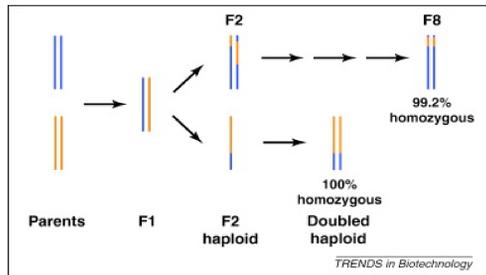


Professional Experience: Wheat Double Haploid Lab

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Jake Lazar Spring Semester 2016

Introduction

I worked as a technician for a lab that focuses on the production of double haploid varieties of wheat. These double haploid varieties produced will be further used to study the traits that are involved with heat tolerance. The main objective of the project is to identify the mechanisms that are controlling heat tolerance in wheat, and to develop those lines for farmers in regions that are being affected by climate change the most to have varieties that are heat tolerant. The reason we use a double haploid breeding method is to accelerate the breeding cycle of wheat. Using the double haploid method, we are able to develop homozygous seeds after one generation as opposed to conventional methods that would take anywhere from 2-5 years. The genetic make up of the seed will be identical to its parents, not forming any type of recombination.



Responsibilities performed

Working for the Double Haploid Lab I;

- Maintained the sanitation of test tubes for haploid plants to grow in the media.
 - If the test tubes were dirty, then fungus could potentially grow on the tubes
- Created the media solution for the haploid plants. Made sure the correct pH levels were present, and all the correct amounts of ingredients were input.
 - The media has to be exact for the development of the plant to grow as planned
- Performed the Emasculations on the wheat spikes
 - Cutting out the male reproductive parts, called the anthers, so the plant does not self pollinate. We are making it homozygous by doing this.
- Made sure all the plants were being watered
 - If the plants do not receive sufficient amounts of water they will wilt. If the plants receive too much water then they will drown and not complete photosynthesis.
- Performed pollinations with maize pollen
 - maize pollen is used to fertilize our wheat, this tricks the plant into believing that it is being fertilized by other wheat, and leads to the creation of double haploid.
- Gave hormone treatments
 - application of synthetic auxin (2,4D) is sprayed on the plant after pollinations to speed up growth.
- Embryo Rescue
 - Embryos from pollinated seed are collected and then transplanted into the soilless media. There is an extensive cleaning process for this
- Colchicine treatments
 - Colchicine induces the plant to believe it has a full set of chromosomes to complete its growth process. This is necessary for the production of double haploid lines.

Responsibilities

Growing F1 plants

Healthy wheat plants were grown under normal conditions (22°C / 18°C; 16hr Day / 8hr Night)



Emasculations

Removal of anthers before anthesis to prevent self pollination



Wheat x Maize crosses

Pollination of wheat with freshly collected maize pollen



Hormone Treatment

Application of auxin (2,4-D, 213 ppm at pH 10.36) on the pollinated spikes as spray



Embryo rescue

Embryos from pollinated seeds were collected aseptically and placed on half strength MS medium



Haploid plant regeneration

Haploid plants regenerated from embryos were transplanted to green house



Colchicine treatment

Haploid plants at tillering stage were treated with 0.05% Colchicine to induce chromosome doubling and replanted in the green house



Wheat doubled haploid plants

Seeds from individual doubled haploid were harvested separately



Pictures



Summary

During the course of this internship I was able to present a research poster at the Showcase for Undergraduate Research event. Presenting in front of an academic audience let me experience what it is like to communicate with knowledgeable professionals. I took away a lot from that experience and know I will use this later on in whatever field I go into. This internship has also sparked my interest in genetics, so much so that I may consider pursuing a Masters degree in plant breeding. I am very grateful for the opportunity to work with this lab and have learned an invaluable amount from this and feel more prepared to enter into the agriculture science field with my newly acquired knowledge and skills.