ID002

Poster

Graduate Science - Health

Systematic review of the functionality and efficiency of bionic prosthetics for trans-tibial amputees based on mechanical interface, biomechanical dynamics, and neuroelectric components

Background: Transtibial prosthetic designs have evolved over time with ankle components initially being rigid and static. Flexible components and now bionic components are available. Prosthetic ankle components vary in their ability to mimic a biological limb especially in regards to metabolic energy and in gait efficiency. Purpose: The purpose of this review was three-fold: first to evaluate the strength and quality of the current research evidence on the use of powered plantar prosthetics, second, to determine whether current evidence regarding the use of bionic prosthetics should be considered when making decisions regarding functionality and efficiency of gait; and third, to identify weaknesses in the current evidence and area for continued research. Design: Systematic Review Methods: A literature search was performed on databases including: IEEE Xplore, Science Direct, IOP Science, PLOS one, Google scholar, Wiley, EBSCO Host, and PubMed. Articles selected for review were those of original research since 2003 and were evaluated for quality using the Oxford Centre for Evidence-Based Medicine 2011 levels of evidence system. Results: A total of 20 sources were reviewed for this study. Articles examined the current practices for preventing gait abnormalities based on prosthetic design, the biomechanics of healthy lower extremities, the biomechanics of prosthetic gait, and gait speed and efficiency. Conclusions: Three bionic designs emerged: intrinsic powered plantar flexion, EMG regulated plantar flexion and a combination integrating both intrinsic algorithms and EMG regulation to control the prosthetic. Of the three types of designs, evidence suggests the intrinsic algorithms with EMG extrinsic regulation is the most functional and efficient for transtibial prosthetic gait. Implications: Individuals with trans-tibial amputations that use powered plantar prosthetics are more functional and efficient in ambulation than passive prosthetics. Funding: No funding sources

ID003

Poster

Graduate Science - Health

The Correlation Between Episiotomy and Postnatal Urinary Incontinence

The Correlation Between Episiotomy and Postnatal Urinary Incontinence: A Systematic Review

Daugherty A., SPT; Hough J., SPT; Smith A., SPT; Waters G., SPT & Edmondson D., Ed. D

The International Continence Society defines urinary incontinence (UI) as the involuntary loss of urine. An estimated 57% of women experience some form of UI between the ages of 35-74, while an 6-43% occurrence is reported in postpartum vaginal deliveries. Episiotomy is a prevalent procedure with vaginal births due its consideration as preventative care of pelvic floor musculature (PFM). However, several recent studies have challenged the effectiveness of episiotomy in preserving PFM stability and function, using urinary incontinence (UI) as an outcome measure. A systematic review compiling recent research to summarize the relationship between episiotomy and UI does not yet exist. Therefore, this study questioned whether mothers with episiotomy will have higher occurrences of postpartum UI than women without episiotomy. The systematic review was conducted from Cochrane Review, Google Scholar, Journal of Women's Health Physical Therapy, and PubMed, using keywords "Episiotomy AND Urinary Incontinence" and "Episiotomy AND Pelvic Floor Dysfunction". Original research within the last 20 years involving any grade of episiotomy and number of births were included. Thirty-three articles qualified with outcomes split overall evenly in positive and negative correlations between the two factors. It was concluded that, based on current available research, the relationship between episiotomy and UI is inconclusive.

ID004

Oral

Graduate Science - Environmental

Microhabitat Use by the Hellbender Salamander (Cryptobranchus alleganiensis) in East Tennessee

The Hellbender salamander (Cryptobranchus alleganiensis) is a long-lived, fully-aquatic salamander that inhabits cool, well-oxygenated streams and rivers in the eastern United States. Although once abundant, C. alleganiensis populations have experienced major declines across the historical range. Habitat degradation, siltation, aquatic contaminants, and infectious diseases are commonly suggested contributors to these declines. Although Tennessee provides areas of high-quality habitat for C. alleganiensis, microhabitat differences among life stages have not been well documented. We evaluated microhabitat use of larval, juvenile, and adult C. alleganiensis at three streams in east Tennessee by comparing sites occupied by C. alleganiensis to random sites within each stream. We used a generalized linear mixed model to evaluate what stream covariates best explained presence of C. alleganiensis, along with discriminant function analysis to evaluate differences in microhabitat use between C. alleganiensis life stages (i.e., larval, subadult, and adult). We completed habitat assessments for a total of 60 individuals. Our results showed a trend indicating a strong association between the percent large rock, the percent of low embedded rocks, and the number of rocks above 50 cm with C. alleganiensis presence. In addition, our results showed a trend indicating a strong difference in microhabitat use among life stages, which indicates that each life stage may select different microhabitat covariate within suitable streams. Overall, our analysis identified microhabitat covariates that are potentially important for long-term C. alleganiensis conservation, and provides guidance for stream protection and restoration practices that may mitigate sedimentation and habitat degradation in impacted streams.

ID005

An Examination of Virtual Reality Interventions as a Resource for the Treatment of Phantom Limb Pain

Virtual reality is a new and developing technique entering the medical community that may be effective in relieving pain. A specific type of pain termed phantom limb pain (PLP), is the occurrence of pain in an area that has been amputated and is reported to affect more than 50% of patients with amputations. Currently, the treatment of phantom limb pain is highly variable in the strategies used and their effectiveness. Based on the theory of maladaptive cortical reorganization causing PLP, we hypothesized that the use of a virtual reality intervention would elicit a reduction in PLP. Using the Oxford Centre of Evidence-based Medicine (OCEBM) classification, a systematic review of the literature, was conducted to determine the pathophysiological mechanisms contributing to PLP and how virtual reality techniques could beneficially impact cortical reorganization. Based on OCEBM, the majority of the articles reviewed were level 2 evidence and supported virtual reality as a resource for alleviating PLP. We concluded that the available evidence supports that the use of virtual reality could be an alternative treatment for PLP and could decrease PLP.

ID006

Oral

Undergraduate Science - Life

Synthesis of melanin-like pigments from phenols using peroxide

Melanin-like pigments are synthesized from phenolic or other compounds using a combination of Fe(II) and hydrogen peroxide. By varying the reaction conditions, pigments with different physical-chemical properties can be generated. Experiments are conducted to evaluate the reproducibility of the experimental results. In addition, experiments are conducted to scale up select reactions in order to be able to purify and characterize the materials generated.

ID007

Oral

Undergraduate Science - Life

Synthesis of melanins from catecholamines under varying reaction conditions

Melanin-like pigments are synthesized from catehcolamines or other compounds using a combination of Fe(II) and hydrogen peroxide. By varying the reaction conditions, pigments with different physical-chemical properties can be generated. Experiments are conducted to evaluate the reproducibility of the experimental results. In addition, experiments are conducted to scale up select reactions in order to be able to purify and characterize the materials generated.

ID008

Poster

Undergraduate Science - Life

Investigation of in vitro Cytotoxicity of Fluorinated Hexahydroquinoline in Human Breast Cancer

Investigation of in vitro Cytotoxicity of Fluorinated Hexahydroquinoline in Human Breast Cancer.

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Abstract:

Quinoline and derivatives have attracted the attention of chemists in industry and academia due to their wide range of biological activities, including antibacterial, antimalarial and antitumor activities. They are often found as important pharmacophores in natural products and semi-synthetic compounds. In continuation of our search for anticancer compounds, we synthesized some fluorinated hexahydroquinoline derivatives and evaluated their in vitro cytotoxic activity in human cancer cell lines, MCF-7 and BT549. In addition, it is known that high concentration of estrogen is observed in breast cancer tissues, which puts patients at high risk of developing breast cancer. We hypothesize that small molecule hexahydroquinoline will block the activity of aromatase and result in the development of drug for the treatment of breast cancer. The overarching question is whether the compound interacts with the above enzyme. Thus, we used molecular modeling to investigate possible interaction of the synthesized compounds with aromatase, with the ultimate goal of finding binding conformations, which will provide clues for the mechanism of action of the compounds. The in vitro cytotoxicity and ligand-protein interaction data will be presented.

ID009

Poster

Undergraduate Science - Life

Tributyltin Effects on Akt/Protein Kinase B and Ribosomal S6 Protein Phosphorylation

The ERK1/2 and p38 mitogen activated protein kinase (MAPK) pathway have been shown to be activated by exposure to the environmental contaminant tributyltin (TBT). TBT is found to contaminate a number of food products that humans consume resulting in measureable levels in human blood (ranging as high as 261 nM) as well as other tissues. Recent studies have shown that TBT at certain concentrations increases the production of the pro-inflammatory cytokine interleukin 1 beta (IL-1β) from human lymphocytes without increasing the mRNA for IL-1β. TBT-induced production of IL-1β appears to require the ERK1/2 and p38 pathways. However, it is possible that TBT may be activating other pathways such as Akt/protein kinase B (PKB) which could also contribute to its ability to increase IL-1β production. Additionally, downstream substrates of both ERK1/2 and Akt/PKB can lead to the activation of protein synthesis in part by stimulating phosphorylation of the ribosomal S6 protein. Thus, the current study examines whether TBT is able to activate Akt/PKB and S6 phosphorylation as possible mechanisms for the TBT-induced increases in IL-1β production. Human lymphocytes were exposed to TBT for 10 minutes. Following the exposure the cells were lysed. The lysates were analyzed using western blot. Antibodies specific to the activated forms of Akt/PKB and S6 were used. Initial results indicate that exposure to TBT increases the activation of Akt/PKB and S6. Thus, it is possible that TBT is stimulating IL-1β production by activating both MAPK and Akt/PKB signaling pathways leading to increased translation of IL-1β. Supported by grants U54CA163066 and 4T34GM007663 from the National Institutes of Health.

ID010

Poster

Undergraduate Science - Life

Exposure of Human Immune Cells to Triclosan Alters the Secretion of Interferon gamma

Triclosan (TCS) is a synthetic chemical with antibacterial function that inhibits the growth of microorganisms. TCS is used as an antifungal and antibacterial agent in many products such as: toothpaste, soaps, detergents, toys, surgical cleaning treatments, cosmetics, kitchenware, clothes, and office and school products. It is found in human blood and tissue samples. Interferon gamma (IFNγ) is a cytokine that is specialized for innate and adaptive immunity against viral infections. IFNγ is important for immunity against intracellular pathogens and for tumor control. As a pro-inflammatory cytokine, inappropriately elevated levels of IFNγ can cause chronic inflammation, which has been shown to enhance the development and progression of certain cancers as well as other diseases. Accurate regulation of IFNγ levels is important to avoid the loss of immune capability or the occurrence of chronic inflammation. The aim of this study is to investigate whether TCS alters the secretion of IFNγ from human immune cells. Human peripheral blood mononuclear cells (PBMCs) were treated with 0 -5 μM TCS for 24 h, 48 h, and 6 days. IFNγ levels were measured by enzyme linked immunosorbent assay (ELISA). After a 24 h exposure to TCS there were significant increases in IFNγ seen at several concentrations in all donors tested (total of 4 distinct donors). The specific concentration at which increases occurred varied among cells from different donors. Increases in IFNγ secretion were also seen after 48 h and 6 day exposure to TCS at certain concentrations. Thus, it appears that TCS is capable of disrupting secretion of this important immune system regulating cytokine which could have the potential to increase the potential for chronic inflammation.

ID011

Poster

Undergraduate Science - Life

Pentachlorophenol Effects Synthesis of IL-1β in Human Immune Cells

Pentachlorophenol (PCP) is an environmental contaminant found in human blood. PCP has been used in fungicides, insecticides, herbicides, and antifouling paint. A number of cancers and diseases are associated with exposure to this contaminant. Interleukin 1-βeta (IL-1β) is a cytokine produced by lymphocytes and monocytes. It is involved in stimulating cell proliferation, tissue repair, and present during the inflammatory response to injury. Increased levels of IL-1 β have been associated with rheumatoid arthritis, systemic lupus erythematosus, psoriasis, ulcerative colitis, and tumor progression. A decrease in levels of IL-1 β could lead to lack of an appropriate immune response to a pathogen while elevations in its levels may lead to increased potential for inflammatory disorders and tumors. Previous studies in our lab show that PCP increases secretion of IL1β from peripheral blood mononuclear cells (PBMCS) and monocyte-depleted PBMCS. Increased secretion could be due to PCP-induced release of a store of pre-existing cytokine in these cells or due to PCP-induced increases in the synthesis of IL-1β. The objective of this study was to examine if exposure of human immune cells to PCP increases the synthesis (secreted + intracellular levels) of IL1β. PBMCS were exposed to 5 µM to 0.05 µM PCP for 10 min, 1 h, 6 h, and 24 h. PBMCs showed increased synthesis of IL1β after 6 h and 24 h exposures to PCP. The concentrations of PCP at which these increases occurred varied among the donors. These results suggest that PCP-induces synthesis of IL1-β which may have the potential to cause immune system dysregulation. Supported by NIH grant U54CA163066.

ID012

Oral

Graduate Science - Agriculture

Assesment of Biodiversity and Seasonal Patterns of Leech (Hirudinea) Parasitism of Semi-Aquatic Turtles in an Urbanized Wetland System

Aquatic turtles inhabiting a palustrine emergent wetland adjacent to Tennessee State University in Nashville, Tennessee were examined for leeches as a component of a multi-year mark and recapture study. Leeches serve as bioindicators in aquatic environments, and are useful in determining the biological condition of aquatic ecosystems based upon various evaluations such as species richness indices between parasite and host. This study investigated seasonal fluctuations in leech species diversity, abundance, and severity of infestation on hosts over a four-month period. Aquatic funnel traps were baited and deployed weekly from June â€" October 2016 to sample the turtles. Each captured turtle was weighed, measured, sexed, marked, and examined for external leeches. All located leeches were removed and preserved for later identification. Turtle species captured during this study, included the Common Snapping Turtle (Chelydra serpentina), Stinkpot (Sternotherus odoratus), Spiny Softshell Turtle (Apalone spinifera), and the Red-eared Slider (Trachemys scripta elegans). The leeches that were collected from the turtles represented 3 different genera under phylum Hirudinea, including Batracobdella, Placobdella, and Helobdella, and 7 total species. Collectively, the interpretation of these data can be used to understand parasite-host relationships and how patterns in leech parasitism vary throughout the active season in a wetland system.

ID013

Poster

Graduate Science - Health

Evaluation of Triclosan Exposures on Interleukin 6 and Interleukin 1 Beta Secretion from Human Immune Cells

Triclosan (TCS) is an antimicrobial compound that is widely used in personal hygiene products such as mouthwash and toothpaste. TCS can be ingested or absorbed through the skin and has been found in human blood, breast milk, and urine. Interleukin (IL)-6 and IL-1 beta (IL-1β) are important pro-inflammatory cytokines produced by lymphocytes, monocytes, and other cells. Both regulate cell growth, tissue repair, and immune function, increased levels of each have been associated with a number of diseases including rheumatoid arthritis and certain cancers. TCS has been shown to inhibit the lytic function of human natural killer (NK) lymphocytes and to decrease expression of key cell surface proteins on NK cells. Here we examine whether TCS alters the secretion of IL-1β and IL-6 from human immune cell preparations. Human peripheral blood mononuclear cells (PBMCs) and monocyte-depleted (MD)-PBMCs were exposed to TCS at concentrations of 0-5 µM. Cytokine secretion was measured at 24 h, 48 h, and 6 days using enzyme-linked immunosorbent assay (ELISA). Both IL-1β and IL-6 secretion were increased at one or more concentration of TCS at one or more length of exposure. These results indicate that TCS has the capacity to disrupt secretion of these two important pro-inflammatory cytokines.Supported by NIH grant U54CA163066

ID014

Poster

Undergraduate Science - Life

Triclosan Alters the Secretion of Tumor Necrosis Factor alpha from Human Immune Cells.

Triclosan (TCS) is an environmental contaminant added as an antibacterial agent to many products including mouthwashes, soaps, and toothpastes. TCS can be absorbed through skin and mouth and is found in human blood, urine, amniotic fluid, and breast milk. Tumor Necrosis Factor Alpha (TNFα) is an essential pro-inflammatory cytokine that is produced by monocytes, macrophages, lymphocytes and neutrophils. TNF acts as a systemic inflammatory mediator in response to sepsis and infectious disease. While a normal inflammatory response is critical to health, high levels of inflammatory proteins such as TNFα can lead to chronic inflammation which contributes to a number of disease states including cancer. Alternatively, if immune cells are unable to secrete adequate amounts of TNFα this would leave the organism susceptible to infections. Previously, we have shown man-made environmental contaminants that gain access to the human system are able to alter the secretion of TNFα from human immune cells and we hypothesize that TCS also has the capacity to alter TNFα secretion. In the current study, peripheral blood mononuclear cells (PBMCs) were treated with TCS at concentration of 0.05-5 µM for 24 h, 48h, and 6 days. TNFα level was measured by using enzyme-linked immunosorbent assay (ELISA). The result showed that 24 h exposure to TCS caused a significant increase in TNFα secretion at 5 µM in cells from 4 separate donors. This increase maintained at 48 h and 6 days of exposure. Other concentrations of TCS, including the lowest of 0.05 µM, also caused significant increases in TNFα, but the specific concentrations at which the increases were seen varied among donors. These data show that exposure of (PBMCs) to TCS alters the secretion of TNFα. TCS has the capacity to increase this important master regulator of inflammation, which would have the potential to lead to development or exacerbation of several disease states.

