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# Rose's Thesis...

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# Chapter 1

## Introduction

Polyploidy is well tolerated in plants, being a ubiquitous feature in the lineages of most plant taxa (Ramsey and Ramsey 2014). While they have been studied for over a century, the factors that drive the success of polyploid establishment in the face of reproductive disadvantages and high extinction rates are still unclear. What is it that allows this extreme mutation to persist and become fixated within a population?

The process of whole-genome duplication is also thought to be fundamental in the diversification of plant species; having been found to coincide with around 25% of plant speciation events (Wood et al. 2009).

Make sure this figure is as correct as can be. Does it need the breakdown between different taxa?

However, a study by Arrigo and Barker (2012) on the extinction rates of polyploids has

26 suggested that many of these new lines are evolutionary dead ends

27 MORE DETAIL on evolutionary dead ends and exact extinction rates.

## 28 **1.1 Costs**

29 They conclude that polyploids tend to become extinct at the establishment phase due to  
30 reproductive disadvantages such as limited mate-choice (by diploid pollen-swamping, or  
31 delayed flowering), and triploid sterility.

### 32 **Diploid Pollen-Swamping**

### 33 **Delayed Flowering**

### 34 **Triploid Sterility**

## 35 **1.2 Benefits**

36 Benefits associated with polyploidy may offset these costs: Polyploids are frequently  
37 linked with distinct traits such as “gigas effects”, which include increases in plant organs,  
38 reversal of selfing inhibition, enhanced capabilities for buffering of deleterious mutation  
39 (due to increased heterozygosity), and hybrid vigour (heterosis) (Woodhouse et al. 2009;  
40 Ramsey and Ramsey 2014). These traits are thought to overcome the reproductive dis-  
41 advantages of polyploidy and instead make this mutation key to the invasive and adaptive  
42 potential of plants, ultimately shaping broader patterns of plant diversification.

43 **Gigas-effects**

44 **Genetic buffering**

45 **Hybrid Vigour**

46 **1.3 So what are the core mechanisms?**

47 **1.4 Or the most suspicious?**

48 **1.5 Or how do these mechanisms link?**

49 Does limited mate-choice set the scene for the evolution of selfing vs out-  
50 crossing?

51 Delayed flowering (cost) is associated with gigas-effects of increased size  
52 (benefit). TRADE-OFF.

53 **1.6 Under what different conditions do these mecha-**  
54 **nisms work?**

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