



Alfred obtained his B.S.c. in Health Science at Benedictine University in 1996 where he was a Howard Hughes scholar. After working in the medical field for two years, he completed his master in biology at Chicago State University in 2004. His thesis work was on the use of terrestrial isopods as bioindicators for metal neurotoxicity. Shortly after obtaining his masters Alfred began teaching introductory biology classes in two local Chicago junior colleges. In addition to his dissertation work he has been a teacher's assistant for such classes as Hort 101 and AGR 201 here at Purdue University. After finishing at Purdue Alfred will pursue a career in academia

Agricultural & Biological ENGINEERING

Dissertation Defense

Speaker: Alfred Ramon Diggs

Title: Enhanced Biophysical Methods to Measure Indole Acetic Acid (IAA) Transport

Major Professor(s): Dr. Marshall Porterfield

Date: Friday, June 24, 2011

Time: 10:00 AM

Location: ABE 301

Abstract:

The primary regulatory phytohormone, indole acetic acid (IAA) plays a crucial role in the growth and development of plants. The polar transport of this hormone is essential to processes such as vascular differentiation, organogenesis, apical dominance, and the tropic effects. Due to the importance of this growth regulator, the development of physiologically relevant methods to measure IAA transport is greatly needed. An IAA selective hybrid platinumized platinum and multiwalled carbon nanotubes (Pt/Ptblack/MWNTs) amperometric self referencing microsensor was optimized and validated. Using this microsensor the first real time endogenous IAA flux measurements were taken and mathematical methods were devised to analyze the integrated flux. Both induced and endogenous flux indicated that maximal transport occurs at the region of the root referred to as the distal elongation zone (DEZ). However, endogenous integrated IAA flux revealed a small net loss of IAA at the DEZ. Oscillation patterns within the efflux and influx of both B73 and br2 were found using the integrated flux methods. These oscillation patterns were fitted to a simple harmonic model. Ultimately, methods outlined in this study may be used not only for mutant screening but also to study essential IAA dependent processes such as gravitropism.

Application:

Since the beginning of the Green Revolution Indole acetic Acid (IAA) transport mutants have been of great interest to the agriculture community because their dwarf stature makes them resistant to lodging and allows for less nutrient input and water use per edible biomass. Outlined in this talk is a new sensor technique to study the biology of IAA transport. This technique in turn can be used for mutant screening of potential dwarf crops.