ID015

Oral

Graduate Science - Environmental

Detection and Habitat Modelling for the State Threatened Western Pygmy Rattlesnake (Sistrurus miliarius streckeri) in Tennessee

Shawn Snyder, Dr. William Sutton

Globally, reptile populations are declining at a rate quicker than most other vertebrates. The Western Pygmy Rattlesnake (S. miliarius streckeri) occurs in a narrow range in west-central Tennessee along the Tennessee River drainages and Western Highland Rim. Little is known about the spatial ecology or habitat requirements of this species in Tennessee where it is listed as State Threatened. Previous studies on this species have reinforced the rarity of this species in the state with as little as 30 confirmed occurrences coming in the last 30 years. Our primary research objectives are to evaluate the distribution of the Western Pygmy Rattlesnake in Tennessee by using a variety of field-based survey methods and species distribution modeling techniques. Our preliminary habitat suitability model suggests most of the suitable habitat for pygmy rattlesnakes in Tennessee occurs on the East side of the Tennessee River and is predominantly associated with riverine and stream systems.

ID016

Oral

Undergraduate Science - Life

Flame Retardant, Hexabromocyclododecane, Alters Secretion of Interleukin 6 from Human Immune Cells

Hexabromocyclododecane (HBCD) is a brominated flame retardant compound. It is used in polystyrene insulation, accumulates in living organisms and is highly toxic to aquatic organisms. Interleukin 6 (IL-6) is a pro-inflammatory protein that is produced by T lymphocytes and monocytes (as well as other cells). It regulates cell growth, tissue repair, and immune functions. Previous studies have shown that HBCD alters the secretion of cytokines IL-1Î², TNFÎ±, and INFÎ³ from human immune cells. Due to the important role IL-6 plays in immune responsiveness, it is important to understand whether exposures to HBCD are able to disrupt its secretion. HBCD is found in human blood and previous studies have shown that it inhibits the ability of human NK lymphocytes to destroy tumor cells. This study examines whether HBCD affects the secretion of IL-6 from monocyte-depleted (MD) human peripheral blood mononuclear cells (PBMCs). IL-6 secretion was measured by enzyme linked immunosorbent assay (ELISA). Results indicate that exposures of MD-PBMCs to different concentrations of HBCD (ranging from 5-0.05 ÂµM) for 24 increase secretion of IL-6 from these immune cells. Thus, exposure to HBCD may potentially disrupt the immune regulation mediated by IL-6.

ID017

Oral

Undergraduate Science - Life

The Combined Effect of Canagliflozin and Metformin in Human Prostate Cancer Cells

There is still a need to identify effective treatments for castration-resistant prostate cancers. Recent studies have shown that two drugs used to treat type 2 diabetes, metformin and canagliflozin, may be effective treatments for castration-resistant prostate cancer. Both drugs have individually been shown to inhibit proliferation of 22Rv1 and PC3 prostate cancer cell lines. However, it is not known if combined treatment with metformin and canagliflozin suppresses the growth of prostate cancer cells better than each drug alone. The goal of this study was to determine the effectiveness of the combination of canagliflozin and metformin as an alternative treatment for prostate cancer. Presto Blue Assays were used to assess the effect of metformin and canagliflozin on proliferation prostate cancer cell lines. Western blot analysis was performed to determine effects of metformin and canagliflozin on androgen receptor (AR) protein levels. Canagliflozin produced a significant decrease in the proliferation of PC3 and 22Rv1 cells. While metformin showed no significant decrease in proliferation of PC3 cells, metformin did significantly decrease 22Rv1 cell proliferation. The combination of canagliflozin and metformin showed a significant decrease in both PC3 and 22Rv1 cells. However, the effect of the combination was no greater than canagliflozin alone. AR protein levels were reduced by canagliflozin, metformin, and the combination of both drugs. The combination of metformin and canagliflozin was most effective in reducing AR protein levels. The combination of canagliflozin and metformin was equally effective as canagliflozin alone at reducing prostate cancer cell proliferation. However, this drug combination was more effective at suppressing AR protein levels within castration-resistant prostate cancer cells. These data suggest that combination treatments involving metformin and canagliflozin could be used to decrease tumor growth and AR expression in prostate cancer.

ID018

Nigrospora sphaerica products from the flowering dogwood exhibit antitumorigenic effects via the translational regulator, pS6 ribosomal protein

Research reports have shown that endophytic fungi that colonize plant tissues without any external symptoms produce novel bioactive metabolites that exhibit wide array of applications in biomedical field. In this study, Nigrospora sphaerica isolated from the flowering dogwood (Cornus florida L.), was examined for secondary metabolites that have anticancer properties on cell lines A549 (lung) and U251 (glioblastoma). Crude extracts of N. sphaerica exhibited antiproliferative and antimigratory effects on these solid tumors. Lung and glioblastoma cancer cells showed 17% and 25% decrease in cell viability when treated with 2 µg/ml of N. sphaerica crude extract as compared to control. These quantitative effects on both cell lines were further supported by ANOVA analysis which showed a statistically significant differences ($p < 0.05$) across all concentrations examined. Boyden chamber assays revealed that cells treated with N. sphaerica crude extracts decreased tumor cell migration as compared to vehicle treated control cells ($p < 0.05$). Results also suggested that the antitumorigenic effects of N. sphaerica were as a consequence of negatively regulating the PI3K/Akt/mTOR translational control signaling pathway, a canonical mechanistic axis that contributes to the maintenance and progression of several human cancers. Thus, the results of this study provide experimental evidence that the endophytic isolate of N. sphaerica from flowering dogwoods is a promising source of bioactive metabolites with potential antitumor and antimetastasis properties.

ID019

Phylogenetic diversity and biocontrol potential of endophytic fungi associated with Cornus florida L.

Endophytic fungi isolated from Cornus florida L. were analyzed for their diversity and antimicrobial properties against plant pathogens Macrophomina phaseolina, Sclerotium rolfsii, and Phytophthora capsic in vitro . A total of 379 endophytic fungi were isolated from 1050 tissue segments of 70 stem samples. Molecular identification of fungi were based on internal transcribed spacer rDNA sequence analysis. All isolates belonged to species of phyla Ascomycota and Basidiomycota, distributed over 5 orders and 11 genera including Xylariales (Hypoxylon, Whalleya, Nemania, Pestalotiopsis, Discotroma, and Xylaria), Diaporthales (Diaporthe and Cytospora), Trichosphaeriales (Nigrospora), Glomerellales (Colletotrichum) and Xylomelasma. Clustering analysis of isolated fungi was carried out using MEGA 7 software. The isolates belonging to same family clustered together in the phylogenetic tree. Out of the organisms that reside in dogwood tissue without causing symptoms, Hypoxylon sp., Diaporthe, Cytospora, Colletotrichum sp. and Pestalotiopsis have been reported as plant pathogens associated with cankers, and dieback diseases. Some of these isolates displayed biocontrol activity against major plant pathogens invitro. Hence, this study have systematically demonstrated the diversity, phylogeny and antagonistic activities of endophytic fungi isolated from C. florida.

ID020

Oral

Graduate Science - Life

Harfmful Algal Blooms (HABs) in the TSU Wetland

The main campus of Tennessee State University (TSU) houses agricultural research facilities as well as a 26-acre wetland. Since 1996, beavers have established this wetland area, doubling its size every five years. The wetland becomes eutrophic during the spring and summer. Due to research livestock and wildlife having access to the wetland, concerns about the eutrophication and harmful algal blooms (HABs) has increased. TSU, the Tennessee Department of Health, the Tennessee Department of Environment and Conservation, and the U.S. Geological Survey conducted a study in the summer and fall of 2017 to determine if cyanotoxins were present. Water samples were collected at different locations within the wetland to measure nutrients (nitrogen, phosphorous, iron, sulfur), Secchi disk depth, type of algae present, and various cyanotoxins. Continuous water-quality instruments were maintained at the upper end of the wetland, mid-wetland and below the wetland to document dissolved oxygen, pH, temperature, specific conductance and turbidity. Several bacteria genera capable of producing cyanotoxins were present in the wetland during the sampling period, including Dolichospermum, Chrysosporum, Aphanizomenon, Anabaena, Oscillatoria, Pseudoanabaena, and Lyngba. Microcystin and saxitoxin levels in the wetland were ranged from trace amounts to 0.26 µg/L. The highest toxins concentrations were found in the mid-wetland area, near the livestock access point at levels approaching the US EPA's health advisory. Additional work is being done to determine the correlation between water chemistry parameters and cyanotoxin concentrations, which may provide an early and inexpensive indicator for cyanotoxins.

ID021

Poster

Graduate Humanities

Assessing Community Advisory Board Effectiveness

Meharry-Vanderbilt-TSU Cancer Outreach Core:

Assessing Community Advisory Board Effectiveness

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Abstract

The Meharry-Vanderbilt-TSU Cancer Partnership's (MVTCP) Cancer Outreach Core (COC) Community Advisory Board (CAB) was created to facilitate input into MVTCP activities and research projects and to promote community awareness of the MVTCP. The purpose of this assessment was to evaluate the Community Advisory Board's effectiveness, in terms of CAB member engagement in providing input into MVTCP activities, research projects, and promoting community awareness of the MVTCP. An existing survey instrument, "Community Advisory Board Effectiveness," was used. CAB members completed a 26-question survey, which measured the level of importance and their level of agreement with indicators of CAB processes and performance. The survey also included one open-ended qualitative item that asked for at least one suggestion to improve the CAB. CAB members completed the survey in person during a CAB meeting or via an online version of the survey. Participation in the survey was voluntary and anonymous. A total of 23 surveys were collected for a response rate of 77%. Descriptive and bivariate analyses were performed and completed on survey items. Qualitative responses were reviewed and summarized.

ID022

Oral

Graduate Science - Environmental

Detecting the Presence and Abundance of Streamside Salamanders (Ambystoma Barbouri) in Middle Tennessee Using Environmental DNA

Amphibians represent the vertebrate taxa that has experienced the greatest declines globally. Declines tend to occur in species with geographically-isolated and/or fragmented populations. This is specifically true for the Streamside Salamander (Ambystoma barbouri), an Ambystomatid salamander that occurs in Middle Tennessee. This salamander species emerges to breed in low-order, ephemeral streams during the winter and spring months. As these animals are cryptic and only surface-active for several months, they can be difficult to detect using traditional survey methods. Surveys that target environmental DNA (eDNA) in the form of DNA sloughed into their aquatic environment could provide an effective method for detecting the presence of this species. Water samples were collected at 50 meter stretches of 17 streams across the A. barbouri range four times over 6 months (December 2016 â€" May 2017). Stream segments were searched for all life-stages of salamanders using rock-turning and visual surveys. We used real-time PCR to quantify DNA amounts using an A. barbouri species-specific primer. We used Generalized Linear Mixed Models to evaluate relationships between A. barbouri adult, larval, and egg counts and biomass at each site. In addition, we evaluated the change in eDNA amounts across the active season of A. barbouri. Primary outputs from this study include a replicable eDNA approach to identify A. barbouri populations in Tennessee and sampling guidelines for appropriate times to collect eDNA survey data for A. barbouri. This information will provide a method which can be used by wildlife agencies to further the knowledge and conservation of this species.

ID023

Detection of Salmonella typhimurium in Leafy Vegetables using a Surface Plasmon Resonance Biosensor

Salmonella contaminated leafy vegetables are responsible for 17 outbreaks, 762 illnesses and 26 hospitalizations in United States. Although different methods are available to timely detect Salmonella in foods, Surface Plasmon Resonance (SPR) has benefit of real-time, label-free and rapid detection with higher sensitivity and specificity. The purpose of this study was to develop a SPR method in conjugation with the Immunomagnetic Separation (IMS) for detection of low levels of Salmonella in leafy vegetables. Samples of romaine lettuce were inoculated with Salmonella typhimurium ATCC-13311 at low levels (101 to 102 CFU/g) and incubated overnight in Buffered Peptone Water at 37 oC. The numbers of naturally occurred bacteria and the inoculated Salmonella in the samples before and after incubation were determined by aerobic plate count and XLT-4 agars. Flagellin antigen was captured by the antibody immobilized on magnetic beads and then eluted by Glycine-HCl, pH 3.0. Flagellin antigen was neutralized and injected onto the SPR sensor surface immobilized with a flagellin-specific monoclonal antibody. SPR signals resulting from the binding of flagellin on sensor surface were observed and quantified. The IMS isolated samples yielded an average detection signal of 22.9 ± 5.5 uRIU, whereas the average detection signal for non-isolated samples was 4.1 ± 0.4 uRIU. The biosensor detection sensitivity was 2.4×105 CFU/mL after enrichment. The lowest detection limit in inoculated samples before enrichment was 80 CFU/g. Four other bacteria (Enterobacter, Pseudomonas, Serratia and Aeromonas) were isolated from the vegetable samples after enrichment, but none of them were detected by the SPR when analyzed individually. Our results suggest that SPR can be used for faster detection of Salmonella typhimurium in leafy vegetables with higher specificity and sensitivity. Further study will be conducted to improve this developed method for detection of other serotypes.

ID024

Oral

Graduate Science - Agriculture

Analysis of Flagellin Protein of Campylobacter Species with Monoclonal Antibodies

Campylobacter species are important enteric pathogens causing disease in humans and animals. The flagellar filaments of Campylobacter are complex, composed of two flagellin subunits primarily Fla A and secondary Fla B. Both are known to be highly homologous to each other. The objective of this study was to identify common epitope binding sites and molecular variations of flagellin among Campylobacter species using two sets of monoclonal antibodies (MAbs). Ten strains of Campylobacter from three species namely Campylobacter jejuni, Campylobacter coli and Campylobacter fetus were cultured in Campylobacter blood-free agar (CCDA). Flagellin proteins were extracted from the cell surfaces and separated by SDS-Polyacrylamide Gel Electrophoresis. Two sets of MAbs (Groups I and V), composed of seven clones of MAbs, were used in Western blot to detect the binding patterns with respect to naturally expressed flagellin proteins. Both groups recognized flagellin proteins with molecular weights around 64 kDa and divers of flagellin fragments with molecular weights between 20 and 55 kDa. The results showed that two distinct binding patterns between Groups I and V MAbs with all tested strains. Within the same group of MAbs, the differences were also observed among the tested strains with respect to the molecular weights and relative binding intensities of flagellin fragments. The diverse patterns of Western blots from distinct strains of Campylobacter were compared using image tool analysis. The result showed that the binding patterns were unique for different strains and consistent in the subsequent cultures from the same stains. These monoclonal antibodies therefore may be valuable in strain identification and immunological tests.

ID025

Oral

Graduate Science - Agriculture

Comparison of concentration methods to facilitate the successful recovery and early detection of Phytophthora species from Tennessee nursery irrigation water

Diseases caused by Phytophthora are one of the most important problems for ornamental nursery production in the United States and water serves as an important means of introduction and spread of Phytophthora. The objective of this study was to develop methodology for reliable and sensitive screening of irrigation water for the presence of Phytophthora spp. in the complex environment of commercial nursery operations. P. nicotianae and P. capsici were used to spike 1L creek and chlorinated tap water samples with 102 and 104/ml zoospores. Phytophthora was concentrated by: 1) filtration (0.22 Âµm, 0.45 Âµm, 3 Âµm and 5 Âµm membrane filter), 2) centrifugation, and 3) baiting (1, 3, 5, and 7 days) and then tested directly with serological and molecular detection assays and culturing on selective PARPH-V8 medium. Filtration was the most effective and sensitive method for detecting low level of zoospores followed by baiting and centrifugation. Water samples (from small (<10 acres), medium (>10, <100 acres) and large (>100 acres) nursery production operations- 33 total samples) were processed with current accepted baiting procedure (USDA APHIS protocol). Six out of thirty tree water samples were confirmed as Phytophthora positive (3- P. syringae, 2- P. cryptogea and 1- P. hydropathica) using immunostrip, culturing on PARPH-V8 medium, PCR and sequencing. Reliable and sensitive detection of Phytophthora spp. in source and production water will be critical for making timely production management decisions by nursery growers and will help researchers and regulatory agencies to determine the distribution of Phytophthora species. This project was funded by the State of Tennessee, Department of Agriculture Specialty Crop Block Grant Program Agreement No. 32506-01117.

ID026

Poster

Graduate Science - Agriculture

Development of integrated pest management approach to control Phytophthora root rot in field grown hydrangeas

Phytophthora root rot is one of the destructive diseases in oakleaf hydrangea (Hydrangea quercifolia) productions. Experiments were established at Nursery Research Center field plot in McMinnville, TN to determine the efficacy of biorational fungicides and conventional fungicides against Phytophthora root rot in oakleaf hydrangea cvs. Alice, Ruby Slippers, and Munchkin. Plots were inoculated with P. nicotianae infested rice grains and were arranged with a randomized complete block design with four replications. Treatments applied were biopesticides - RootShield PLUS+, MBI-110, IT-5103, OxiPhos and TerraClean + TrerraGrow program and fungicides - Segovis, Empress Intrinsic, and Subdue Maxx. Treatments were applied as drench application starting after transplanting except TerraClean. All of the treatments reduced root rot disease severity compared to the inoculated, non-treated controls. Plots treated in all cultivars with Segovis, Empress Intrinsic, Subdue Maxx, MBI-110, and TerraClean + TrerraGrow program had significantly reduced Phytophthora root rot severity than the other treatments. Hydrangea cv. Alice was most susceptible to P. nicotianae than other cultivars. There were no significant differences among non-treated inoculated control, non-treated non-inoculated control and treated plots in plant weight, root weight, plant height and width. Phytotoxicity and defoliation were not observed in any of the hydrangea plants. This study shows that biopesticides, MBI-110 and TerraClean + TrerraGrow, should be considered alone or in a rotation of the fungicides to reduce the risk of Phytophthora root rot on different oakleaf hydrangea cultivars in field nursery production. This project was funded by USDA-NIFA Evans Allen.

