



Zooming in on Wheat: The Extraction of Wheat DNA



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Abstract

The genetic makeup of plants is crucial to the quality of their yields. In order to genetically engineer plants to have the most optimal traits, scientists must locate which genes codes for each specific characteristic. The extraction of DNA from the plant being studied allows scientists to isolate the structure inside the nucleus which tells each cell how to perform. The genetic markers which code for specific traits are then analyzed and used for further research.

History of Genetic Engineering

- 1857- Gregor Mendel experiments with crossbreeding pea plants
- 1859- Darwin's book *On the Origin of Species by Means of Natural Selection*
- Presently- molecular research involving phenotype characteristics

Objective

- Analyze processes leading to DNA extraction of wheat
- Isolate leaf tissue of wheat plant
- Collect DNA pellet
- Use DNA markers to identify which genes influence specific traits



Wheat grain collected from the field

Methods and Materials

1. 150 lines of Soft Red Winter Wheat were exposed to the Fusarium Head Light Disease
2. 400mL of beta-mercaptoethanol was added to each tube to keep the DNA stable.
3. The tubes were placed in liquid nitrogen and the leaves crushed into a fine powder.



Freezing of tissue in liquid nitrogen



Centrifuge tubes of tissue in the water bath

4. 600 mL of CTAB were added to each sample and they were incubated in a water bath. The samples were cooled on a shaker. 700 mL of chloroform octanol were added.
5. After centrifuging the samples, the chloroform and leaf tissue separated from the buffer and DNA.
6. 600mL of DNA liquid were transferred to 1.5 mL tubes. 600 mL of cold isopropanol were added.
7. The tubes were centrifuged for ten minutes, suspending the DNA pellets. The excess isopropanol was dispensed into a waste container
8. 800mL of 76% ethanol were added to the tubes and the centrifuging and extracting of ethanol process was repeated.



DNA buffer solution separates after centrifuging



DNA pellet suspended in buffer solution

Upon completion of the DNA extraction process, the samples were stored until needed for future studies.

Discussion

The extraction of DNA is a valuable technology that is continually being expanded upon. Using the extracted DNA, scientists can locate genetic markers and gene sequences. Once identified, scientists can either inject the specific genetic sequence into wheat plants, or they can crossbreed wheat plants with complementary traits. Wheat is susceptible to many diseases, molds, and fungi. Inserting certain disease resistant genes into wheat makes the wheat immune and more productive. Other genes that control grain size and stalk length may also be used to produce wheat as efficiently as possible.

Genetically modifying wheat allows for maximum production and therefore a maximum yield.



Conclusion

The suspension of the DNA pellets from the wheat tissue was successfully completed using the given procedure. Utilizing the properties of the double helix strands of DNA and its reaction to buffers and other solutions allowed for the completion of our experiment. The concentration of the DNA pellet from the wheat tissue will allow scientists to further their studies into the genetic engineering of plants.