



Hardy-Weinberg Equilibrium

p = the frequency of the dominant allele

q = the frequency of the recessive allele

For a population in genetic equilibrium:

- $p + q = 1.0$ (The sum of the frequencies of both alleles is 100%)
- $(p + q)^2 = 1$, so $p^2 + 2pq + q^2 = 1$
- The three terms of this binomial expansion indicate the

frequencies of the three genotypes: p^2 = frequency of homozygous dominant, $2pq$ = frequency of heterozygous, and q^2 = frequency of homozygous recessive.

TA Expectations:

- Give a review of Hardy-Weinberg and how we can use that in a bi-allelic scenario to determine allele frequency in a random mating population. The TAs should probably work through an example in lab.
- Review the phenotypes of the mutants involved and the possible epistatic interactions that were observed from Lab 3 and how those interactions need to be dealt with when determining allele frequency.

Materials & Supplies:

- There are ~130 ears that are part of a "large breeding population" of maize, which has been "randomly mated". Each lab section will have ~12 ears that need to be phenotyped. Each ear will be segregating for up to 4 kernel traits and 2 maternal traits. It is important to note that not all ears will be segregating for the same kernel traits.
 - The genotype of the original cross was: (R1/r1 C1/c1 Su1/Su1 Pr1/pr1 Y1/y1) x (r1/r1 c1/c1 Pr1/Pr1 su1/su1 Y1/Y1). In other words, there are 5 genes segregating in this population that control the 4 kernel characteristics.
 - The following recessive genotypes and their corresponding phenotypes are segregating in the population: white ($p1/p1$) vs. red cob ($P1/-$), sugary kernel ($su1/su1$) vs. normal ($Su1/-$), colored ($C1$) vs. colorless ($c1$) kernels, blue ($Pr1/-$) vs. red kernels ($pr1/pr1$), yellow ($Y1/-$) vs. white endosperm ($y1/y1$).
 - Note that all loci are unlinked.
 - Starting allele frequency of population should be $q=0.5$ for $su1$, $q=0.25$ for $pr1$ & $y1$, and $q=0.75$ for $c1$ & $r1$.

Hardy Weinberg Equilibrium Study Guide

Judd E. Hollander



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Table of Contents Hardy Weinberg Equilibrium Study Guide

1. Understanding the eBook Hardy Weinberg Equilibrium Study Guide
 - The Rise of Digital Reading Hardy Weinberg Equilibrium Study Guide
 - Advantages of eBooks Over Traditional Books
2. Identifying Hardy Weinberg Equilibrium Study Guide
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Hardy Weinberg Equilibrium Study Guide
 - User-Friendly Interface
4. Exploring eBook Recommendations from Hardy Weinberg Equilibrium Study Guide
 - Personalized Recommendations
 - Hardy Weinberg Equilibrium Study Guide User Reviews and Ratings
 - Hardy Weinberg Equilibrium Study Guide and Bestseller Lists
5. Accessing Hardy Weinberg Equilibrium Study Guide Free and Paid eBooks

- Hardy Weinberg Equilibrium Study Guide Public Domain eBooks
- Hardy Weinberg Equilibrium Study Guide eBook Subscription Services
- Hardy Weinberg Equilibrium Study Guide Budget-Friendly Options
- 6. Navigating Hardy Weinberg Equilibrium Study Guide eBook Formats
 - ePub, PDF, MOBI, and More
 - Hardy Weinberg Equilibrium Study Guide Compatibility with Devices
 - Hardy Weinberg Equilibrium Study Guide Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Hardy Weinberg Equilibrium Study Guide
 - Highlighting and Note-Taking Hardy Weinberg Equilibrium Study Guide
 - Interactive Elements Hardy Weinberg Equilibrium Study Guide
- 8. Staying Engaged with Hardy Weinberg Equilibrium Study Guide
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Hardy Weinberg Equilibrium Study Guide
- 9. Balancing eBooks and Physical Books Hardy Weinberg Equilibrium Study Guide
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Hardy Weinberg Equilibrium Study Guide
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Hardy Weinberg Equilibrium Study Guide
 - Setting Reading Goals Hardy Weinberg Equilibrium Study Guide
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Hardy Weinberg Equilibrium Study Guide
 - Fact-Checking eBook Content of Hardy Weinberg Equilibrium Study Guide
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development

- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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