ID027

Poster

Graduate Science - Health

Influence of Post-Traumatic Stress Disorder and Depression on the Quality of Life of Veterans with Traumatic Lower Extremity Amputations

INTRODUCTION

Physical Therapists utilize Quality of Life (QOL) scores to quantitatively measure how patients perceive their own QOL throughout the rehabilitation process. QOL is not only affected by physical health, but also mental health. PTSD and depression have been shown to have a notable presence among in Veteran populations. As Veterans with lower extremity (LE) amputations are a growing subgroup within the veteran population, this study looked to investigate how the diagnoses of PTSD and depression in Veterans with a traumatic LE amputation affected their QOL.

METHODS

A systematic review of multiple databases was performed using the keywords Veterans, lower extremity amputation, PTSD, Depression, and QOL to cultivate information related to our research topic. Twelve articles were identified that met our inclusion and exclusion criteria.

RESULTS

QOL scores for veterans with lower extremity amputations were shown to be moderately decreased for those with a diagnosis of PTSD or depression. Traumatic amputation in itself did not directly correlate to a decreased QOL. Additional factors, such as the number of amputations an individual has and/or their level of amputation, did not show a strong correlation with a decreased level of QOL for this population.

CONCLUSION

Self-reported QOL values indicated that amputation status, with or without non-mental health related comorbidities, does not directly result in decreased QOL. Although amputation status alone did not provide a direct correlation to QOL values, depression and PTSD were found to negatively impact the Physical Component Summary (PCS) in QOL scores. PTSD and depression are highly prevalent in veterans with lower extremity amputations, resulting in a moderately viable predictor of QOL scoring for this population.

SOURCES OF FINANCIAL SUPPORT

None

ID028

Oral

Graduate Science - Agriculture

Integration of high frequency soil data for improving a microbial-enzyme-mediated decomposition model performance

Abstract. Soil organic carbon (SOC) response to climate warming is largely uncertain. The uncertainty lies in very poor parameterization of key microbial processes that can invoke critical feedbacks to climate warming. To improve the parameterization and model performance will require high-frequency observation data for model calibration such as soil microbial biomass. By working with a microbial-enzyme-mediated decomposition model (MEND), we integrated soil heterotrophic respiration and MBC data to MEND model based on 10 independent soil collections in a 180-day long soil incubation experiment. Multiple scenarios were designed by integrating 2, 4, 6, 8 and 10 measurements in MBC with the model while the same respiration and soil organic C pool data were included in all scenarios. In each scenario, the model simulations and observations will be compared in order to evaluate the model performance from integrating low frequency to high frequency data. Preliminary results showed that simulation with high frequency scenario showed better fit with observed heterotrophic respiration than that with low frequency (R^2, 83% vs. 42%). The model projections over 1-year and one decade showed large discrepancies between low and high frequency scenarios. The preliminary output supports that integrating higher frequency MBC data can substantially improve model performance as compared with the traditional model calibration with low frequency data. Future field and laboratory experiment design should accommodate high frequency measurements of key soil and microbial variables. The proposed work is a collaborative project between TSU and Oak Ridge National Laboratory with funding sources of USDA and Department of Energy (DOE).

ID030

Oral

Graduate Science - Agriculture

Interactive Learning to Educate Youth About Safe Handling and Preparation of Poultry and Eggs

Youth are an important population to understand regarding knowledge and perceptions of food safety because they are more prone to mishandling foods. Educating youth about best food practices is a time-honored tool to reach parents and families of youth to catalyze adoption of technologies and information. Our purpose was to evaluate dissemination of Poultry and Egg Education Project (PEEP) food safety using interactive instructional modules. Our goals were to 1) evaluate learning modules, each focusing on different messages regarding poultry and egg food safety and to 2) document knowledge of key messages/content. Youth participants were also asked to self-report impacts of the PEEP modules. With assistance from TSU students, six activities were chosen and delivered: Bacteria on a Stick, Bean Bag Refrigerator Toss, Microscope and Toy Bacteria, Pick the Right Thermometer, Bag Demonstration, and our PEEP Videos. Using convenience sampling, students (N = 247) participating students were asked to complete an online survey following completion of learning modules that measured knowledge gained and impacts of the modules. They also rated each of the activities on a scale of 0 = Nothing new learned and not interesting to 100 = Learned something and found very interesting. The results showed that out of 247 participants 47% knew how long they should wash their hands, 95% state they had learned something new about poultry and egg safety, 93% percent state they are adopting the safety standards, and 91% state they will share the information. Lastly, students reported the highest enjoyment for hands on activities, and the lowest for the informative videos. The significance is that participants learned and intend to share proper poultry and egg safety standards.

ID031

Poster

Graduate Humanities

Teacher Perceptions of Implementation and Impact of CASE

The Curriculum for Agricultural Science Education (CASE) is an 80-hour professional development program that prepares teachers to deliver STEM-based CASE courses. Participants experience inquiry-based lesson plans, activities, and supporting resources from the viewpoint of a student and teacher.

Objectives

The objectives of this study were to examine teacher perceptions of levels of implementation and impact of CASE institutes.

Design

The design was a one-shot case study using descriptive survey research. Convenience sampling of those that responded in person or online garnered 386 responses.

Materials and Methods

The lead researcher on this project, a CASE-certified teacher who has credentials and experience for multiple courses, developed a list of questions. These questions inquired about student, teacher, and administer feelings towards CASE and were placed on a paper survey and given out in person at the National FFA Convention. After the convention was complete the surveys were then added to an online survey system and emailed to CASE participants.

Results

A majority of teachers reported complete implementation of CASE and acquisition of all suggested course materials. A majority of teachers reported that CASE cut their planning time in half or by greater blocks of time. Most teachers reported that CASE improved their instruction and their interactions with students. Student and administrator responses to CASE were positive, perhaps because of reported improvements in academics, critical thinking, and science knowledge/skills. Most participants were certified in multiple courses already and intended to certify in more.

Conclusions

Participants that invested time and resources to certify as a CASE instructor implemented CASE fully, and they created a positive impact on key student variables.

Source(s) of financial support

CASE is funded by Cooperative Extension at TSU and by participating individuals and school districts sending participant to the training.

ID032

Poster

Undergraduate Science - Life

Modulation of Phospho Tensin Homolog (PTEN) in Cancer Cells and Preadipocyte Cells Following Exposure to Flavonoids

Plant flavonoids have been shown to offer more protective health benefits against oxidative deoxyribonucleic acid (DNA) damages caused by ï•§-ray radiation, UV irradiation, chemicals, and endogenous oxidative stress. The above compounds have been shown to can modulate the activity of enzymes and affect the behavior of many cell systems. While these may account for the anti-mutagenic activities of flavonoids in experimental systems, relatively little is known about the mechanisms of the modulation of PTEN activity in cancer cells. The objectives of this study was to investigate the effects of three flavonoids: quercetin, kaempferol and genistein on the expression levels of both phospho- and total-PTEN in breast cancer (BT-549), lung cancer (A-549) and human preadipocytes (3T3-L1 which was used as controls). Cells were seeded and were exposed to each of the flavonoid at concentrations of 0, 5, 10, 15, 20 and 25 ÂµM and the phosphorylation of PTEN at Ser380, total PTEN levels were measured. The results indicate the flavonoids increased both phospho-PTEN- and total-PTEN levels increased in a dose-dependent manner. The effect of quercetin was more pronounced followed by genistein and kaempferol. The findings suggest that the flavonoids play an important role in controlling oxidative stress in cells.

ID033

Poster

Graduate Humanities

Prospect Theory based Behavioral Decision Making

The problem of decision making for hypothesis testing traditionally seeks to optimize an expected utility theory based objective function, such as Bayes risk. However, many modern decision making systems (such as crowdsensing systems) involve human agents, who are known to deviate from expected utility theory based models in the decision making process. The main objective of this work is to characterize decision making rules under behavioral considerations of human agents. Modeling human decision making behavior has been done using Prospect Theory, a Nobel prize winning work that describes human behavior. Our analysis shows that, under cost considerations, the decision rule obtained for prospect theoretic agents significantly deviates from the decision rule that minimizes Bayes risk when the distance between the means of the conditional distributions of the observation under the two hypothesis is smaller than a certain threshold. Numerical results provide insights into our solution.

ID034

Poster

Graduate Humanities

Consumption pattern of food assistance recipients: findings from a survey of low income families in Nashville metro area of Tennessee

Supplemental Nutrition Assistance Program (SNAP) from the United States Department of Agriculture (USDA) is aimed at providing nutritional security to nearly 46.5 million low income American families through food purchasing assistance via food stamps and vouchers. Additionally, there are other various food assistance and support programs such as Women, Infants and Children (WIC), Farmer's Market Nutrition Program (FNMP), Senior Farmer's Market Nutrition Program (SFMNP). However, there has been a debate about whether significant portion of that support is used towards healthy diet by recipient families. Specifically with increasing child and adult obesity problems among poor communities, SNAP has been criticized for failing to meet its goal of nutritional security. The goal of this study is to examine the food purchasing behavior of low income families. The study conducted a face-to-face interview among low income households in Nashville metro area of Tennessee. Information on different food purchase behavior is collected with relevant socio-demographic characteristics of the households; findings are compared between SNAP-recipient and non-recipient, particularly on attributes relevant to healthy food consumption such as shopping for different forms of fruits and vegetables and fruit and vegetable juices. Based on the response from 66 households, mainly from African American communities and using discrete and categorical models, this study tests for the effect of food stamp program participation on healthy food consumption. Then the study discusses implications of the findings for local and national level policies.

ID035

Poster

Graduate Humanities

Credit constraint, financing sources, and financial performance: A case from small farms in Tennessee

Agriculture is a major source of livelihood for a large number of people throughout the world. Small farmers and ranchers in America contribute significantly to the economy by ensuring a safe and reliable food supply, improving energy security and supporting job growth and economic development. As important as these small farmers are, they are faced with some issues. An access to capital and financing is one of the important issues. This study aims to understand the major sources of funds and factors affecting the selection of these sources by small farmers in Tennessee. Additionally, study also examines challenges faced in accessing these funds and utilization and management of these funds. This study conducted a primary survey with small farms in Tennessee to collect information about agricultural activities, diversification, production, finance, and risk in 2017. Using 104 total responses, we discuss findings regarding farm financial performance of credit constrained and unconstrained farmers.

ID036

Poster

Graduate Science - Health

The Effectiveness of Extracorporeal Shockwave Therapy on Athletes with Medial Tibial Stress Syndrome: A Review of the Evidence

The purpose of this evidence review is to determine if extracorporeal shockwave therapy could be an effective treatment option for athletes with medial tibial stress syndrome (MTSS). MTSS is a common diagnosis among athletes who increase training duration or intensity too quickly or may result from a change in running surface, style or footwear. MTSS is described as pain or tenderness along the distal 2/3 of the posteromedial tibia spanning an area of at least 5 cm. Risk factors include: female gender, high body mass index (BMI), higher navicular drop, previous lower extremity injury, and increased external hip rotation with hip in flexion. It is also associated with decreased bone density. Extracorporeal shockwave therapy (ESWT) is a noninvasive modality used for the treatment of pain and healing. ESWT is effective in alleviating pain in plantar fasciitis, healing fractures of long bones, healing of superficial tendinosis, and increasing bone density. Studies supporting the effects of ESWT to increase blood flow show a promising future of the use of ESWT to stimulate bone marrow and periosteal edema in order to speed up the recovery of MTSS. Treatment with ESWT in combination with a home exercise program consisting of stretching and strengthening has been found to result in reduction of pain and degree of recovery when compared to stretching and strengthening alone. Similarly, incorporating ESWT with a grading running program has been shown to accelerate return to sport when compared to only using a graded running program. More research is needed on the mechanism of biological changes resulting from MTSS, as well as the physiological effects caused by ESWT in order to determine if ESWT would be a viable treatment option for MTSS. Further randomized control trials looking at the outcomes of ESWT on MTSS are also needed.

ID037

Oral

Graduate Science - Agriculture

Effects of Elevated Hydrostatic Pressure for Decontamination of Raw Milk from Listeria monocytogenes and Background Microflora

Recent CDC epidemiological studies indicate approximately 99% of illnesses caused by Listeria monocytogenes are foodborne in nature, leading to hospitalizations in 94% of cases, and are responsible for collective annual death of 266 American adults. Current study evaluates effects of hydrostatic pressure at controlled temperatures for decontamination of raw milk. Various time (0 to 12 minutes) of elevated hydrostatic pressure (310 and 380 MPa e.g. 45K and 55K PSI) were investigated for inactivation of 4-strain mixture of Listeria monocytogenes (ATCCÂ® numbers 13932, 51779, 51772, BAA-2658) inoculated at target level of 6.0 log CFU/ml of raw milk. Temperature was monitored and maintained at 4, 25, and 50 ÂºC by a circulating water bath and a stainless steel water jacket. The experiments were conducted in two biologically independent repetitions, as blocking factors of a randomized complete block design, containing three repetitions per time/treatment/pressure within each block. Study was statistically analyzed by ANOVA using OpenEpi software. Inactivation indices were calculated using GInaFiT Software. At 380 MPa, for treatments of 0 to 12 minutes, D-values of 3.47, 3.15, and 2.94 were observed for inactivation of Listeria monocytogenes at 4, 25, and 50 ÂºC. Up to 3.73 and >4.26 log CFU/mL reductions ($P < 0.05$) of Listeria monocytogenes at planktonic stage were achieved using application of pressure at 380 MPa for 3 and 12 minutes, respectively. Similarly, background microflora counts were reduced ($P < 0.05$) by 1.3 and >2.4 log CFU/mL after treatment at 380 MPa for 3 and 12 minutes, respectively. Treatments below three minutes were less efficacious (P â‰¥0.05) against the pathogen and background microflora, in vast majority of time and pressure combinations. Results of this study could be incorporated as part of a risk-based food safety management systems and risk assessment analyses for mitigation of public health burden of listeriosis.

ID038

Poster

Graduate Science - Agriculture

Biofilm formation of wild-type and pressure-stressed Cronobacter sakazakii and Salmonella serovars and their sensitivity to sodium hypochlorite

Aggregate cells are the predominant physiological mode of bacterial proliferation in food processing and clinical settings and microbial biofilms are responsible for as high as 80% of all bacterial infections. Current study discusses biofilm formation of two pathogenic species on an abiotic surface and validates a decontamination intervention against wild-type and pressure-stressed phenotypes of the bacteria. Four strain mixture of Cronobacter sakazakii and Salmonella serovars were used for biofilm formation for up to 14 days. Biofilm formation/enumeration/decontamination was conducted on surface of stainless steel coupons (finish 2b) at 7 and 25 ºC. After removal of loosely attached cells, samples were neutralized using D/E neutralizing broth and separated from coupons using glass beads method, prior to culture dependent analyses. Pressure-stressed phenotypes were prepared by exposing the isolates to sub-lethal elevated hydrostatic pressure at 15,000 PSI (approximately 100 MPa) for 15 minutes. The experiments were conducted in two biologically independent repetitions, as blocking factors of a randomized complete block design and analyzed statistically using OpenEpi software. In excess of 3.26 and 2.17 log CFU/cm^2 increase ($P<0.05$) in biofilms mass of stainless steel coupons were observed during 14 days for wild-type and pressure-stressed phenotypes of Salmonella, respectively at 25 ºC. Treatment on days 0, 7, and 14 of biofilm formation were responsible for 2.54, 1.78, and 1.88 log CFU/cm^2 reductions ($P<0.05$) of biofilms of wild-type Cronobacter sakazakii, respectively at 25ºC and lead to reductions of 2.76, 1.62, and 0.99 log CFU/cm^2 reductions ($P<0.05$) of biofilms of pressure-stressed Cronobacter sakazakii. Overall, wild-type and pressure-stressed phenotypes of Salmonella serovars and Cronobacter sakazakii exhibited similar biofilm formation capability and sensitivity to the sanitizer.

ID039

Oral

Graduate Science - Health

High Pressure Pasteurization for Inactivation of Rifampicin-Resistant Cronobacter sakazakii in Reconstituted Infant Formula

Infections associated with Cronobacter sakazakii are often fatal in infants born premature and those younger than two months. Two historic outbreaks of Cronobacter sakazakii associated with infant formula in Tennessee in 1988 and 2001, and a 2016 infection episode of the bacterium associated with a premature infant in Pennsylvania had brought increasing attention to endeavors for decontamination of the bacterium from infant formula. Current study investigated effects of high pressure pasteurization at 4 and 50 ºC for inactivation of the bacterium inoculated in reconstituted infant formula. Various times (0, 1, 4, 7 and 10 minutes) and two intensity levels of 310 and 380 MPa (e.g. 45K and 55K PSI) of elevated hydrostatic pressure were investigated for inactivation of 4-strain mixture of rifampicin-resistant Cronobacter sakazakii, inoculated in reconstituted infant formula. Experiment was conducted at 4 and 50 ºC, in two biologically independent repetitions, as blocking factors of a randomized complete block design. Samples were enumerated on TSA supplemented with rifampicin and yeast extract. Analysis of variance was conducted followed by LSD-based mean separation using OpenEpi software. During treatments at 380 MPa at 4 ºC, 1.59 and >6.01 log CFU/mL of inoculated pathogen were reduced ($P<0.05$) after 1- and 10-minute treatments, respectively. At 50 ºC and 380 MPa, corresponding reductions ($P<0.05$) were >5.00, >5.90, >5.81, and >6.00 log CFU/mL after treatments for 1, 4, 7, and 10 minutes, respectively. At 310 MPa the reductions ($P<0.05$) were ranging from 1.35 to 3.67 and 3.10 to >5.72 log CFU/mL for samples treated at 4 and 50 ºC, respectively. Over 5-log reduction of Cronobacter sakazakii in reconstituted infant formula is achievable as result of optimized high pressure pasteurization that could be utilized to assure safety of infant formula particularly for premature newborns and those with elevated risk of Cronobacter infection.

