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| Wisconsin Fast Plant: Dihybrid Genetics |
| Genetics Lab 3166-01Dr. WilliamsOctober 8, 2014 |

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# Abstract

My prediction for the Dihybrid Wisconsin Fast Plant cross is that if we crossed the F1 generation, the F2 generation produced will have a 9:3:3:1 phenotypic ratio for stem and leaf color. Gregor Mendel developed two laws that help us understand the basis of inheritance. We grew plants that either had a purple stem or not purple stem and green leaves or yellow-green leaves. We crossed the F1 generation and found an F2 generation that showed more variation than both the P1 and F1. This experiment shows how a dihybrid cross can display Mendelian patterns.

# Introduction

Gregor Mendel helped us understand genetic inheritance with two laws, the Law of Segregation and the Law of Independent Assortment. Mendel tested both laws in garden pea plants and noticed patterns in the number of each phenotype present in different generations of progeny. His experiment suggested that there could be multiple forms of the same gene, also known as genetic variation, and some alleles could be dominant and recessive. The Law of Segregation states that for any particular trait, the pair of alleles of each parent separate and only one allele passes from each parent on to an offspring; the Law of Independent Assortment, different pairs of alleles are passed to offspring independently of each other (O'Neil, 2013). In this lab we tested Mendel’s laws with the variations of stem color (purple or not purple) and leaf color (yellow-green or green) in Wisconsin Fast Plants. We crossed a quad of P1 and P2 both opposing true breeds for stem and leaf color, a purple stem green leaf plant with a PPGG genotype and a not purple stem yellow-green leaf plant with a ppgg genotype. Then we crossed the F1 generation and produced an F2 generation. If we follow Mendel’s laws of inheritance, what will the phenotype of the F2 generation express? I predicted that the offspring for the F2 generation was: 9 purple stem green leaf plants with four possible genotypes (PPGG, PPGg, PpGG,PpGg), 3 purple stem yellow-green leaf plants with two possible genotypes(PPgg or Ppgg), 3 not purple stem green leaf plants with two possible genotypes (ppGG or ppGg) and 1 not purple yellow-green leaf plant with a recessive genotype (ppgg).

# Materials and Methods

First, my lab partners and I placed wicks in each cell of a quad, with the tip showing from the bottoms of the cells. Then, we filled each cell with potting soil. Next, we added three fertilizer pellets to each cell, and then filled the cell with soil and added three seeds in each cell. Next, we sprinkled water in each cell. Lastly, we left our plants in the classroom holding chamber for two weeks, while periodically watering them.

# Results

my lab partners and I collected data from all of the plants used in this experiment and totaled the entire class’ results collectively. Our class encountered an error, therefore our data we given to us by our professor, derived from a previous class’ experiment. Thirteen to fifteen plants were observed in total. Stem color in the P1 generation was tested and all of the groups observed that the stem color was 0 purple stem plants and 22 not purple stem plants and 32 plants had yellow-green leaves. For the F1 generation all 50 of the plants expressed the trait for purple stems and green leaves. Our given data for the F2 generation showed 35 purple stem green leaf plants, 13 purple stem yellow-green leaf plants, 12 not purple stem green leaf plants, and 4 not purple stem yellow-green leaf plants.

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| --- | --- | --- |
|  | Purple Stem | Not Purple Stem |
| P1 | 0 | 22 |
| F1 | 50 | 0 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Purple Green | Purple Yellow | Not Purple Green | Not Purple Yellow |
| F2 | 35 | 13 | 12 | 4 |

# Discussion

Analyzing our data we saw more variation within our F2 progeny. With the given data I can concluded the genotypes and phenotypes of most of the individuals included. The P1 generation was a cross between a homozygous dominant plant for both traits for purple stem and green leaf with PPGG as the genotype and a homozygous recessive plant for both not purple stem and yellow-green leaf with ppgg as its genotype. The offspring of this cross, the F1 generation was all purple stem green leaf plants. Since the P1 offspring was a unanimous phenotype, we can imply the dominant allele for stem color is purple stems, which can be expressed genotypically as PP or Pp, with the allele for a not purple stem being recessive which can be expressed as pp. In leaf color green leaves are dominant over yellow-green leaves therefore the genotype for the green leaf allele can be expressed as GG or Gg, and the genotype for the yellow-green leaf allele is gg because it is recessive. Once we crossed the F1 offspring, we produced 35 purple stem green leaf plants with P-G- as the genotype, 13 purple stem yellow leaf plants with PPgg or Ppgg as the genotype, 12 not purple stem green leaf plants with ppGG or ppGg as the genotype, and 4 not purple stem yellow-green leaf plants with ppgg as the genotype. The results look very similar to that of a 9:3:3:1 ratio. Mendel’s Law of Segregation says that an individual inherits one copy of each allele from each parent and alleles are separated during gamete formation, which in association to our experiment gave us our F1 progeny. Mendel’s Law of Independent Assortment says that all traits are inherited independently of each other. Knowing that a pure-breeding individual has two identical copies for each allele, an F1 cross-bred pea plant is a heterozygote having one copy of two different alleles (Biotechnology Learning). In comparison to the experiment, stem color and leaf color are inherited separate of each other, with the allele for purple stems and green leaf color being the dominant allele for the Wisconsin Fast Plants. The data derived from this experiment full supports and agrees with both Mendel’s Laws of Segregation and Independent Assortment. My hypothesis can now be accepted.

New section for the acknowledgement

I would like to thank all of my colleagues and fellow peers for their participation during this experiment.

References:

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