Team New Groove
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BIOL 495-067
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Research Week 2020 Abstract

Title: Peroxygenase Enzymatic Activity in Plants: Ginger and Jalapeno Peppers

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Abstract: Peroxidases are a ubiquitous class of enzymes found in plants fungi and other higher organisms that catalyze chemical oxidations using hydrogen peroxide as an oxidant. They are useful in a number of industrial and biotechnological applications where non-selective oxidations are required. Though a number of plant peroxidases are known, much of the focused research has occurred with a single member from this family, horseradish peroxidase. Consequently, there is an incredibly rich diversity still available for discovery in the peroxidase world, with potentially novel industrial application. The ***long-range objective*** of the research described herein is to explore a very broad range of plant sources for isolation and characterization of novel peroxidase enzymes, with enzymatic characteristics that have previously been undiscovered. ***Sources selected for this study*** include skin samples from the root of ginger, root of rutabaga, and the seeds isolated from a variety of peppers of varying pungency on the Scoville scale.

Crude preparations of the peroxidases have been accomplished through crushing of the tissue with a mortar and pestle in the presence of buffer, followed by high-speed centrifugation to remove plant debris. Activity was initially screened using the enzymatic conversion of

guaiacol into tetraguaiacol in the presence of H_2O_2. The assay produces a bright orange/red color which can be quantified using a spectrophotometer. At first, whole root of ginger and the entire pepper plants were utilized for crude peroxidase preparation, however upon dissection, it was determined that the major source of activity was found in the roots' skins and the pepper's seeds, respectively.

Following larger scale purification of each of the samples using a combination of ammonium sulfate precipitation and column chromatography, analysis of the enzymes for pH optimum, substrate selectivity and potential novel catalytic mechanisms have been assessed. These results and comparison with other peroxidases isolated in the lab are given in this presentation.