ID040

Survival and Inactivation of Wild-Type and Rifampicin-Resistant Cronobacter sakazakii and Background Microflora of Infant Formula using Repeated Cycles of Hydrostatic Pressure

Previously known as Enterobacter sakazakii from 1980-2008, Cronobacter sakazakii could survive and proliferate in dry, low moisture environments such as infant formula. Infections caused by the bacterium are often fatal in infants born premature and those younger than two months. Sporadic cases have been investigated in Florida, Oklahoma, Missouri, Illinois, Tennessee, and more recently Pennsylvania in 2016. There have been occurrence of two outbreaks associated with Cronobacter sakazakii in infant formula in Memphis, TN (1988) and Knoxville, TN (2001). Up to 9 cycles of elevated hydrostatic pressure (350 MPa, 30 seconds) were investigated for inactivation of 4-strain mixture of wild-type and rifampicin-resistant Cronobacter sakazakii, at 4 and 55 ºC, respectively. In a companion experiment, survival of the 4-strain mixture Cronobacter sakazakii in infant formula was investigated during aerobic storage at 10 and 25 ºC. The experiments were conducted in two biologically independent repetitions, as blocking factors of a randomized complete block design, containing three repetitions per cycle/phenotype within each block. Study was analyzed by LSD-based ANOVA using OpenEpi software. Counts of Cronobacter sakazakii were reduced ($P < 0.05$) from 5.50±0.5 to 4.74±0.2 log CFU/g (approximately <90% reduction) during a 14-day aerobic storage at 25ºC. Counts of background microflora were similarly reduced ($P < 0.05$) from 7.19±0.4 to 5.03±0.2 log CFU/g (approximately >99% reduction), during a 14-day aerobic storage at 25ºC. At 55ºC, >2.04 and up to 6.56 log reductions ($P < 0.05$) of wild-type Cronobacter sakazakii were observed as result of application of elevated hydrostatic pressure at 350 MPa (51K PSI). At 4ºC, >1.06 and >5.23 reductions ($P < 0.05$) of wild-type Cronobacter sakazakii were observed as result of application of elevated hydrostatic pressure at 350 MPa (51K PSI).

ID041

Oral

Undergraduate Science - Agriculture

Synergism of Natural Antimicrobials and High Pressure Pasteurization for Inactivation of Listeria monocytogenes in a Processed Dairy Product

Listeria monocytogenes is one of the leading causes of foodborne diseases and unlike vast majority of foodborne pathogens is halophilic in nature and could tolerate cold temperatures. A recent multistate outbreak associated with contaminated ice-cream with Listeria monocytogenes had drawn the attention of researchers and the popular press to safety of ice-cream products. Various time (0 to 9 minutes) of elevated hydrostatic pressure (380 MPa e.g. 55K PSI) were investigated for inactivation of 4-strain mixture of Listeria monocytogenes (ATCC® numbers 13932, 51779, 51772, BAA-2658) inoculated at target level of 7.5 log CFU/ml of ice-cream base. Temperature was monitored and maintained at 4 ºC by a circulating water bath and a stainless steel water jacket surrounding the chamber. Control samples, and those containing 1% lactic acid, caprylic acid, and citric acid were studied. In a companion experiment, survival of the 4-strain mixture Listeria monocytogenes and background microflora in ice-cream base was investigated during aerobic storage at -20 ºC for control samples and those with 1% added citric acid. The experiments were conducted in two biologically independent repetitions, as blocking factors of a randomized complete block design, containing three repetitions per time/treatment within each block. Study was statistically analyzed at type one error level of 5% by LSD-based ANOVA using OpenEpi software. During the survival experiment, background microflora were 6.77 ± 0.4 and 7.66 ± 0.3 log CFU/mL on days 0 and 14, respectively. Similarly, Listeria monocytogenes counts were 5.72 ± 0.2 and 5.86 ± 0.4 log CFU/mL on days 0 and 14, respectively, after aerobic storage at -20ºC. A treatment at 380 MPa (55K PSI) for 9 minutes reduced (P <0.05) the pathogen counts for 1.66, 3.24, 1.51, 5.05 log CFU/ml of control samples and those with 1% lactic acid, caprylic acid, and citric acid, respectively.

ID042

Oral

Undergraduate Science - Agriculture

Sensitivity of Foodborne Isolates of Salmonella serovars, Cronobacter sakazakii, and Listeria monocytogenes to Mild Hydrostatic Pressure and Heat in Phosphate Buffered Saline Medium

Application of high pressure processing in food manufacturing had been gaining increasing momentum in recent years due to advances in engineering of commercially available units. In the United States the market size of pressure-treated products are estimated to surpass $9B annually. Hydrostatic pressure of 103 to 380 MPa (15k PSI to 55K PSI) were applied at various time intervals (0 to 10 minutes) for inactivation of five strains of Salmonella serovars (at 35 and 55ºC), four strains of Listeria monocytogenes (at 25ºC), and four strains of Cronobacter sakazakii (at 25 and 55ºC), inoculated at target population of 7.0 log CFU/mL in phosphate buffered saline medium. The pressure processing unit was equipped with water jacket and circulating water bath surrounding the reaction chamber for precise application of hydrostatic pressure at controlled temperature. Experiments were conducted in Barocycler Reaction PULSE Tubes, with internal pressure, temperature, and compression rate monitored every 3 seconds using Barocycler HUB PBI Software. Results were analyzed using LSD-based ANOVA by OpenEpi software. Salmonella serovars were reduced ($p < 0.05$) below detection limit after 3, 6, and 9 minutes of treatment at 35 ºC and after 1, 3, 6, and 9 minutes of treatment at 55 ºC. At ambient temperature, Listeria monocytogenes was not reduced ($p ≥ 0.05$) after a 1-minute treatment at 380 MPa, and were reduced ($p < 0.05$) by >4 log CFU/mL after a 10 minute treatment at 380 MPa. Cronobacter sakazakii was reduced ($p < 0.05$) by 3.1 and 5.6 log CFU/mL after a 9-minute treatment at 380 MPa, at 25 and 55 ºC, respectively. Application of hydrostatic pressure up to 380 MPa, reduced Salmonella serovars, Listeria monocytogenes, and Cronobacter sakazakii by more than 4 log CFU/mL in phosphate buffered saline medium when applied for more than 3 minutes.

ID043

Poster

Undergraduate Science - Agriculture

Fate and Decontamination of O157 and Non-O157 serogroups of Shiga Toxin-Producing Escherichia coli, including ATCC 43895, as Affected by Elevated Hydrostatic Pressure

Various serogroups of Shiga toxin-producing Escherichia coli including O157, O26, O45, O103, O111, O121 and O145 had been involved in an array of recalls associated with meat products leading to 423 outbreaks from 1998 to 2016. This study investigated fate and effect of elevated hydrostatic pressure on reduction of wild-type phenotype of various serogroups of Shiga toxin-producing Escherichia coli. A 6-strain mixture of Escherichia coli O157:H7, non-O157 Escherichia coli (CDC's big six serogroups), as well as ATCC 43895 (1992-1993 outbreak strain) were inoculated in 10% meat homogenate. In addition to a two-week aerobic storage trial, hydrostatic pressure at 380 MPa (55,000 PSI) were applied at various time intervals (0 to 10 min) for decontamination of the inoculated serogroups. Analysis of Variance followed by LSD-based mean separations were conducted at type I error level of 5% using OpenEpi software. Experiments were conducted in two biologically independent repetitions, each as a blocking factor of a randomized complete block design. During the aerobic storage at $10ºC$, O157 E. coli strains were increased ($P>0.05$) from 5.55 $\pm$ 0.1 to 7.67 $\pm$ 0.2 log CFU/mL of inoculated meat homogenate on days 0 and 14, respectively. Similarly, non-O157 E. coli strains were increased ($P>0.05$) from 5.81 $\pm$ 0.2 to 7.79 $\pm$ 0.2 log CFU/mL on days 0 and 14, respectively. A treatment at 380 MPa for 10 minutes reduced ($P<0.05$) the pathogen counts for 1.74, 1.91, and 2.08 log CFU/ml for O157, non-O157, and ATCC 43895 samples, respectively. Treatments below three minutes showed low efficacy ($P≥0.05$) in decontamination of the pathogen. In vast majority of tested time and pressure combinations, O157 and non-O157 E. coli showed similar ($P≥0.05$) sensitivity and reduction patterns. The 1992-1993 E. coli O157:H7 outbreak strain also showed comparable sensitivity to high pressure pasteurization.

ID044

Host range study of a lysogenic phage in a roseophage-roseobacter system and characterization of lysogens in affecting marine biogeochemistry

University of Tennessee, Knoxville

Department of Microbiology

Viruses are abundant in the marine environment, where they actively infect marine bacteria and contribute to biogeochemical cycles. Bacterial viruses (phage) display two distinct lifestyles: host lysis or integration in their host's genome (where they are termed prophage). Prophages lie dormant until environmental conditions trigger their induction to a lytic cycle. In a limited number of well-studied phage-host systems, prophages have been able to provide their hosts immunity against infection by other phage. The extent to which this immunity is prevalent in marine bacteria and influences the occurrence of lytic events has not been well studied. We have isolated a marine bacterium, Sulfitobacter sp. CB2047, and its infecting phage (ϕCB2047-A). The bacterium contains a prophage with high sequence similarity (85.65% identity) to ϕCB2047-A. We have also isolated four additional Sulfitobacter strains, isolated from distinct environments and none of which contain a prophage. Integration experiments of Sulfitobacter CB2047 with ϕCB2047-A results in a substitution of the prophage, yield the strain YM3A. We hypothesize that phage integration is possible in the additional Sulfitobacter strains and have data to support this for Sulfitobacter sp. EE-36. These data increase our understanding of the biotic factors that stimulate prophage integration. We also hypothesize that prophage in their lysogenic state will affect host physiology. Indeed CB2047 and YM3A have distinctly different phenotypes with respect to growth rates, cell size, and biofilm formation, suggesting that roseophage have the ability to dramatically alter bacterial physiology and marine biogeochemistry.

ID045

Poster

Undergraduate Science - Agriculture

Epidemiology of Foodborne Disease Outbreaks in Tennessee and the United States: A Secondary Analysis of CDC Outbreak Data of 1998 to 2016

Foodborne diseases could affect healthy individuals and more severely at-risk groups such as the very young, the elderly, pregnant women, and the immunocompromised. It is estimated that around 30% of US population are currently considered as at-risk individuals for foodborne diseases. Recent epidemiological estimates of the Centers for Disease Control and Prevention indicate as high as 1 in 6 Americans experience foodborne diseases every year, leading to more than 127,000 episodes of hospitalizations and around 3,000 deaths. From 1998 to 2016, there have been more than 19,900 single or multistate outbreaks leading to about 380,000 illness with 4% rate of hospitalization.

Information derived from active surveillance of the Centers for Disease Control and Prevention from 1998 to 2016 were analyzed and will be presented in the current study. Particular emphasis has placed on comparison of Tennessee-related food safety outbreaks, illnesses, hospitalizations, and death episodes as related to national statistics. In addition, Disability Adjusted Life Year (DALY) of main foodborne pathogens of concern in Tennessee will be presented.

ID046

Poster

Graduate Science - Life

Quantitative In Vivo Imaging Approaches For Measuring Precursor Targeting to Plastids

University of Tennessee

Dept of Biochemistry & Cellular & Molecular Biology

Plastids, such as chloroplasts, have one of the most complex systems of protein sorting, consisting of translocons and selective machinery that mediate proteins from the cytosol to the proper location within the organelle. Though plastids have a genome of their own, the majority of localized proteins are nuclear encoded and must be post-translationally imported. They do this through a transit peptide â€œzip code,â€• a targeting sequence specific to the directed localization of the specific protein. Recently, qualitative progress has been made using chimeric fluorescent proteins with the transit peptide for the small subunit of RuBisCO fused variants of the green fluorescent protein (GFP). We have made this assay quantitative by using YFP targeting to leucoplasts in onion epidermis following biolistic transformation. Although this assay is quite quantitative it suffers from several limitations: 1) it uses non-green plastids for looking at targeting of photosynthetic proteins, 2) onion is a monocot and most constructs are from dicots, and 3) the efficiencies are too low to allow any further biochemical analysis such as plastid isolation. To overcome these limitations, we have begun using rapidly growing pea (Pisum sativum) seedlings as a source for in vivo analysis. We are now comparing three quantitative in vivo approaches to test various transit peptide site-specific mutations: PEG mediated transfection of protoplasts, and both Agrobacterium mediated and Biolistic transformations of leaves. Following PEG mediated transfection, the intact chloroplasts can be isolated and evaluated quantitatively for protein translocation using confocal microscopy, flow cytometry, and/or immunoblotting. Import and processing can be confirmed using exogenous treatment of the protease thermolysin on the intact chloroplasts. The various advantages and disadvantages of the three methods are presented here.

ID047

Poster

Graduate Science - Life

Is reduced apical height of conical petal cells a new trait in the selfing syndrome?

University of Tennessee, Knoxville

Department of Ecology and Evolutionary Biology

A novel function of a floral trait, the presence of conical petal cells (CPC), has been identified in Antirrhinum. In a set a behavioral assays, it was determined that bees that visit wild type Antirrhinum flowers (wild type CPC expression) have increased foraging success relative to bees that visit mutant flowers that lack CPC expression (flat epidermal cells). Bees on flowers with CPCs retain a grip on the petals of large, showy, zygomorphic flowers, which facilitates outcross pollination. On petals with only flat epidermal cells, bees are unable to maintain their grip on flowers, which reduces outcross reproductive success. CPCs have been documented in ~80% of angiosperm taxa examined, yet little is known about differences in surface abundance CPCs or morphology between plant species with predominantly outcrossing vs. selfing mating systems. We hypothesize that highly self-fertilizing species will have significant reductions in the relative petal area covered by CPC and apical height of cells compared to outcrossing species. We test this hypothesis by quantifying the percent petal area covered by CPC and the apical height of individual petal cells using scanning electron microscope (SEM). We contrast these metrics in two selfing/outcrossing sister species pairs in the genus Collinsia (Plantaginaceae) [C. rattanii /C. linearis and C. parryi/C. concolor]. Our results show that the selfing species have a reduced percent area of CPCs and nearly exclusively flat petal cells compared to their outcrossing sister species. These results suggest that reduced CPCs may be an additional trait in the selfing syndrome.

ID048

Poster

Graduate Engineering

Generic framework for parameter studies in distributed systems

University of Tennessee, Knoxville

Department of Electrical Engineering and Computer Science

Computational approaches, such as simulation and modeling, are widely used to extract insights and information from a wide range of domains. These applications are often complex due to the sheer size of the parameter space and long run times. As a consequence, testing and validating such applications is not trivial, moreover, since parameters may come from disparate sources (e.g., command line arguments, environment variables, and/or files). In order to find an optimal or "good" set of parameters, a parameter study tries out many combinations from the search space. High-performance and distributed computer systems are practical for performing parameter studies due to their large collection of processors and storage resources. The setup, submission, and orchestration of such jobs in computing clusters may be a challenge, particularly to non-programmers or new users. This project presents a Python/C++ framework for conducting parameter studies in a parallel or distributed fashion. The parameter space is defined in JSON configuration files, thus removing from the user the need to create complex submission scripts and having to schedule multiple independent jobs. By providing such capabilities at the user-level, a user can set up parameter sweeps in an easy and quick manner. In several cases, a parameter sweep requires execution of multiple tasks, containing inter-task dependencies. An additional feature of this framework is a lightweight workflow management system, also expressed via configuration files. The contribution of this work is to provide a simple method for performing parameter studies for a variety of application classes, and in turn reduce the turnaround time of results and increase the usage efficiency of the computing resources.

ID049

Poster

Graduate Science - Life

Growth Effects of Tumorigenic Cells Exposed to Extracts of The Medicinal Plant Onosma

Growth Effects of Tumorigenic Cells Exposed to Extracts of The Medicinal Plant Onosma. Jawaher Albaqami and E. Lewis Myles

Cancer informed benign tumor or malignant neoplasm. It is also considered as a group of disease that abnormal growth of the cells with the potential to spread and invade other parts of the human body. This examination concentrates fundamentally on Onosma has been customarily utilized and consider has demonstrated their significant antibacterial, antimicrobial, and against parasitical exercises. It is noted that Tobacco use is the leading cause of about 30% of cancer deaths in the world. Another 20% is due to obesity, poor diet, consumption of alcohol and lack of physical activity. About 10-20% of cancer is because of genetic problems inherited from one individual to the other. These vital attributes give the reason for examining Onosma and concentrates further for potential antitumor specialists. However, Concentrates were taken from the already expressed plants and presented to cancer cells for 24 hours. Development examination was then decided to utilize a cell viability indicator Alamar. At its most elevated concentration, cell growth was just about 5 percent at a certain point, an outcome not noticeable in different plants. Nonetheless, the slightest viable plant gives off an impression of being Onosma, in which cell development was averagely higher than all plants even at its most astounding concentrations. In all cases, this concentrate demonstrated practically no impact in diminishing cell expansion. Then again Onosma had some influence on COLO320, PC3, SW620 and A549 however just at the most astounding concentration of 0.01mg/ml.

Biased on the result, it is presumed that extracts from Onosma ought to be concentrated further to describe their antitumor potential, research their original dynamic mixes, and to comprehend better their components of activity.

ID050

Poster

Graduate Science - Life

Cytotoxicity Activities of Lemon balm, Wormwood, Costus, Guava leaves Plant Extracts and Honey against Breast/Lung /Colon Cancer Cell Lines.

