome and Epigenome



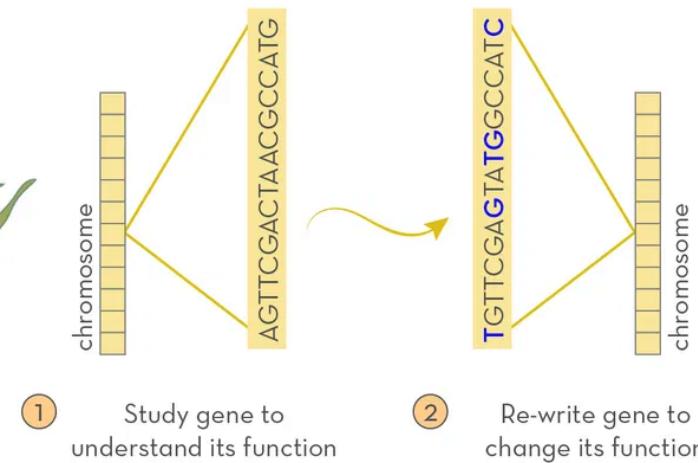
Environment creates further complexity to gene function

# Important to improve crops

## Re-writing the Genetic Code



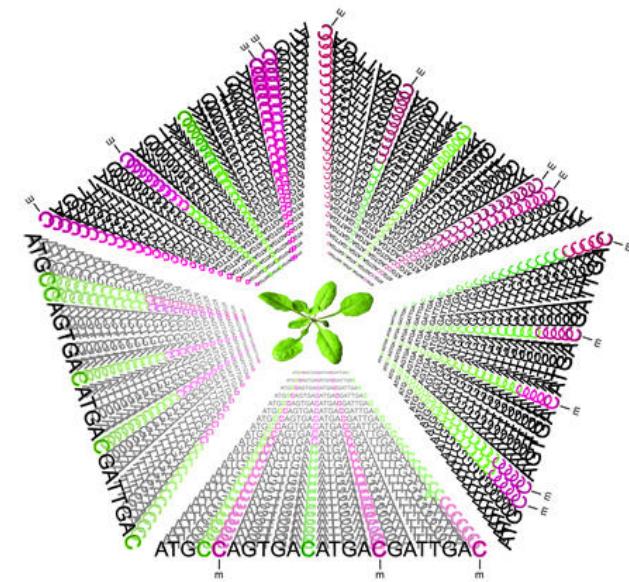
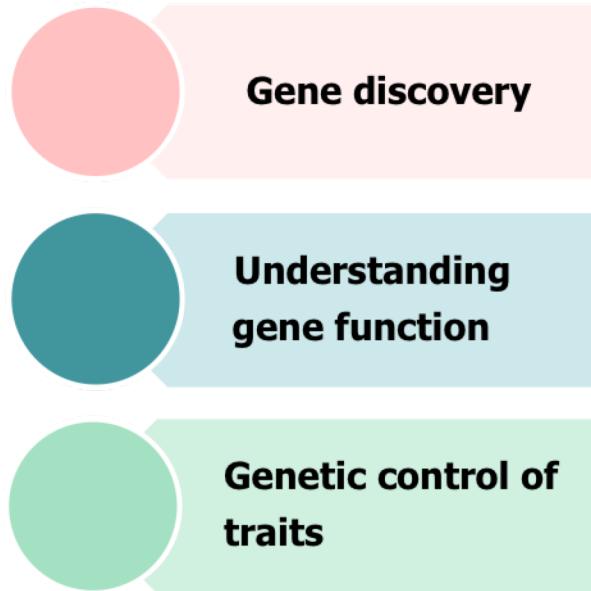
Crop plant



