

Mapping Quantitative Trait Loci

Introduction

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Introduction

Many traits of agronomic and horticultural interest are controlled by a single gene and fall into a few distinct phenotypic classes. These classes can be used to predict the genotypes of the individuals. For example, if we cross a tall and short pea plant and look at F₂ plants, we know the genotype of short plants, and we can give a generalized genotype for the tall plant phenotype. Furthermore, if we know the genotype we could predict the phenotype of the plant. These type of phenotypes are called **discontinuous traits**.

Other traits do not fall into discrete classes. Rather, when a segregating population is analyzed for these traits, a continuous distribution is found. An example, is ear length in corn. Black Mexican Sweet corn has short ears, whereas Tom Thumb popcorn has long ears. When these two inbred lines are crossed, the length of the F₁ ears are intermediate to the two parents. Also, the length does not fall into a tight distribution, but exhibits a bell-shaped distribution. Furthermore, when the F₁ plants are intermated, the distribution of ear length in the F₂ ranges from the short ear Black Mexican Sweet size to the Tom Thumb popcorn size with a distribution that resembles the bell-shaped curve for a normal distribution. These types of traits are called continuous traits and cannot be analyzed in the same manner as discontinuous traits. Because continuous traits are often given a quantitative value, they are often referred to as **quantitative traits**, and the area of genetics that studies their mode of inheritance is called quantitative genetics. Furthermore, the loci controlling these traits are called **quantitative trait loci** or **QTL**.

Because many important agricultural traits such as crop yield, weight gain in animals, fat content of meat are quantitative traits, much of the pioneering research into the modes of inheritance of these traits was performed by agricultural geneticists. Many human phenotypes such as IQ, learning ability and blood pressure also are quantitative traits. **These traits are controlled by multiple genes, each segregating according to Mendel's laws. These traits can also be affected by the environment to varying degrees.**

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