Cytotoxicity Activities of Lemon balm, Wormwood, Costus, Guava leaves Plant Extracts and Honey against Breast/Lung /Colon Cancer Cell Lines. Heba Alhamdi and Chris Davis, E. Lewis Myles

The National Cancer Institute states that the overall number of Americans with cancer diseases is approximately 13.7 million people. The U.S. cancer mortality rate is currently 580,350 Americans per year and 1,600 per day, according to 2013 statistics. Furthermore, cancer is the second most widespread cause of death in the United States, exceeded by heart disease. Cancer covers approximately 20 percent or one-fifth of all death causes in the U.S. This investigation focuses primarily on Costus speciosus , Psidium guajava, Melissa officinalis, Artimisia, and honey. These important characteristics provide the rationale behind studying these plants and extracts further for potential antitumor agents.

Experimental: extracts were taken from the previously stated plants and exposed to breast, lung and colorectal cancer cells for 24 hours. Growth analysis was then determined using a cell viability indicator Alamar blue and a florescent plate reader.

 Results: Psidium guajava appears to be the most effective plant when it comes to inhibiting cancer cell growth, followed by Melissa officinalis. At its highest concentration, cell growth was almost zero at one point, a result not visible in other plants. However, The least effective plant appears to be Costus speciosus, in which cell growth was averagely higher than all plants even at its highest concentrations. In all cases, this extract showed little or no effect in reducing cellular proliferation.

Conclusion: We conclude that leaf extracts from Psidium guajava and Melissa officinalis and Honeybee should be studied further to characterize their antitumor potential, investigate their main active compounds, and to better understand their mechanisms of action.

ID051

Oral

Graduate Engineering

Network resource management for cloud based networked control systems via adaptive sampling

A recent advancement in computing technology, referred to as cloud computing, enables control systems to access computational and storage resources over communication networks. Motivated by the benefits of using the cloud, several research efforts are going on to incorporate cloud into the traditional control system. However, signals, including control actions, are transmitted over a communication link which is associated with bandwidth limitation that could cause delay, packet drops which ultimately affects the performance and stability of the underlying control system. In this paper, we propose a real-time network resource management strategy to manage network resources to overcome such drawbacks. The proposed fuzzy based algorithms are implemented in an experimental platform to demonstrate the effectiveness of maintaining the successful operation of the plant under limited network resources.

ID052

Poster

Graduate Science - Agriculture

Anti-proliferative potential of sweetpotato leaves and stem breast and lung cancer cell lines

Sochinwechi Nwosisi, Elbert Lewis Myles, Dilip Nandwani

Over the last few decades, researchers have been searching for plant derived medicines. Though much of the focus has been on medicinal herbs, many vegetables such as sweetpotato also have been discovered to have medicinal properties due to their high levels of nutrients and phytochemicals. The aim of this study was to determine the effects of methanolic extracts from sweetpotato leaves and leaves/stem on human lung (A549) and breast (BT549) cancer cell lines. The sweetpotato leaf and stem were obtained from Tennessee state University Organic research farm and extracted using methanol. Alamar blue assay was used to determine if the methanolic extracts from the fresh sweetpotato leaves (cv. All Purple) and leaves/stem (cv. Carolina Ruby) had the potential to affect cell proliferation on the human lung (A549) and breast (BT549) cell lines in-vitro. Tamoxifen was used as the positive control while DMSO was used as the negative control. Sweetpotato leaves of the All Purple cultivar and stem/leaves of the Carolina Ruby cultivar inhibited lung and breast cancer cell growth in a dose-dependent manner. Anticancer activities of these extracts were displayed through their ability to inhibit the growth of cancer cell lines, such as BT549 (breast cancer) and A549 (lung cancer) in concentration--dependent manner. Further studies should be carried out to determine not only the bioactive compounds that may be present in this compounds that produced this effect.

ID053

Oral

Graduate Engineering

Agent-based Framework for Real-Time Detection of False Data Injection Attacks in Software Defined Networking Enabled Power Grid SCADA Systems

We study false data injection (FDI) attacks on measurement data and false data injection attacks on command data against a Supervisory Control and Data Acquisition (SCADA) system of the power grid. An attacker who knows the syntax and payload of SCADA control commands can craft a false data injection attack against commands causing them to appear legitimate which upon execution may put the energy delivery system in a critical state. On the other hand, an attacker who knows the topology of the power network can also craft a false data injection attack against measurement data such that conventional bad data detection schemes employed in state estimators fail to detect such attacks. We develop a distributed agent-based framework for detecting attacks that modify control signals such as control commands issued by the SCADA to remote substations and measurement data transmitted from substations to the SCADA. The distributed agent-based FDI detection framework proposed is composed of agents deployed at substations equipped with local substation data and the capability to exchange this data with agents at neighboring substations to detect malicious control commands and maliciously corrupted measurement data. In addition to detecting FDI attacks against legacy SCADA systems we extend our results to software defined networking (SDN) enabled SCADA systems to achieve some level resilience in the presence of false data. We develop an SDN framework which defines cyber threats and assigns a level of criticality on threats based on their location and impacted SCADA components for efficient and timebound detection and resolution of faults.

ID054

Oral

Graduate Science - Health

Synergistic combination of luteolin and indole-3-carbinol selectively restrains estrogen receptor-positive breast cancer development

Dietary phytochemicals have emerged as modulators of multiple molecular or cellular components in various types of cancer. The rational of combining dietary phytochemicals is that phytochemicals at low dosages efficiently exert anticancer without side effects. In the present study, we firstly combined luteolin with indole-3-carbinol (I3C) at various concentrations to inhibit breast cancer cell growth using a cell proliferation assay in MCF7 (estrogen receptor alpha-positive, ERα+), MDA-MB-231(triple negative breast cancer, TNBC) and BT-549 (TNBC) cells. Our results show that the combinations of luteolin and I3C (luteolin < 30 µM and I3C < 120 µM) selectively inhibited ER+ MCF7 breast cancer cell growth but have no inhibitory effects either in MDA-MB-231 or BT-549 cells. Moreover, the selected combination of luteolin and I3C did not exhibit cytotoxicity in human normal endothelial cells (EA.hy926) compared to a couple of commercial anti-breast cancer drugs. Furthermore, immunoblot assays demonstrated that combination of luteolin and I3C down-regulated SIRT1 and ERα protein expression in MCF7 cells. Finally, we found that co-administration of luteolin (8mg/body weight/day) and I3C (20mg/body weight/day) by intraperitoneal injection for 28 days significantly suppressed tumor growth while the individual luteolin or I3C injection have no significant anti-cancer effect in MCF7 xenograft mice. These results suggest that combination of luteolin and I3C may be an efficient approach to treat/prevent ER+ breast cancer without side effects.

ID055

Oral

Undergraduate Engineering

The Design of a GPS Spoofing System

As modern warfare becomes more technological, new methods of attack become available to the technologically savvy. Many military operations are intended to be covert but rely on vulnerable Global Positioning System (GPS) information. Tech savvy attackers can penetrate the GPS network and obtain secret information, such as the locations of sensitive operations. This investigation focuses on the design and implementation of a GPS spoofing system that misleads attackers regarding the true position information by broadcasting false GPS data. A system engineering approach is used to design this system. Relevant mathematical, scientific, and engineering theories, principles, and tools are administered accordingly. The GPS spoofing system is composed of a software capable of manipulating a genuine GPS signal. We show that the cloaking of true GPS information is advantageous as both an offensive and a defensive military strategy.

ID056

Oral

Graduate Science - Health

Anti-inflammatory Effects and Molecular Mechanisms of the Combination of Curcumin and Resveratrol in Vascular Cells and Mouse Aorta

Monocyte recruitment and adhesion to the endothelium is a crucial step the development of endothelial dysfunction and therefore induces cardiovascular disease (CVD), the number one killer of Americans. Emerging evidence shows that polyphenols, the secondary plant metabolites present in a large variety of foods, have the potential ability in reducing risk of CVD. The aims of this study are to investigate the synergistic anti-inflammatory effects of combined polyphenols at physiological levels and define relevant molecular mechanisms. Our results indicate that resveratrol and curcumin dose-dependently inhibited tumor necrosis factor-alpha (TNF-α)-induced monocytes adhesion to human EA.hy 926 endothelial cells. The half maximal effective concentration values of curcumin and resveratrol are 15 μM and 26 μM respectively. Particularly, combined curcumin (8 μM) and resveratrol (13 μM) significantly inhibited TNF-α-induced monocytes adhesion to endothelial cells while the individual chemicals did not have such effect at these concentrations. The combination index value of curcumin plus resveratrol at the selected concentrations is 0.82, indicating combination of these two polyphenols has synergistic anti-inflammatory effect. This synergistic anti-inflammatory effect was confirmed in the ex vivo assays using aorta from C57BL/6 mice fed with diet containing curcumin 500 mg/kg and resveratrol 200mg/kg for one week. Combination of resveratrol and curcumin also synergistically ameliorated the TNF-α-enhanced protein expressions of vascular cell adhesion molecule and monocyte chemotactic protein-1, two major indicators of vascular inflammation, both in cultured endothelial cell

ID057

Oral

Undergraduate Science - Agriculture

Multiple Displacement Amplification of Individually Isolated Sweet Sorghum Microspore's Genomes

Multiple displacement amplification (MDA) is more efficient whole genome amplification (WGA) technology than the polymerase chain reaction (PCR) method. PCR procedure is used in WGA through primer extension pre-amplification (PEP) through melting, primer annealing, and extension temperatures during each amplification cycle. MDA utilizes random hexamer primers (small length) which can anneal to the template at 30°C while same constant temperature is needed for DNA strand synthesis by Phi 29 polymerase. This enzyme does not disassociate from the template DNA during synthesis, thus eliminates the potential for sequence bias and circumvents the need to melt the template at the growing fork. It can thus be hypothesized that DNA from individually isolated microspores of Sorghum bicolor L. amplified using MDA would have greater WGA success than that from the PCR-based PEP method. Two varieties of Sorghum bicolor L. ('Dale' and 'Topper 76-6') were grown in a greenhouse and closely monitored for physical indications around developing panicle (booting stage) for capturing microspores immediately after tetrad stage when the free microspores are without any exine (cell wall) and can be lysed. To isolate microspores, the individual sessile spikelets measuring 3.3-3.7 mm in length were dissected from spikes under a microscope to retrieve anthers. The anthers were crushed in sorbitol solution to release free microspores and cell-wall absence was confirmed under a high-power microscope. The microspores were then individually isolated into PCR tubes using a CellTram (Eppendorf North America, Hauppauge, NY) micro-injector mounted on an ultrafine move Marzhauser (HS-6) micromanipulator (ALA Scientific Instrument, Westbury, NY). Whole genome DNA amplifications were carried out using REPLI-g Single Cell Kit (QIAGEN, Germantown, MD) and comparatively quantified by NanoDrop™ One (Fisher Scientific, Hampton, NH) UV-Vis Spectrophotometer. Funded by National Academies Sci., facilities Col Ag

ID058

Sweet sorghum varietal differences as depicted through plant development stages and sugar yields

Four sweet sorghum (Sorghum bicolor L.) varieties, i.e, 'Archi Turi', 'Dale', 'Dasht local' and Topper 76-6 were grown in a greenhouse under controlled environmental conditions. Germinated seeds were grown in seven gallon plastic pots (Nursery Suppliers Inc., Chambersburg, PA; USA) containing professional grow mix (Sun-Gro Horticulture Distribution Inc., Agawam, MA; USA) maintained at controlled temperature (day average temp 18.97°C; night average temp 14.48°C). Plants were fertilized and watered regularly when needed while the glasshouse was maintained at average of 32.06% relative humidity. It was hypothesized that using plant growth, number and stages of microspore as well as sugar yield data; the best sweet sorghum variety can be identified for biofuel studies. Plant height, boot radius, flag leaf width, panicle length, spikelet length and microspore stages of development were periodically recorded. All four varieties were also compared on the basis of the sugar yield data obtained from each plant. From microspore data, it was concluded that the highest microspores width were observed when harvested from top to middle of the panicle comparing same panicle lengths with minor exception for Topper 76-6 variety. Through plant growth data, 'A. Turi' and 'Dale' Varieties showed gradual decrease in the flag leaf width accompanied by gradual increase in the boot radius while 'Dasht Local' variety showed more uniformity. Juice harvested from each variety showed different Brix0 values ranging highest from Topper (11%), Dasht local (10.6%), Dale (9.5%) to lowest in A. Turi (2.7%). On the other hand, Dale and A. Turi varieties showed better resistance against insect pest infestation in the greenhouse. Based on sugar yield and inect-resistance to data, it can be concluded that 'Dale' variety is relatively most suitable for microspore studies, however, all varieties have potential in the field conditions. Research funded by National Academies of Sci., facilities Agr. College.

ID059

Oral

Graduate Engineering

The Synthesis and Mechanical and Structural Properties of Piezoelectric Polyvinylidene Fluoride Doped with Barium Titanate Nanoparticles

Authors: A. Joaquim, O. Paul, R. Turner, R. Parthasarathy, L. Ouyang, Yu. A. Barnakov and F. R. Williams

Strain engineering is an innovative and prominent concept in the field of materials science. The coupling of materials' strain/stress with their functional properties leads to a number of unprecedented phenomena ranging from surface enhanced Raman spectroscopy (SERS) enhancement in corrugated plasmonic structures to modification of the energy landscape in catalytic systems, from improving of nanoscale ferroelectricity in coherent epitaxial films to an increase of energy harvesting efficiency in photovoltaic devices. Herein, preliminary results of research work related to modification and improvement of piezoelectric properties of polyvinylidene fluoride (PVDF) nanocomposites by employing strain technology is presented. Two experimental approaches are utilized to produce polymer nanocomposites: (i) mechanical stretching of PVDF matrix doped with ferroelectric barium titanate nanoparticles and (ii) doping of PVDF with mechanochemically synthesized $BaTiO_3$ nanoparticles. The overall goal is to improve elasticity of polymer composites in order to enhance their piezoelectric functionalities. The mechanical and structural properties of the synthesized materials will also be discussed.

ID060

Oral

Graduate Engineering

The Light Intensity Induced Phase Transitions in Graphene Oxide Doped Polyvinylidene Fluoride

Authors: O. Paul, A. Joaquim, M. Eguakun, V. P. Petranovskii, Yu. A. Barnakov, F. Williams

The coupling of light (high frequency phenomena) with low frequency functionalities in materials is a long-standing problem. Often low frequency functionality can be manipulated in a material using mechanisms such as heat, mechanical strain, or electric stimulation. This research work presents data that indicates a fourth degree of freedom to stimulate our material through light.

In this work, an interesting finding of the light intensity induced phase transitions observed in 0.05 % weight graphene oxide (GO) doped piezoelectric polyvinylidene fluoride (PVDF) films with 100 µm thicknesses. Two effects were discovered in the Raman studies with wavelength of incident beam 532 nm: (i) an alternated modulation of integrated intensities of 797 and 840 cm-1 as a function of time, where wavenumbers stand for vibration modes of CH2 rocking of α non-piezoelectric and β piezoelectric phases, respectively and (ii) reversible switching between α and β phases depending on the light intensity (power within the range of 10 – 40mW). A hypothesis on the mechanism and origin of observed effects within the framework of pyro-electricity of GO doped PVDF is also provided.

ID061

Oral

Graduate Engineering

Evaluation of Impact of Trucks on Intersection delay and Emission

Trucks have complex dynamics compared to passenger vehicles, they require a longer distance to stop, have lower acceleration/deceleration rates and takes longer time to maneuver when crossing the intersection, which causes disturbance to other vehicles. Such dynamics may impact overall intersection operation by increasing delays, which give rise to emission and total fuel loss. This study, therefore have two objectives, first to evaluates the impact of trucks volume on overall intersection operation, air pollution, and fuel loss. The Secondary objective is to suggest suitable mitigation strategies, to minimize delays, reduce emission and fuel loss. To achieve the objectives of this study nine-intersections in Shelby County were considered, twelve (12) hours traffic count survey (Turning Movement Count) was conducted at the selected intersections to observe traffic volume and vehicles composition. Also, existing traffic signal data were obtained from local traffic engineering office. Microsimulation software (VISSIM & SIMTRAFFIC) was adopted to simulate the traffic movement on the studied intersections and to estimates the total delay, emission, and fuel loss. The study found that intersection with higher trucks volume, associated with higher delays, emissions and fuels loss compared to those with lower trucks volume. The study explores various mitigation strategies, among others, optimizing signal time for trucks found to be effective. This attained by extending the green time in order to allow trucks to cross the intersection without stopping, this will not only benefit trucks but also reduce the travel time of all vehicles.

ID062

Oral

Graduate Engineering

Impact of Transit Signal Priority and Queue Jump lanes on Bus Travel Times in a Mixed Traffic Environment: A Microsimulation Approach

Transit Signal Priority (TSP); an effective means of improving bus regularity and punctuality has gained its popularity in the field of public transportation over the years. As a process of giving preferential treatment to transit vehicles in a mixed traffic environment, it gives a competitive edge to transit vehicles in comparison to the general traffic. TSP has the potential to greatly improve the attractiveness of transit vehicles to the general traffic even to automobile owners by reducing passenger waiting times at bus stops especially in areas where the demand for transit vehicle is low. This research therefore aims to evaluate through microsimulation the impact of transit preferential treatments such as Bus Signal Priority (BSP) and Queue Jump Lane (QJLs) on bus travel times, using a 0.8 mile section of Gallatin Pike corridor as a case study. This paper also aims to compare bus travel times with and without TSP. To achieve the research objectives this paper answers the following research questions: What is the expected bus travel time without TSP? What is expected bus travel time with TSP alone and with TSP and QJLs. Transit signal operations and phasing conditions were coded in Vehicle Actuated Programing (VAP) language with red truncation and green extension strategies which is provided as an add-on in VISSIM microsimulation software. Field data were also coded and calibrated in VISSIM to ensure that the simulated condition is close to the real situation. The findings indicates that priority treatments such as BSP and QJLs are effective to improving transit reliability, mobility and efficiency as it reduces bus travel times.