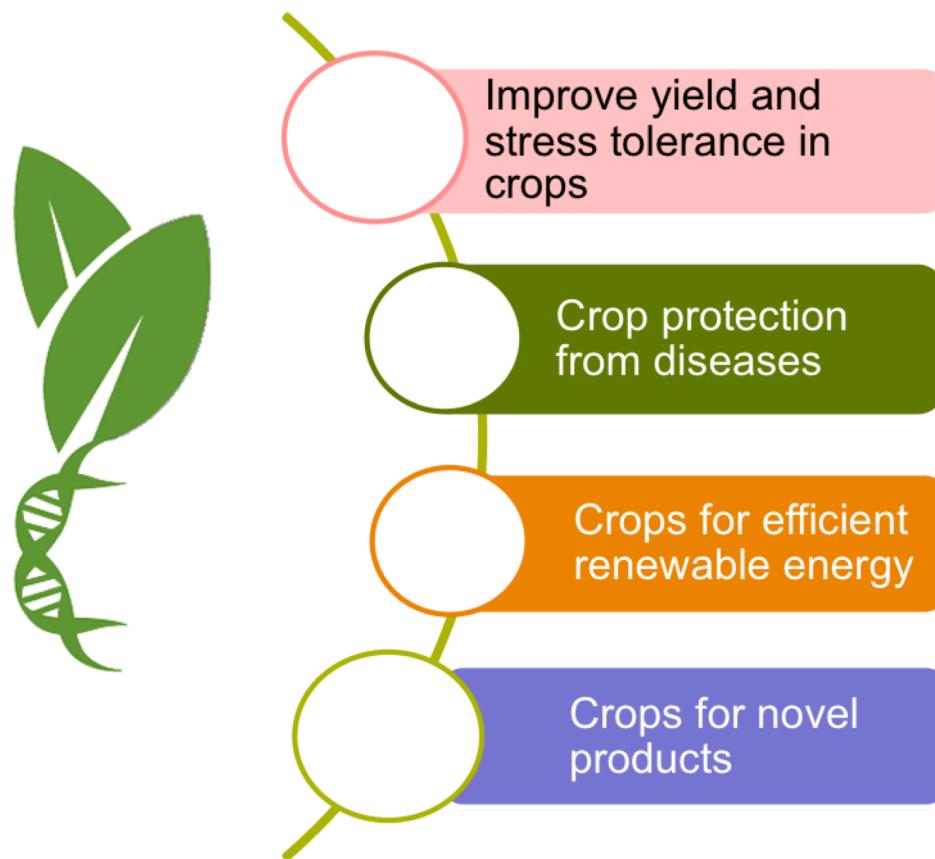
Improved crop plant

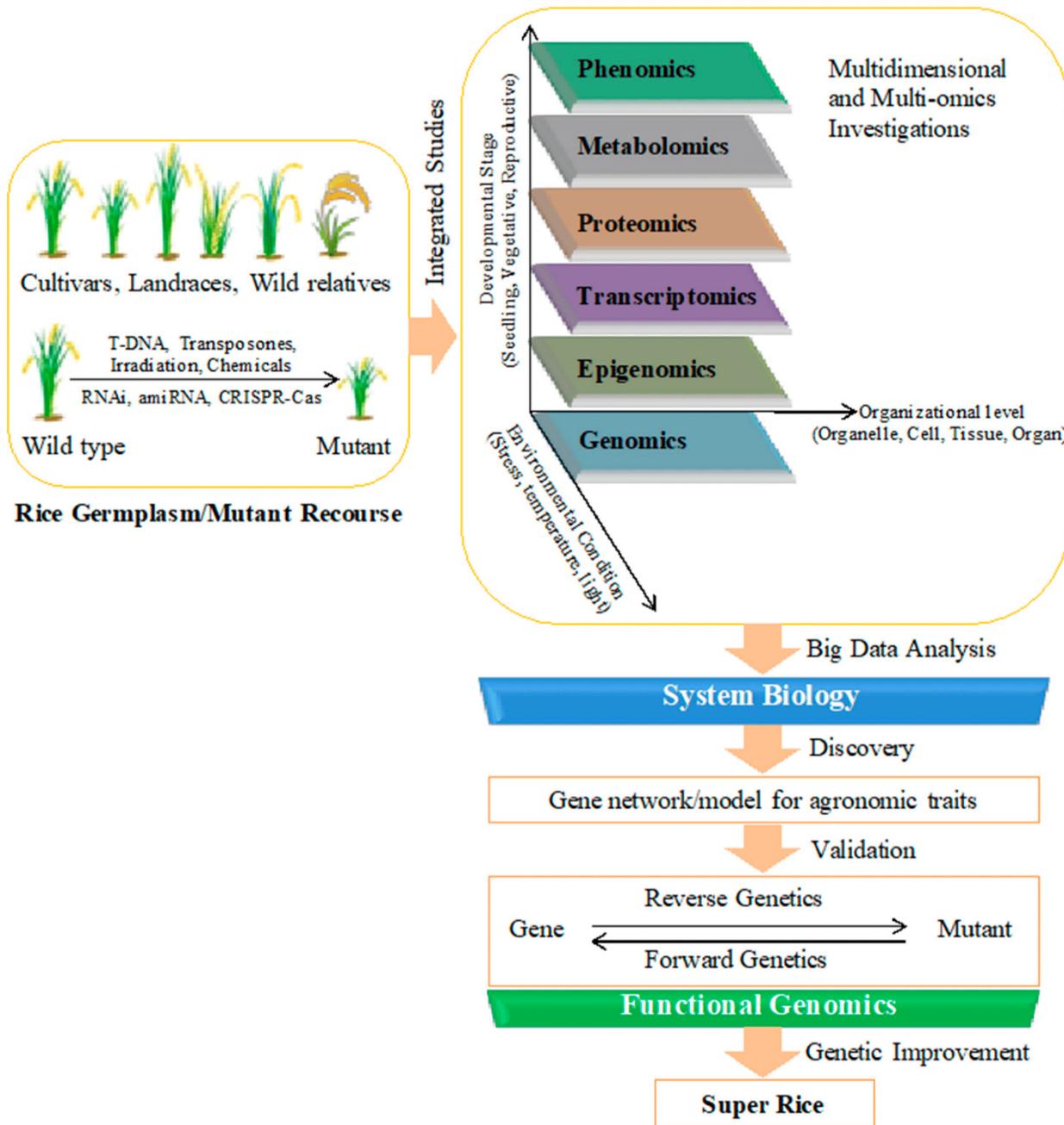
**Gene variations** that might help them **resist a new challenge**  
— say a new disease or pest, drought, or a different habitat

