Public Abstract
First Name: Matthew
Middle Name: John
Last Name: Bauer
Degree: PhD
Academic Program: Biological Sciences
Adviser's First Name: James
Adviser's Last Name: Birchler
Co-Adviser's First Name:
Co-Adviser's Last Name:
Graduation Term: Fall
Graduation Year: 2006

Title: The Interploidy Hybridization Barrier in *Zea mays* L.

The development of kernels in maize (*Zea mays* ssp *mays*,) can be disrupted with interploidy crosses. An interploidy cross occurs when two different ploidies of the same species, i.e. a diploid and a tetraploid, cross fertilize. When this occurs, the development of the resulting kernels are highly abnormal causing a failure in their ability to acquire and store nutrients, thus ultimately resulting is small defective kernels that will often abort the accompanying maize embryo.

The failure of endosperm development due to interploidy crosses could be due to two reasons, neither of which has been studied on its own. 1) There is an imbalance of inherited imprinted loci in the endosperm. 2) There is an altered dosage of gene regulators to their target loci in the endosperm cell after fertilization. This dissertation presents results that address three topics dealing with the molecular genetics of endosperm development; 1) dosage of regulators to target loci is important for normal endosperm development; 2) evaluation of spontaneous central cell development as a cause of defective kernels in lines that induce high frequencies of haploid embryos; 3) examination of endoreduplicated chromosomes in endosperm and impact of interploidy crosses on chromosomal organization.

Maize has been shown to be an ancient allotetraploid. Approximately 4-5 million years ago, the genome of the maize progenitor plant doubled from 5 to 10 chromosomes. Since that time, the progenitor has differentiated into many different species and subspecies of maize. Theses subspecies have similar chromosomal makeup, but cross-fertilizations are not highly successful, and can often resemble that of an interploidy cross. The fertilization barrier, if overcome, could have benefits in crop improvement due to the opportunity to introduce new beneficial alleles. Thus, understanding how interploidy crosses fail to develop properly would give a greater insight into how maize breeders could use closely related crop species to improve overall crop yield.