ID063

Oral

Graduate Engineering

Traffic Calming Measures: Simulating the Effects on Driving Speeds and Level of Pollution to the Environment

Traffic calming is the combination of mainly physical measures including speed hump and speed table and their role is to reduce the negative effects of motor vehicles use, change driver behavior and improve conditions for both motorized and non-motorized street users. However, traffic calming devices have impact on emergency vehicle response time. In this paper, VISSIM microsimulation software was used to study the influence of traffic calming measures on speeds of vehicles and on the level of noise and air pollution to the environment based on the type and location of traffic calming device. The influence of traffic calming measures on driver's behavior is characterized by speed, acceleration and deceleration parameters. In order to study their influence, several roadway segments on Nashville's residential and local streets were selected for traffic data collection focusing on traffic calming measures such as speed humps and speed tables. A high accuracy GPS device connected to a laptop and paired with Geographic Information System (GIS) was used on a probe vehicle to record a vehicle's accurate position (latitudinal and longitudinal coordinates) and speeds at specified 1 second interval

ID064

Poster

Graduate Engineering

Calibration Factors for Urban and Suburban Intersections HSM Models for Tennessee

The objective of the study was to determine the calibration factors to adjust Safety Performance Functions (SPFs) of Urban and Suburban intersection facilities in the Highway Safety Manual (HSM) for Tennessee. The HSM predictive models were developed utilizing data from other states hence needed to be calibrated to account for Tennessee local conditions. The Urban and Suburban intersection facilities which were calibrated include the three leg stop controlled, three leg signalized, four leg stop controlled, and four leg signalized. The statewide calibration results showed that the calibration factors were more than 1.00 indicating that the state of Tennessee has higher number crashes than those predicted using HSM prediction models.

ID065

Poster

Undergraduate Engineering

What are the Impact of Access Management Practices to Pedestrian Safety?

This study focused on the impact of access management practices to the safety of pedestrians. Some of the access management practices considered to impact pedestrian safety included limiting direct access to and from major streets, locating signals, limiting the number of conflict points and separating conflict areas, removing turning vehicles from through traffic lanes, using nontraversable medians to manage left-turn movements and providing a supporting street and circulation system. The study evaluated through statistical modeling the correlation between access management practices to pedestrian crashes. Focused on the impacts of access management on pedestrian crashes, eight major roadway corridors were selected and utilized for analysis. Utilizing Negative Binomial, the correlation between roadway features and pedestrian crashes were modeled. Four variables including AADT, access density, percentage of trucks and the presence of TWLT were found to be positively associated with the pedestrian crash frequency. Variables such as the presence of median, presence of crosswalk, presence of shoulders, presence of sidewalk and high speed limit had negative coefficients hence their increase or presence tends to decrease pedestrian crashes. It could therefore be concluded that though these variables had some influence on the pedestrian crashes, access density, crosswalk, sidewalk and speed limit were the most statistically significant variables that determined the frequency of the pedestrian crashes.

ID066

Poster

Undergraduate Engineering

Developing Crash Modification Factors for Median Cable Barriers in Tennessee

This paper developed Crash Modification Factors (CMF) for median cable barriers in Tennessee. Utilizing cable barriers installed from 2006 to 2010, the study used comparison group approach that considers crashes before and after the installation of cable barriers. Comparison segments were selected if they met criteria such as median width equal to the median width of the existing cable barrier segment plus or minus 10 feet, the segment length is equal to the cable barrier segment plus or minus 20 feet and the AADT is equal to that of the cable barrier segment plus or minus 1000 vpd. Using comparison group and screened median-related crashes only, CMF for fatal crashes was found to be 0.04, fatal and incapacitating injury 0.07, and 0.14 for fatal and all injury crashes combined.. These CMFs which translate into crash reduction percentages of 96% and 86% for fatal and fatal and all injuries combined respectively are comparable or slightly better compared to those obtained from other states. However, when all crashes within the cable segment were used (without screening median related), the CMF for fatal was found to be 0.46, and 1.18 for all crashes. This implies that installation of cable barriers in Tennessee significantly reduces fatal and severe injury crashes but increase minor PDO crashes (mainly those below $400). The developed CMFs responds to the intended benefits of the median cable barriers to prevent cross-median crashes which occurs when a vehicle leaves its travel way enters or crosses the median dividing the highway directional lanes and collides with vehicles in the opposite direction.

ID067

Poster

Undergraduate Engineering

University Campus Evacuation Challenges: Microsimulation approach

This paper attempts to simulate different and possible challenges which my face campus-like emergence evacuations. Using the Tennessee State University (TSU) campus located in Nashville as a case study, a VISSIM based emergency evacuation simulation analysis was conducted. Different evacuation strategies and scenarios were simulated under various transportation infrastructures within the campus, including varied evacuation time, parking lot locations and utilization levels, main (signalized) and minor (unsignalized) intersections surrounding the campus. The simulation results, including network and intersection performances were analyzed under different evacuation scenarios in terms of number of vehicles evacuated, distance traveled, delay, speed, number of stops and level of service (LOS), the findings which are presented in this paper. It was found that the evacuation will be efficient only when the parking lots are 50% or less utilized but will fail beyond that level of occupancy. Considering different evacuation scenarios, full evacuation was achievable only after 80 minutes evacuation time. The challenges were observed on whether to utilize signalized or non-signalized access from the campus. Most of the signalized intersections performed at an undesired level of service with evacuation targeted at 15 minutes or 30 minutes, but improved to LOS D or better for evacuation targeted at 50 minutes to 80 minutes. Intersection delay evacuation model followed power function with a negative scaling factor. Though different campuses have different layouts and configurations, the study findings are assumed to align with problems which might be faced in other similar campuses especially those close to CBD areas as TSU.

ID068

Oral

Graduate Science - Agriculture

Agricultural Education an Mathematics Performance Among Secondar Students

Mathematics and science achievement in the US students continue to lag behind other developed nations. Reasons for this lag include unimaginative instructional methods, inexperienced teachers and lack of connection between school mathematics and the day-to-day experiences. Most students learn mathematics best when they see the connection between the concepts learned in school and their real life applications. Contextual learning enables students to link mathematics concepts and knowledge learned to learning environments of school, home and community. Agricultural education has great potential to deliver relevant curriculum, which engages students with hands-on learning environments that are rich with real life applications of mathematics. The purpose of this study was to determine the effects of agricultural education, Future Farmers of America (FFA) involvement, and Supervised Agricultural Experience (SAE) participation on the mathematics performance of secondary students. Our study explored these factors using an ex post facto research design. The findings of this study revealed that agricultural education students performed better than non-agricultural students on various Common Core math standards using a researcher-developed mathematics test. In terms of specific Common Core standards of mathematics, students overall, scored lowest on statistics and probability as compared to algebra and number systems. There was a positive, low relationship between mathematics score and the number of agricultural courses, as well as participation in SAE. There was a moderate, positive relationship between mathematics test scores and FFA participation. Agricultural educators should look for ways of integrating statistics and probability examples in agricultural education to improve scores in those areas. Agricultural education teachers should encourage students to enroll in as many agriculture courses as possible and emphasize FFA and SAE participation of the students.

ID069

Oral

Graduate Engineering

Hoeffding Tree Algorithms for Anomaly Detection in Streaming Datasets: A Survey

This research aims to deliver an extensive and well-constructed overview of using machine learning for the problem of detecting anomalies in streaming datasets. The objective is to provide the effectiveness of using Hoeffding Trees as a machine learning algorithm solution for the problem of detecting anomalies in streaming cyber datasets. In this survey, we categorize the existing research works of Hoeffding Trees which can be feasible for this type of study into the following: distributed Hoeffding Trees, ensembles of Hoeffding Trees, and existing techniques using Hoeffding Trees for anomaly detection. These categories are referred to as compositions within this research and were selected based on their relation to streaming data and the flexibility of the techniques for use within different domains of streaming data. We discuss the relevance of how combining the techniques of the proposed research works within these compositions can be used to address the anomaly detection problem in streaming cyber datasets. The goal is to show how a combination of techniques from different compositions can solve a prominent problem, anomaly detection. The information surveyed in this research has helped bring forth an understanding of the state-of-the-art classification algorithms or compositions which can be combined to effectively address the anomaly detection problem in streaming cyber datasets. An ensemble approach using diversified proposed research is introduced and a further understanding determining if this type of proposed research is feasible and effective is reviewed through a discussion of the construction of our proposed combination of compositions along with the use of a diverse set of cyber datasets which allows for the flexibility to include public datasets, artificially generated attack datasets, and/or both.

ID070

Oral

Graduate Science - Agriculture

The PRMT1 gene expression pattern in Panicum hallii

Title: The PRMT1 gene expression pattern in Panicum hallii.

Transcription factors (TFs) control gene expression precisely by significant binding to cis-regulatory DNA sequences in the promoters of their target genes. Some developing work put forward that transcriptional regulation may play more imperative roles in plants than in animals because of the large number of TF-coding genes in plant genomes. For this study, we chose PRMT1. PRMT1 belongs to the family of methyltransferases (Arginine specific) which leads to the formation of an epigenetic transcriptional memory. ChIP-Seq was done using the Next-Gen sequencing platform. Both HiSeq and MiSeq yielded more than 44 million raw reads per samples. This represents about 93% of the mapping ratio for the genome of Hall's grass (Panicum hallii, panhal2). Roughly 1300 to 34746 peaks were observed in the annotated gene regions. Fourteen common and 91 upregulated broad and narrow peaks were identified from the ChIP which sequenced the control and drought treated samples. After epigenetic modifications in Panicum hallii, some locations of the genome were enriched with high protein fold enrichment values. Out of these enriched areas, 69 genomic regions with a differential enrichment level had been chosen for qPCR. This confirmed that the presense of DNA-protein binding site occurred through methylase enzymes. Based on the gene ontology terms that follow biological processes, a higher percentage of these 69 genes involve in developmental process, metabolic process, response to stresses, as well as cell organization and involve in transport activity (including energy pathway). Some of the genomic areas are highly repetitive and involved in signal transduction.

ID071

Poster

Graduate Science - Agriculture

Effect of Insecticide Residual Activity on Prevention of Ambrosia Beetle Attacks

Ambrosia beetles are pests of ornamental nursery crops. Female adult beetles excavate galleries in the wood and introduce symbiotic fungi. Ambrosia beetles are attracted to ethanol released by stressed trees. Current management recommendations include trunk sprays of pyrethroid insecticides every 2 wk. The objective of this experiment was to determine the duration of permethrin effectiveness, which may allow nursery growers to reduce their spray frequency. Tree bolts were sprayed with Perm-Up 3.2EC at 24, 17, 8, and 0 d before deployment, while the control bolts were sprayed with water at deployment. At deployment, bolts were zip-tied to stakes 1 m from the ground and placed along a wooded border in a randomized complete block design using 6 replicates with 5 m between treatments and 10 m between replications. Bolts were then filled with 15 mL of 70% ethanol to attract ambrosia beetles. Bolts were monitored every 2-3 d for new ambrosia beetle attacks until 10 d after deployment. The bolts treated with permethrin at 0, 8, and 17 d before deployment had less attacks than the non-treated controls. None of the bolts treated 17 d before deployment were attacked until 7 d after deployment. Insecticide-treated trees may be protected from ambrosia beetles for 3 wk after insecticide application.

ID072

Oral

Undergraduate Science - Agriculture

Synergism of Natural Antimicrobials and High Pressure Pasteurization for Inactivation of Listeria monocytogenes in a Processed Dairy Product

Listeria monocytogenes is one of the leading causes of foodborne diseases and unlike vast majority of foodborne pathogens is halophilic in nature and could tolerate cold temperatures. A recent multistate outbreak associated with contaminated ice-cream with Listeria monocytogenes had drawn the attention of researchers and the popular press to safety of ice-cream products. Various time (0 to 9 minutes) of elevated hydrostatic pressure (380 MPa e.g. 55K PSI) were investigated for inactivation of 4-strain mixture of Listeria monocytogenes (ATCC® numbers 13932, 51779, 51772, BAA-2658) inoculated at target level of 7.5 log CFU/ml of ice-cream base. Temperature was monitored and maintained at 4 ºC by a circulating water bath and a stainless steel water jacket surrounding the chamber. Control samples, and those containing 1% lactic acid, caprylic acid, and citric acid were studied. In a companion experiment, survival of the 4-strain mixture Listeria monocytogenes and background microflora in ice-cream base was investigated during aerobic storage at -20 ºC for control samples and those with 1% added citric acid. The experiments were conducted in two biologically independent repetitions, as blocking factors of a randomized complete block design, containing three repetitions per time/treatment within each block. Study was statistically analyzed at type one error level of 5% by LSD-based ANOVA using OpenEpi software. During the survival experiment, background microflora were 6.77 ± 0.4 and 7.66 ± 0.3 log CFU/mL on days 0 and 14, respectively. Similarly, Listeria monocytogenes counts were 5.72 ± 0.2 and 5.86 ± 0.4 log CFU/mL on days 0 and 14, respectively, after aerobic storage at -20ºC. A treatment at 380 MPa (55K PSI) for 9 minutes reduced (P <0.05) the pathogen counts for 1.66, 3.24, 1.51, 5.05 log CFU/ml of control samples and those with 1% lactic acid, caprylic acid, and citric acid, respectively.

ID073

Oral

Graduate Science - Agriculture

Control of Phytophthora cinnamomi on flood stressed woody ornamental plants using preventive and curative fungicides

Phytophthora cinnamomi is an oomycete pathogen that attacks woody ornamentals; especially plants exposed to elevated soil moisture levels. During flooding events, Phytophthora root rot often causes damage in nurseries throughout the Southern and Eastern United States, sometimes leading to complete nursery crop loss. In this study, we evaluated the efficacy of fungicides and biofungicides for preventive and curative control of Phytophthora root rot on flooded dogwood seedlings. Fungicides or biofungicides were applied as preventive or curative drench treatments 7 d pre-flooding or 1 d post-flooding, respectively, to artificially inoculated dogwood, Cornus florida, seedlings. The plants were flooded by maintaining standing water for 1, 3, or 7 d, with five replications per treatment. After the experiment, plant growth data (fresh weight, root weight, plant height, plant width) were recorded, and roots were assessed for disease severity using a scale of 0-100% roots affected. Preventive treatments that reduced disease severity compared to a non-treated control included Subdue MAXX at 1, 3 and 7 d flooding and Orkestra Intrinsic at 1 and 3 d. Compared to the non-treated control, curative applications of Empress Intrinsic and Orkestra Intrinsic reduced disease severity at 1 and 3 d flooding. Fungicides and biofungicides can be incorporated into an integrated strategy to manage Phytophthora root rot on flood stressed nursery trees.

ID074

Oral

Undergraduate Science - Agriculture

Leaf Spot disease of Redbud (Cercis Canadensis)

Redbud (Cercis canadensis) is an ornamental tree native to North Americas. Red bud is a staple small tree in urban environments, beautifying landscapes with its bright, magenta pink flowers produced in large quantities in spring to early summer before the leaves, sometimes on the bare stems. Redbud trees are resilient and fairly disease free in Tennessee area, consequently, it is widely grown and commonly seen in diverse landscapes and as forest undergrowth tree. In 2017, a leafspot disease was observed in field grown plants in some nurseries in Mid-Tennessee; this disease has caused a lot of grower concerns over the marketability of infected trees and the fate of the redbud tree as an easy-to-grow small tree.Disease symptoms consisted of circular reddish-brown necrotic lesions resulting in unsightly summer foliage and reduced aesthetic value of the affected trees. Identification of the pathogen is needed as a pre-requisite to making recommendations for appropriate disease management strategies. The objective of this study was to isolate and identify the pathogen that caused the leafspot disease in red bud trees. One fungus was isolated from infected leaves and pathogenicity tests reproduced the re-brown lesions and confirmed cause and effect of the disease. Pathogen was identified using morphological features and DNA sequence analysis. Although effective fungicides can be recommended to growers, for the control of this disease, fungicides are potentially harmful to environment and applicators and they kill non-target organisms indiscriminately thereby eroding beneficial microorganism that buffer plants against pathogens. Evaluation of previously selected biological agents will be used to identify biological control agents (BCAs) for a more sustainable solution to disease management. Bacteria previously selected as effective BCAs will be evaluated in-vitro using dual culture assay and results will be confirmed in-vivo using redbud seedlings in greenhouse conditions

ID076

Oral

Graduate Science - Agriculture

Inflammation Links Genetic Endogenous Retroviral Elements to Antibiotic Resistance in Guinea Fowl (Numida meleagris)

Inflammation Links Genetic Endogenous Retroviral Elements to Antibiotic Resistance in Guinea Fowl (Numida meleagris)

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Gut health is a major aspect that affects the overall performance of poultry. The interaction between diet components and gut immune system is key to regulate gut health. Probiotics and antibiotics are among major food supplements to promote gut health; however, our understanding about the underlying molecular mechanism is largely unknown. Endogenous retroviral elements (ERV) comprise nearly 4-10% of animal genomes. ERV expression has been highlighted for the association with cell inflammatory status in studies of mice and humans. In regards to poultry, ERV expression has been related with reduced body size, appetite, and decreased disease resistance in layers. There is a void of data about ERVs in Guinea Fowl (Numidia meleagris) genomes and if they modulate physiological or immune functions. Determination of ERV composition will help genetically explain how Guinea Fowl respond to the food supplements of antibiotics and probiotics. I hypothesize that antibiotics and probiotics used as growth promoters interact with genetic endogenous retroviral elements to affect cellular inflammatory status and animal growth in Guinea Fowls. With experiments in this project, I expect to: (1) classify ERV composition and phylogenic relation in the Guinea Fowl genome and (2) clarify the correlation between endogenous retroviruses and inflammatory regulation by antibiotics and probiotics used as growth promoters.