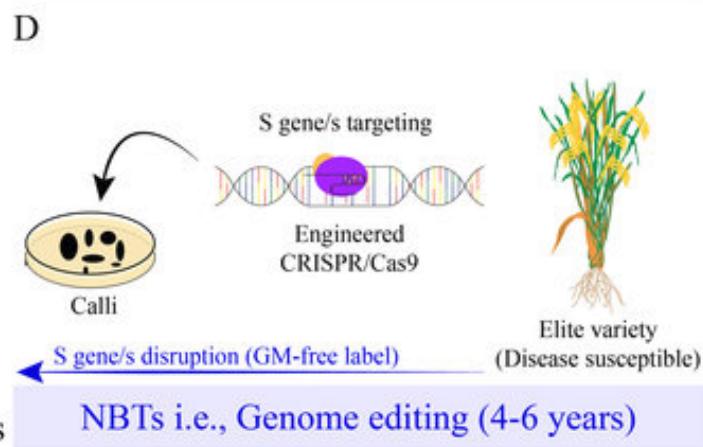
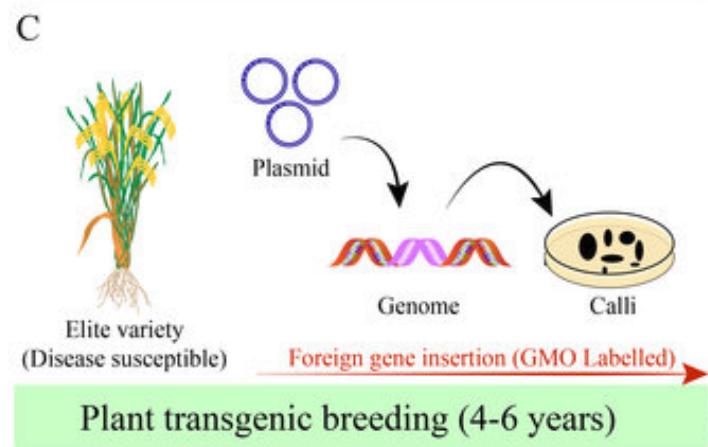
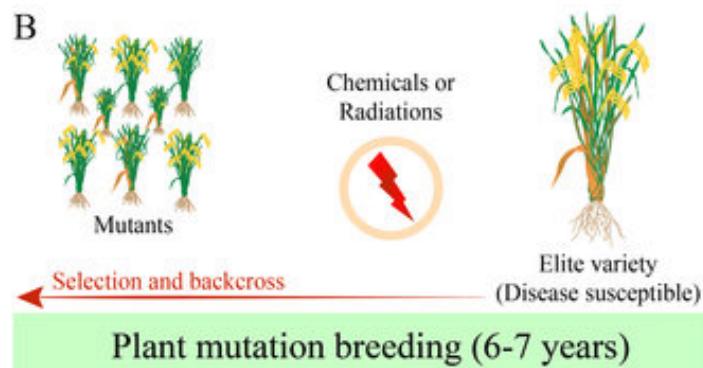
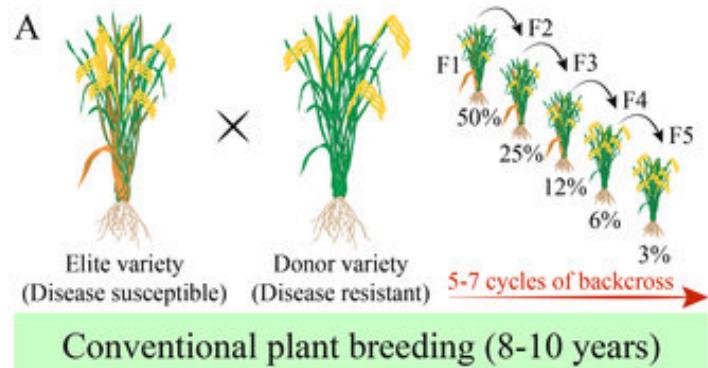
# Understanding Gene Function – tools of plant functional genomics



