Quantitative Analysis of Capsaicin Levels in Hot Peppers to Understand Heat Inheritability
Jacquelyn Dudley, Dr. Melissa Langston

Introduction
• Capsaicin, the organic compound made up of smaller compounds known as capsaicinoids, is the well-known principle of hot peppers.
• There are a plethora of medicinal uses for capsaicin, including certain cancer treatments and arthritis creams
• Naturally occurring in chili peppers, but synthetically derived for pharmaceutical use
• Scoville Heat Units (SHU) - the measurement of the pungency of chili peppers based on the concentration of capsaicinoids

Sample Prep
1. Crush pepper using mortar and pestle
2. Use methanol to wash pulp and seeds into beaker
3. Heat beaker for one hour
4. Vacuum filter and save mixture in large tubes
5. Syringe filter in 1.5mL HPLC vials

HPLC
• High Performance Liquid Chromatography
• Separate, identify, and quantify components
• Methanol and water utilized
• Nucleosil C18 column

Standard Capsaicin

Plant Breeding
• Recent project studying chili pepper genome followed much of the same principles as tomato genetics,
• The pepper genome was 3.5-fold larger than that of a tomato
• Plant breeders are attempting to better identify how heat is passed from parent plant to its progeny
• Different traits are inherited depending on which variety is the mother and which is the father
• Understanding heat transfer will help breeders in making selections to create even hotter peppers, as well as heatless chilis

Chromatogram of Sample Pepper 587
The retention times of the samples sent through the HPLC that match that of the pure capsaicin indicate the pepper contains capsaicin

Results
• While results from all plants were unattainable due to crop failure to fruit set, results that were obtainable indicate the following:
  • Plants that previously tested positive for capsaicin continued to test positive in the next generation
  • Concentration levels were similar between generations
  • Highlighted data tested positive for similar capsaicin concentrations as parent generations

Future Work
• Continue to monitor heat transfer between generations
• Analyze effects of growing conditions on capsaicin concentrations
• In depth look into capsaicin synthase

Acknowledgements
Delaware Valley University Student Research Course
Bristol-Myers Squibb