ID077

Oral

Graduate Science - Agriculture

The Co-Factorial Induction of Obesity Using High Fat Diet and Had-36 Adenovirus: A Transcriptomic Study

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Obesity is defined as a multi-systemic disorder where abnormal or excess fat accumulates in adipose tissue to the extent that health may be impaired. It is considered a chronic disease caused by multiple factors, and a public health problem that is a worldwide epidemic. The United States' obese population has increased by 50%, resulting in more than one-third (34.9%, 78.6 million) of its adult population labeled as obese. A possible cause factor and consequence of obesity is the infection of the human adenovirus 36 (Had-36). Due to the higher susceptibility of obese persons to viral infection, it is possible that the prevalence of Had-36 is not just a cause of obesity, but a consequence. The infection upregulates the chronic inflammation, adipogenic commitment and differentiation of pre-adipocytes, which leads to an increased number of fat cells in animal models. Had-36 is also prevalent in 11% of the non-obese United States' adult population, implicating that the obese population infected with Had-36 must be due to co-effects from other cause factors. Given these findings, we hypothesize that a co-factorial obesity animal model induced with a high fat diet (HF) and Had-36 infection will better replicate and represent the obese population. We will use a co-factorial animal model of mice intestinal cells to (1) establish an animal obesity model with HF + Had-36 infection, (2) use a genome-wide profile signature to locate specific gene-responsive pathways using transcriptomic RNA-Seq, and (3) manipulate signature genes in an adipocyte cell line to study their role in adipogenesis.

ID078

Oral

Graduate Science - Agriculture

Molecular and functional novelty of porcine interferon-ω subtype revealed through cross-species computational analysis

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Type I interferons (IFNs) are innate cytokine mediators that regulate antiviral immunity and have significant functional and molecular diversity in order to combat rapidly evolving viral pressures.

IFN gene families in the genomes of 155 animal species have been annotated and analyzed to reveal that pigs have the largest type I IFN family which consists of nearly 60 genes that encode for 7 IFN subtypes including multigene subtype IFN–ω. Subtypes such as IFN-α and –β have been extensively studied, whereas the unconventional subtypes such as IFN-ω remain under investigated. This research has evolutionarily defined the porcine IFN family and demonstrated that porcine IFN-ω subtype possesses novel features including: a multi-gene subtype displaying specific expansion in bats and ungulates, emerging isoforms with higher antiviral potency than conventional IFNs, cross-species high antiviral activity in mammalian cells, and potential actions through non-canonical signaling pathways. By focusing on understanding porcine IFN-ωs evolution, functional diversity, signaling specificity, and optimization of novel antivirals against viral diseases, the research has expanded the limited knowledge of the functional divergence of unconventional IFN subtypes and species-specificity of IFNs in livestock animals, while simultaneously demonstrating that IFN-ωs exert broad and high antiviral activity. Finally, this research has furthered IFN-based novel antiviral design by establishing state-of-the-art procedures for efficient characterization of the molecular and functional spectrums of unconventional IFNs.

ID079

Oral

Graduate Engineering

Detection of Distributed Denial of Service (DDoS) Attacks Using Artificial Neural Networks on Cloud Computing Platform

This research proposes a technique for detecting a significant threat to the availability of cloud services. By definition, a Distributed Denial of Service Attack (DDoS) refers to an attack in which multiple systems compromised by Trojan are maliciously used to target a single system. The attack leads to the denial of a particular service on the target system. In a DDoS attack, both the target system and the systems used to perform the attack are all victims of the action. This research first presents a survey of the various mechanisms, both traditional and modern, that are applied in detecting cloud-based DDoS attacks. We then proposed a DDoS detection system using artificial neural networks that will detect known and unknown DDoS attack. The proposed method has two major subsystems; (i) Data collection: a traffic generator has been developed to collect data corresponding to different DDoS types; and (ii) distributed DDoS detection: two different neural network algorithms, anomaly and signature-based approaches, are used for detection. The Amazon public cloud was used for running the fast cluster engine with varying cores of the machine. Finally, we have compared and evaluated our proposed system to other existing DDOS detection systems. The findings in this research can be extended to allow the application of the proposed technology for more complicated problems with considerable bigger network traffic.

ID080

Oral

Graduate Engineering

Evaluate Security of Multiple SDN Controllers Using Stochastic Petri Net

Software-defined networking (SDN) is a networking paradigm that provides automated network management at run time through network orchestration and virtualization. SDN control plane manages the network by applying rules using SDN protocols (e.g., OpenFlow) to switch that work as simple forwarding devices. SDN has received considerable attention in industrial and academia fields by its capability of network management centralization and programmability. However, there is increasing security concern that centralized controller in SDN introduces new network attacks. Compromising the network controller allows the attackers to have control of the entire network. Previous researches suggested to replicate controllers and distributed controllers, but there is still lack of research that studied the risk of using multiple of controllers. In this research, we present a model to analyze attacks on multiple SDN controllers and generate risk assessment scores that can aid mitigation. We build and analyze a Generalized Stochastic Petri Net (GSPN) model using PIPE tool. We explore the security impact of using multiple controllers vulnerabilities.

ID081

Oral

Undergraduate Science - Agriculture

Molecular Attenuation of the Porcine Reproductive Respiratory Syndrome Virus toward Vaccine Design

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Abstract

Porcine Reproductive Respiratory Syndrome (PRRS), which was recognized in North America and European almost simultaneously in early 1990s, is still a significant disease devastating the swine industry to cause dramatic economic loss globally. Nearly 40-50% swine farms in the United States are PRRS positive. There is lack of effective vaccine to provide broad protection across heterologous PRRS viral strains (PRRSV). This project is designed to optimize vaccine protection by molecular manipulation of the viral genome. We hypothesize that molecular manipulation through a reverse genetic approach will speed up our need to attenuate the viral pathogenicity for generation of ideal vaccine backbones. Using a PRRSV infectious cDNA clone, we have engineered a PRRSV strain to express exogenous genes including fluorescent proteins and some antiviral cytokines (interferons) to essentially debilitating the engineered virus. A current research is to attenuate the PRRSV strain using a molecular handling to enrich the CG (cytosine and guanine)-dinucleotide content in the viral genome, which will elicit a zinc-finger antiviral protein's (ZAP) response to suppress the viral replication and pathogenicity in anima cells. We expect that some attenuated laboratory strains will be produced to fulfill the need for vaccine production.

ID082

Oral

Graduate Engineering

Multi-Modality Sensor Modeling and Imagery Data Generation in the Virtual Environment Based on Robust Ray-Tracing Technique

Creating simulated Synthetic Aperture Radar (SAR) images as range maps thru virtual environments is helpful for the training and testing of proposed algorithms and techniques used for the analysis of SAR imagery and extraction of field information. The SAR imagery is achieved by modeling electromagnetic (EM) backscattering reflections patterns of objects in the environment. The SAR system, which operates based on radio wave transmission and receiving principles, projects narrow beams of EM radio waves in the azimuth-elevation planes and record time of flight of its transmitted and received signals to determine the environment objectsâ€™ ranges along its sight of view. This technique has various applications in the area of synthetic radar imagery generation, remote sensing, objects detection, localization, and tracking, as well as many aerial geographical surveying. In this paper, we propose an effective ray-tracking technique for SAR response modeling in a virtual environment simulation model (IRIS-VESM) developed at TSU. The approach is vigorously used to generate SAR imagery responses under different operating conditions. The environment objects, for this purpose, are generated using SolidWorks CAD software and imported into IRIS-VESM. Each SAR image represents a reflectivity map (i.e., 2D image) with pixel intensities scaled proportional to range of the nearest object corresponding to direction of projection of SAR in that particular direction in the environment. Using the proposed ray-tracing technique, we demonstrate two other applications of this technique including: (1) Light Detection and Ranging (Lidar), and (2) Infrared Thermal imaging. In the former technique, we take into consideration the optical characteristics of light illuminator and ranging. In the latter technique, we measure the thermal radiation reflectivity of heated objects in the virtual environment. Several examples of these techniques will be presented with appropriate technical details.

ID083

Oral

Graduate Engineering

Facial Expression Recognition and Learning

Face detection plays an important role in today's world. It has many real-world applications like human/computer interface, surveillance, authentication and video indexing. However, research in this field is still young. Face recognition depends heavily on the particular choice of features used by the classifier. The recognition of facial expressions in image sequences is a difficult problem with many applications in human machine interaction. The State of the Facial expression analyzers achieve good recognition rates, but virtually all of them deal only with prototypic facial expressions of emotions and cannot handle temporal dynamics of facial displays. Human emotions are deeply intertwined with cognition learning. They tend to direct cognitive processes and mental cognitive processing of humans implicitly. The goal of this work is to design a model with the capability of classifying the uncertainty, contradiction, and the cognitive nature of the emotions — particularly, for states of mental overload situations. Our approach constructs a multi-level framework utilizing multiple appearance-based learning methods to build corresponding face detectors and poses of human faces in the complex background situations. The completed system consists of an efficient computing technique with close to real-time response for dynamic facial expression recognition, tracking, and characterization. The proposed system offers appreciative improvements over existing technology and significantly enhances human-computer interfacing experience. Particularly, in terms of its capability to handle poorly illuminated facial expressions from within complex background situations. Other application of this technology is related to civilian, military, and homeland security surveillance.

ID084

Poster

Graduate Science - Health

Classical Music and its Effect on Memory and Cognitive Function

The purpose of this research study is to determine if classical music has an effect on memory and cognitive function. A randomized generator will provide each participant with a four digit code to aid in keeping each subject's identity anonymous. The research study will be conducted in a private classroom in Clement Hall. Participants will be asked to participate in two memory recall sessions, one with a classical musical stimulus and one with no musical stimuli. Each session will take approximately 5-10 minutes. The classical music stimulus session will have Mozart's Symphony #7 playing in the background while the participant is memorizing and recalling the list of words provided by the investigators. In each session, a randomized list of 60 words will be provided for the subject to study and write down the recalled items after a two minute time limit. The investigators hypothesize that the classical music will have a positive effect on memory recall versus a quiet environment.

ID085

Mindfulness-based Stress Management Training and Its Effects on Factory Workers' Well-being

It is almost impossible to mention work without the word "stress" appearing in the same conversation. While previous research supports the stress reducing benefits of mindfulness training in health professionals and other white collar workers, more research is needed to examine the potential benefits and participation willingness for other industrial populations such as factory workers. The purpose of our study is to determine if participation in a workplace mindfulness-based stress reduction training program will lead to an increase in factory workers' levels of mindfulness and a decrease in stress levels. Participants will attend group mindfulness sessions at work one day per week for six weeks during the lunch break. During the sessions, participants will learn and practice strategies to increase mindfulness. They will also listen to mindfulness meditations during the group session. Participants will complete two short questionnaires before and after the six week study to compare their levels of perceived stress and mindfulness before and after completing the mindfulness training program. We predict that there will be an increase in mindfulness and a decrease in stress levels reported on the questionnaires after completing the training.

ID086

Poster

Graduate Science - Health

The Effects of Occupational Therapy Intervention Relating to Self-Efficacy with Formerly Homeless Individuals in Supported Housing

The Effects of Occupational Therapy Intervention Relating to Self-Efficacy with Formerly Homeless Individuals in Supported Housing completed by Tennessee State University occupational therapy students aims to delve into how the experience of homelessness can affect feelings of self-efficacy. Homelessness not only affects someone's life when it comes to not having a stable place to call home, but it also affects mental health and occupational functioning. The Tiny Home Project at Green St. Church in Nashville, Tennessee has created a camp with 12 houses and 3 tents that gives those experiencing homelessness a place to rest their heads, while spending the day working or looking for a job. As these individuals begin to get back on their feet, there may be feelings of nervousness and uncertainty. This study aims to discover if occupational therapy would be beneficial for these individuals. A total of five sessions were carried out, a pre- and post-test and three specific occupational therapy interventions. The Canadian Occupational Performance Measure (COPM) was utilized to measure self-efficacy before and after occupational therapy interventions. Money management, stress management, and vocational and leisure exploration were covered over the course of this study with specific content related to what each participant was interested in learning. We hypothesized that covering these topics may yield more positive feelings of self efficacy, and more confidence as the participants transition into a more permanent housing situation.

ID087

Oral

Graduate Engineering

Visual Classification of Small Propeller Unmanned Aerial Vehicles Using Morphology Based Features

Small rotary blade UAVs (sUAVs) is an technology sector of extremely rapid growth. These devices change and evolve rapidly as the availability of small, efficient, and light components and materials become better and customers' needs change and evolve. These device are extremely maneuverable, capable of carrying a significant payload relative to their mass and size, and extremely easy to deploy anywhere anytime. These devices have been shown to be used to deliver various package types, to do monitoring, and to do search and rescue. Thus the need for remote recognition and tracking of these devices is becoming greater and greater for safety and security. Given that the majority of popular civilian sUAVs are physically similar with small or inferred features differentiating them. Due to the rapid pace of change and need to catch up to deployment speeds, some of the more sophisticated techniques trade too much speed and computational power for accuracy and robustness. In this paper, we present a more specialized classification approach using morphology based features such as propeller count, wingspan, and aspect ratio. Our dataset is generated by imaging CAD models of popular civilian sUAVS set in a 3D virtual environment at various distances from various angles. Using this dataset, we compare the descriptive accuracy of our descriptor, memory usage, and speed using a Support Vector Machine (SVM) against two generalized methods, Speed-up Robust Features (SURF) with a SVM and a neural network based on Hamming distance.

ID088

Oral

Graduate Engineering

Multi-Camera Target Tracking Via Imagery Data Fusion Techniques

Human activity detection and recognition capabilities have broad applications for civilian, military, and homeland security. However, monitoring of human activities are very complicated and tedious tasks especially when multiple persons involved perform activities in confined spaces that impose significant obstruction, occultation, and observability uncertainty. In advanced surveillance systems utilization of multi-cameras monitoring system is highly imperative for tracking, inference, and recognition of variety of group activities. Although single-camera tracking may be sufficient for small civilian surveillance spaces, however, many military and homeland surveillance applications require full large area coverage, tentative focus of attention, robust tracking accuracy, and even curiosity-based exploration and exploitation. With a single camera, tracking of multiple targets are very challenging to achieve reliably, at large due to presence of inevitable occultation. With multi-cameras systems, complexity of occultation can be dealt with by finding and correlating the correspondences from within multiple cameras views. In this project, we demonstrate one such a multi-person tracking system developed in a virtual environment and demonstrate how a bus group activity where multiple passengers are involved can be dynamically monitored using four operating surveillance camera systems simultaneously. Here, we present how processing tasks of multiple cameras are shared, what objects features they detect, tracks, and identify jointly. Furthermore, we present the computational intelligence techniques for the processing of multi-camera images for the recognition of objects of interest as well as for the annotation of observed activities. The proposed multi-camera processing system is shown to have respectable efficiency and effectively to track multiple targets exhibiting dynamic behavior of objects involved with their activities.

ID089

Oral

Graduate Science - Agriculture

Analysis of plant growth promoting traits of selected biological control agents

Analysis of plant growth promoting traits of selected biological control agents.

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Bacterial endophytes are ubiquitous microorganism colonizing internal tissues of plants without causing any visible symptoms. Some of these endophytes employ direct or indirect mechanism to enhance plant growth and protect plants against phytopathogens. Eight isolates of endophytic bacteria (B17A, B17B, IMC8, Y, PS, PSL, Prt and E) were previously reported to have potential in biological control of phytopthora blight of pepper and powdery mildew in Cornus florida. Some of these biological control agents (BCAs) have also displayed plant growth promoting abilities in previous studies, but the mechanism of action has not been studied. The objective of this study was to analyze the selected BCAs for plant growth promoting (PGP) traits including the production indole-3-acetic acid (IAA), phosphate solubilization ability, ammonia synthesis, nitrogen fixation, and siderophore production using in vitro studies. All the BCAs tested were able to produce variable amounts of growth hormone IAA ranging between 3-65 Âµg/ml and ammonia ranging between 2-10 Âµmol/ml. Also, all eight BCAs showed ability to differentially fix atmospheric nitrogen while five isolates exhibited inorganic phosphate solubilization. Six BCAs exhibited siderophore production that is normally associated with transport of iron across cell membranes by formation of soluble Fe^{3+} complexes. Isolates B17B, PS, PSL, Prt, and E were positive for all five PGP traits tested, thus suggesting that their growth promotion ability is associated with different mechanisms involving growth hormone production and nutrient availability and uptake.

ID090

Oral

Graduate Science - Agriculture

Controlling Powdery Mildew on Cucurbit Crops through Biological Control Agents

Cucumber and squash are cucurbits that have nutritional and medicinal benefits. These two crops contain essential provitamin, vitamins, and minerals such as potassium, iron, calcium, magnesium, manganese, copper, phosphorous, and calcium. In Tennessee, these cucurbit crops are affected by several major infectious diseases including anthracnose, Cercospora leaf spot, cucumber mosaic, downy mildew, Phytophthora fruit and crown rot, Septoria leaf spot, squash mosaic, Verticillium wilt and powdery mildew which severely reduce their productivity. Powdery mildew is ranked as the most severe disease of these cucurbits. Symptoms of powdery mildew appear as a white powdery residue on the upper leaf surface with circular patches or spots. Infected leaves become brown and shriveled and defoliate prematurely and infected fruits remain small and do not develop fully. Thus, the yield is reduced due to a decrease in the size or number of fruits and/or a decrease in the length of the harvest period. The purpose of this study is to control/treat powdery mildew in cucumber and squash using Biological Control Agents (BCAs). BCAs are known to reduce disease incidence directly or indirectly by inhibiting the development and activities of pathogens and/or promoting plant growth. The BCA mechanisms of actions include direct antagonism of the pathogens by selectively attacking pathogens through hyper-parasitism, production of antibiotics and/or lytic enzymes, competition for space and food source and by inducing systemic resistance in the host plants. Our study focuses in evaluating the effect of five previously isolated BCAs in controlling powdery mildew using weekly foliar sprays on cucumber and squash plants. Our preliminary results show a decrease in powdery mildew disease severity after four BCA applications. Extensive analysis of plant growth response to BCA applications is in progress.

