

In genetics, **dominant** and **recessive** traits refer to the different ways alleles (gene variants) can influence a plant's observable characteristics or phenotype. Here's how they work in plants:

1. **Dominant Traits**:

- A **dominant allele** expresses its trait even when only one copy is present in the plant's genome (heterozygous state).
- If a plant has one dominant allele and one recessive allele for a specific trait, the dominant trait will be expressed.
- For example, in pea plants, **tallness (T)** is dominant over **shortness (t)**. A plant with the genotype **Tt** will be tall because the dominant **T** allele masks the recessive **t** allele.

Common Dominant Traits in Plants:

- **Seed shape**: Round seeds (R) are dominant over wrinkled seeds (r).
- **Flower color**: Purple flower color (P) is dominant over white flower color (p).
- **Pod shape**: Inflated pod shape (I) is dominant over constricted pod shape (i).

2. **Recessive Traits**:

- A **recessive allele** only expresses its trait when two copies are present in the genome (homozygous state).
- If a plant has two recessive alleles for a particular trait, the recessive trait will be expressed.
- For example, a pea plant must have the genotype **tt** (two recessive alleles) to be short.

Common Recessive Traits in Plants:

- **Seed color**: Yellow seed color (y) is recessive to green seed color (Y).
- **Flower position**: Axial flower position (A) is dominant over terminal flower position (a).
- **Pod color**: Green pod color (g) is recessive to yellow pod color (G).

How Inheritance Works:

In plants, each parent contributes one allele for each trait to their offspring. The combination of these alleles determines whether a dominant or recessive trait will appear. Using Mendel's pea plant experiments as an example, a **Punnett square** can predict the likelihood of traits appearing in future generations by illustrating allele combinations.

Codominance and Incomplete Dominance:

- **Codominance**: In some plants, both alleles can be expressed equally. For instance, in some flowers, two different colors may appear side by side.
- **Incomplete dominance**: Neither allele is completely dominant, leading to a blend of traits, like red and white flower alleles producing pink flowers.

This basic framework applies to many plants, though the complexity of genetics can vary across species.