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The use of fluorescence *in situ* hybridization for translocation identification

To identify all maize chromosomes, (2n=20) a multicolor fluorescence in situ hybridization procedure was developed. The procedure utilizes tandemly repeated DNA sequences to generate a distinctive banding pattern for each of the 10 chromosomes. Several different probes were used as a mixture for hybridization to root-tip chromosomes. All of the 10 chromosomes were identified by the banding and color patterns. Another chromosome, called the B chromosome, also shows up in some lines of maize. While its actual purpose is unknown, it undergoes nondisjunction. Nondisjunction is the failure of paired chromosomes to disjoin (separate) during cell division so that both chromosomes go to one daughter cell and none to the other. This nondisjunction plays a role in the dosage affect and how it manipulates gene expression. Previously, translocation was recovered between the B chromosome and the long arm of chromosome 10. Using this B-A translocation, it was crossed with A-A translocated chromosomes to achieve B-A-A translocations. The overall goal of these research projects is to use FISH to identify these translocations. Once spreads are identified using an oil lens and a triple band-pass filter of a Universal microscope and the images are taken using an Optronics MagnaFire charge-coupled device (CCD), the images can be superimposed and edited in Photoshop 7.0. Each individual chromosome can be labeled, and the translocations can be found. This research shows the benefits of FISH for rapid genetic mapping and allows for an easy means of identifying chromosomes.

This project was completed to fulfill a Capstone requirement.