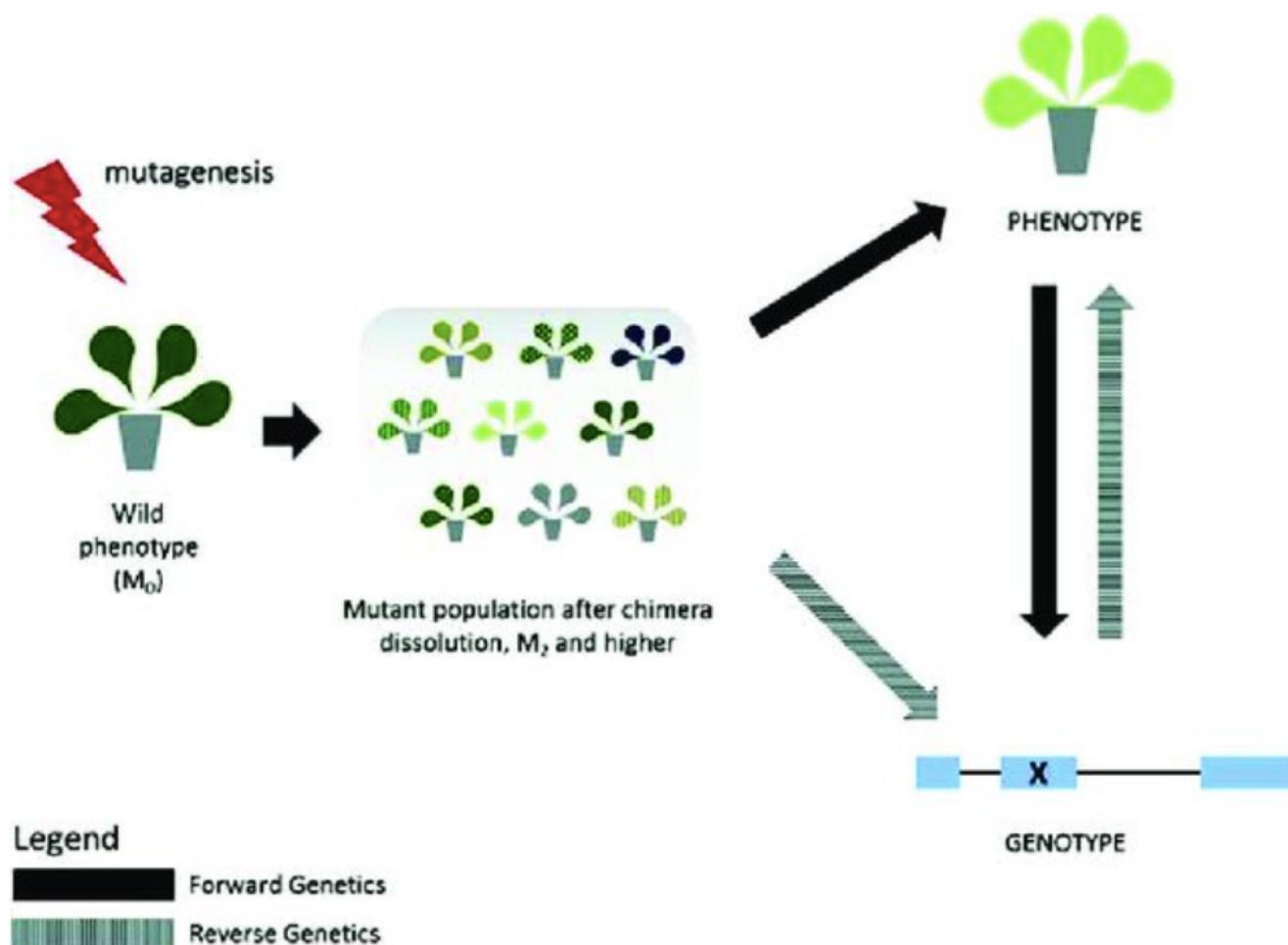
# Genomics for Crop Improvement







# Mutagenesis



# Understanding Gene Function – Starts with .....

Reverse  
genetics

You know the gene sequence,  
looking for its function/trait !!!!

Forward  
genetics

You have a new phenotype or mutant  
(due to loss of function or gain of function)  
looking for gene sequence !!!!

# Understanding Gene Function

## It's all about mutants and their phenotypes!

### Forward genetics



Face value known

Protein  
Sequence

In search of function

### Reverse genetics



Protein/gene  
sequence known

In search of function