ID091

Oral

Graduate Science - Agriculture

Effect of UV-C irradiation on the nutritional quality and safety of cranberry flavored water using a dean flow continuous UV system

Effect of UV-C irradiation on the nutritional quality and safety of cranberry flavored water using a dean flow continuous UV system

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Abstract

The influence of short wave-length UV-C irradiation at 254 nm on microbial inactivation, anthocyanins stability, analysis of ascorbic acid, and cytotoxicity of formulated cranberry flavored water (CFW) was investigated. Pathogenic microbes like Escherichia coli ATCC 25922 and Salmonella typhimurium ATCC 13311 in UV-C treated formulated CFW were inactivated more than 5 log10 at UV-C fluence of 24 mJˆ™cm-2 (p<0.05). Higher UV fluence up to 240 mJˆ™cm-2 were applied to investigate the influence of UV-C irradiation on anthocyanins and ascorbic acid stability in CFW. The concentrations of ascorbic acid and anthocyanins such as (Cy3Ar), (Cy3Ga), (Pe3Ar), (Pe3Ga) in irradiated CFW were determined. UV-C irradiation of formulated CFW decreased concentration of anthocyanins at higher fluence levels (>120 mJ.cm-2). The content of ascorbic acid was retained up to 82% in irradiated CFW at a UV-C fluence of 40 mJˆ™cm-2 (FDA recommended fluence levels for acidic fluids). This research study suggested that UV-C treatment of formulated CFW can achieve high levels of microbial inactivation without significantly decreasing the concentration of anthocyanins and ascorbic acid content. These results suggest that this non-thermal technique can be an alternative to thermal pasteurization in producing high quality beverages.

ID092

Oral

Graduate Engineering

Incorporating Rainfall into Storm Surge Prediction for Hurricane Irma

As increasing sea surface temperatures pave the way for more powerful hurricanes, and population growth remains unwavered in low-elevation coastal zones, the time is certainly ripe for accurate hurricane storm surge prediction. Emergency management officials need a reliable model to properly minimize loss of life, which also benefits authorities in preventing and limiting risks when designing coastal structure protection. A reliable model accurately portrays each parameter associated with hurricane storm surge.

As witnessed with Hurricane Harvey, a hurricane extends far beyond the wind-based Saffir-Simpson scale. The most powerful havoc occurred at its weakest moment as a storm. Tropical Storm Harvey's rainfall wreaked widespread flooding in southeast Texas, with up to $180 billion in overall damages. Yet some hurricane storm surge modeling programs lack a rain source term. This study employs rain, wind speed, and pressure data from the numerical weather prediction system Weather Research and Forecasting (WRF) with the Computation and Modeling Engineering Laboratory (CaMEL) to model Hurricane Irma's storm surge. First, the model simulates Hurricane Irma without a rainfall parameter, and an ADvanced CIRCulation (ADCIRC) simulation is reproduced for validation. Second, Hurricane Irma is simulated in CaMEL applying a rain input from WRF. All three cases are compared to observational data collected from various NOAA stations along the Puerto Rico and Florida coasts. Hurricane Harvey and Hurricane Maria will eventually be simulated as well. Since hurricanes cannot be tamed, a more accurate model that includes rain is the only path to avoiding their destruction.

ID093

Oral

Graduate Engineering

Analysis of Hurricane Harvey's Wind Field Using Weather Research and Forecasting (WRF)

The challenge posed by the 2017 hurricane Harvey has highlighted the urgent need for the development and adoption of advanced hurricane prediction models. Harvey made its first landfall on 25 August 2017 and caused devastating impact on the middle and upper Texas coast resulting in over $ 180 billion in damages, more than any other natural disaster in U.S history. Contrary to many hurricanes that quickly weaken after landfall, Harvey was unique as it did not move inland quickly but instead stalled over the South and South-East Texas coast for days, producing torrential rainfall, flash and river flooding which were the major cause of devastation. For most hurricanes, wind is the primary meteorological parameter driving the storm surge as it directly forces the wave and storm surge models, and hence the accuracy of their forecast. Different techniques are available for forecasting hurricane winds. Most applications are based on analytical parametric formulations such as the Holland model which represent radial profiles of hurricane winds. However, a typical hurricane is rarely circular making such models often to underpredict the storm surge. This research proposes Weather Research and Forecasting (WRF) model that uses full physics to forecast the hurricane wind. This capability gives WRF a special property to support very high resolution and produce far field winds. The results of this study are compared with published early advisories for hurricane Harvey provided by National Hurricane Center (NHC) to validate our results.

ID094

Oral

Graduate Engineering

Implementation of Implicit Solver In Adcirc Storm Surge Model

Hurricanes are among the worst natural disasters, and storm surges caused by these hurricanes are the deadliest and most exorbitant contributors in the resulting destruction. To address this global challenge, the need for precise, fast, and reliable models that are capable of predicating storm surges, floods, and levee overtopping is inevitable. Storm surge models are computational programs, where the hurricanes get formulated mathematically by solving the Shallow Water Equations (SWEs), and simulation of the phenomena is performed before it happens to predict the water surge elevation and velocity. The algorithms used to solve the SWEs equations depends on explicit [1], semi-implicit [1], or implicit [2] methods.

Currently, Advanced Circulation (ADCIRC) [3] framework is a well-known model used by U.S. government to predict storm surge at the east coast; however, due to its explicit or semi-implicit method of solving the Shallow-Water Equations (SWEs), the stability of this model may turn out to be a concern in shallow water regions which needs more investigation [4].

In this research, we are proposing the implementation of an implicit solver in ADCIRC framework. Implicit solvers are found to be more stable than typical explicit or semi-implicit solvers, and hence capable of entertaining large timesteps. The proposed solver was originally presented by Akbar and Aliabadi [2] and Aliabadi et al. [5], and it uses hybrid finite element and finite volume methods to solve the Shallow Water Equations to model storm surges.

After an extensive comparison between ADCIRC explicit and semi-implicit solvers and the proposed solver [4], the authors concluded that implementing the implicit solver in ADCIRC framework would have a significant influence on storm surge research.

The objective of implementing the implicit solver in ADCIRC is to enhance the numerical stability, provide an option of using large timesteps, take advantage of the parallel architecture in ADCIRC framework,

ID095

Poster

Graduate Science - Health

The Influence of Weighted Items on Challenging Behaviors in Adults with Developmental Disabilities

The purpose of the study, The Influence of Weighted Items on Challenging Behaviors in Adults with Developmental Disabilities, is to identify whether or not sensory self-regulation/integration techniques, that are popular with children, will decrease challenging behaviors in adults with developmental disabilities and autistic behaviors. Participants were recruited from BrightStone work-based day program located in Franklin, TN, and have been diagnosed with various intellectual and developmental disabilities. These participants exhibit behaviors that distract from their participation as a student at BrightStone. For the purpose of this study, challenging behaviors are categorized as repetitive body movements, self-injurious/dangerous behavior, auditory/verbal self-stimulation, and atypical social and communication skills. Each participant was observed during two, 1-hour sessions to determine a baseline for challenging behaviors. Following observation, the application of weighted items fell into two randomly assigned protocols. One group received a weighted vest while the other group received a weighted lap cover, each for 15 minutes. Each group was observed for one hour in total so that behaviors post-application were documented. The following week, the protocol was reversed and each participant received the other form of weighted item and subsequent observation. Through this study, we expect to find that weighted interventions will promote self-regulation and diminish impact of challenging behaviors affecting occupational performance.

ID096

Poster

Graduate Science - Health

Short-Term Memory Recall:The Effectiveness of Handwritten Repetition Compared to Verbal Repetition

This research project is to investigate if verbal repetition or written repetition methods from word lists yield a higher number of recalled words based upon four short-term recall trials. The word lists contain randomized words varying in length. The study contains a preferred learning type pre-assessment (auditory, visual, etc.) to assess if a correlation exists between learning types and the results of the trials conducted between verbal and written repetition strategies. The investigators intend the data of this research to yield the following result: handwritten repetition will be a more effective method for short-term memory recall than verbal repetition.

ID097

Oral

Graduate Engineering

Design and Analysis of Variable Camber Compliant Wing Wrapped by thin Layer of Skin for Adaptive Morphing Wings Smart Technology

This research work is focused on design and analysis of variable camber compliant wing (VCCW) wrapped by a thin layer of seamless skin to predict the behavior of compliant membrane wings subject to camber shape adaptation. VCCW method is found to have a useful advantage comparing with other traditional morphing techniques. Some of VCCW benefits are: simple design, light weight, reduces airframe noise, improving the maneuverability, low operation power, single actuation mechanism to control a leading and trailing edges at the same time, and has the potential of increasing the lift/drag ratio.

In addition, an evaluation of the wing morphing which employs a continuous inextensible surface, continuous boundary conditions are presented here. SolidWorks used in this study as a solid modeling computer-aided design to model a fixed wing structure, ANSYS-FLUENT to extract an aerodynamic pressure around the wing, and ANSYS-Static Structural used for the analyzation of the stresses and other physical properties resulted from camber deformation design. The study intended to focus on the two wing morphing profiles i.e. NACA 2410 and NACA 8410.

ID098

Oral

Graduate Engineering

Effect of Temperature Distribution on the Efficiency of a Photovoltaic Module

The sun is the ultimate source for all the energy sources that we use today. Over time, people have developed devices and emerging technologies to collect solar energy for heat and to convert it into electricity. An example of these devices are solar photovoltaic cells. Solar cells convert radiation from sunlight directly into electricity and the efficiency of a photovoltaic (PV) solar cells is inversely proportional to their operating temperature [4]. The temperature distribution in a PV module will also give rise to thermal stresses within the module [1]. Hence, it is important to determine the operating temperature of solar cells accurately. This paper presents the finite element steady state thermal analysis of a typical PV module whereby the temperature distribution in each of the layers of the module is determined. The layers consist of a top glass cover, solar cells, ethylvinylacetate (EVA), tedlar back sheet and aluminum fins. To simulate the actual situation, the frame of the PV module is also modelled. The results shows that the addition of finned plates at the bottom surface of the module leads to increased convective heat transfer in the module and as well an increase in overall electrical efficiency. This analysis provides an understanding of how the convection heat loss affect the temperature of the solar cells and their efficiency.

ID099

Poster

Graduate Science - Agriculture

Single cell type proteomics of switcghrass roots for Al tolerance

Aluminum (Al) stress causes a significant reduction in plant growth when grown in acidic soil and forms stunted root systems. To identify the cause of this phenomenon, single cell type proteomics of aluminum treated switchgrass plants was performed. Single-cell-type proteomics provides the capability to reveal the genomic and proteomics information at cell-level resolution. In this experiment switchgrass plants were grown in hydroponic tanks filled with Al-treated and control solutions. After three months of aluminum treatment (800 Î¼M) plants started showing physiological stresses such as declining photosynthetic activities and biomass. Root tips were harvested and thin sections (~10-Î¼m thick, 20 sections per root tip) of root tips were prepared. Epidermal cells (15000â€"20000 cells per tissue type) from the thin sections were isolated under an LCM microscope and proteins were isolated from these epidermal cells and digested with trypsin. TMT labeling coupled with mass spectroscopy was used for the quantitative proteomic analysis of the trypsin-digested proteins from epidermal cells. Results from the proteomic analysis are currently being processed and will help to determine which proteins are being expressed in single cell type.

ID100

Poster

Graduate Science - Health

The Behavioral Effects of Personalized Music Therapy on Levels of Alertness, Interaction and Mood in Long-term Care Patients

As the population ages, the number of people with Alzheimer's and other dementias will continue to increase; therefore, the more research and progress that can be done and made will allow for lower costs of caring for Alzheimer's patients and higher quality care. Various studies have been done to evaluate the effectiveness of general music therapy on behavioral and psychological symptoms of dementia, and the majority of these studies report positive results on symptoms. Music therapy involving listening to preferred music has been studied to a lesser degree. This research will study the effects of the Music and Memory program on 5-18 subjects with dementia living at Mary, Queen of Angels Assisted Living in Nashville, TN. The subjects' levels of alertness, interaction with others, and mood will be observed before, during, and after participation in the Music and Memory program to determine the immediate impact of listening to preferred music. Because other studies have shown that individuals with dementia react positively to listening to general music selections, we expect that our subjects will show positive behaviors as a result of listening to preferred music.

ID101

Poster

Graduate Science - Agriculture

Single cell type proteomics of switcghrass roots for Al tolerance

Aluminum (Al) stress causes a significant reduction in plant growth when grown in acidic soil and forms stunted root systems. To identify the cause of this phenomenon, single cell type proteomics of aluminum treated switchgrass plants was performed. Single-cell-type proteomics provides the capability to reveal the genomic and proteomics information at cell-level resolution. In this experiment switchgrass plants were grown in hydroponic tanks filled with Al-treated and control solutions. After three months of aluminum treatment (800 Î¼M) plants started showing physiological stresses such as declining photosynthetic activities and biomass. Root tips were harvested and thin sections (~10-Î¼m thick, 20 sections per root tip) of root tips were prepared. Epidermal cells (15000â€"20000 cells per tissue type) from the thin sections were isolated under an LCM microscope and proteins were isolated from these epidermal cells and digested with trypsin. TMT labeling coupled with mass spectroscopy was used for the quantitative proteomic analysis of the trypsin-digested proteins from epidermal cells. Results from the proteomic analysis are currently being processed and will help to determine which proteins are being expressed in single cell type.

ID102

Oral

Graduate Engineering

Closed Loop Analysis of the Geothermal System Containing a Heat Exchanger and a Deep, Water Basin

Geothermal systems have become an area of intrigue due to the attributes that are a result of what they provide to a given entity. Analysis of these systems are primarily done using computational fluid design capable programs such as COSMOL and ANSYS. Given an increase in the usage and need for understanding of the system, this research uses ANSYS Fluent to capitalize on formulating a model for a deep, water basin used by Metropolitan Nashville Airport Authority (MNAA) for recycling tarmac heat energy to analyze and simulate practical use of the system while providing in depth analysis as a bi-product of the computing capabilities of the software for a better understanding of effects. The focal point for development is to research and understand applications, gather systematic information to formulate the approach for analysis, configuration of a system in ANSYS Fluent, simulate to characterize thermodynamic properties, and provide conclusive results using benchmarks and intuitive results.

ID103

Oral

Graduate Engineering

Thermodynamic Analysis of CFRP for Early Detection of Failure

Carbon Fiber Reinforced Polymer (CFRP) composites are trending lightweight materials used in aircrafts due to favorable characteristics. However, aeronautical structures are subjected to continuous cyclic loading and are highly susceptible to damage by impact. Impact damage is considered the relative cause of fatigue in the composite. Fatigue has been found to be the major mode of failure within aircraft's structures. Developing theoretical and experimental methods for characterizing early stage failure in CFRP composites subjected to cyclic loading was the primary focus.

Experimentation requires quasi-static testing using tensile testing paired with NDI techniques, acoustic emissions (AE) and infrared thermography (IT), to study structural behavior of the CFRP. Correlating detection of failure from quasi-static testing allows interpretation of parameters needed for fatigue testing. Analysis techniques involve evaluating the structure as it experiences cyclic loadings, using data obtained from thermography and acoustic emissions with tensile testing. AE and IT provide energy data relevant to balance of interactive energy in the system. Understanding energy balances through structural changes can be derived with analysis of dissipated energy proportional to the overall energy balance of the system. Interpretation provides a new scope for analyzing energy accumulated through AE detection and IT to understand onset of failure.

ID104

Poster

Graduate Science - Agriculture

Effect of potassium on the volatile compounds of parsley (Petroselinum crispum L.) analyzed using electronic nose

Parsley is mainly grown in the Mediterranean region. It is consumed because of its rich nutritional values and anti-carcinogenic properties. The nutrition of parsley may have a significant impact on aroma characterization. Parsley aroma component analysis has been evaluated by various methods such as GC and GC-MS. While these methods may be reliable sources when evaluating such components, newer technology such as electronic nose (e-nose) could possibly improve the findings and also provide a reduction in analysis time. Therefore, a study was designed to evaluate the effect of potassium (K) source and concentrations on parsley leaf aroma. Plants were grown in pine bark (70 %) and peat (30 %) substrate with 3 g.L-1 of dolomitic lime. They were initially fertilized as needed with a water soluble fertilizer (20N-4.4P-8.3K). Treatments consisted of a modified Hoagland's nutrient solution containing various concentrations (1.0, 2.5, 5.0, 7.5 and 10.0 mM) of K supplied as potassium (K_2SO_4) or potassium chloride (KCl) while the remaining nutrients were constant. The plants were fertilized twice over a seven-day period. Fresh leaf samples of young, recently mature and matured leaves were collected and analyzed using e-nose. The e-nose results indicated that there were more than fifteen volatile compounds present while more than 90% of the volatile compounds were identified and reported here. Preliminary analysis using AromaChem software indicated that young leaves had higher tetramethylpyrazine (26.6 %), followed by 1, 8 cineole (25.54 %) and myrcene (20.28 %), the recently matured leaves had higher 1, 8 cineole (28.33 %) followed by myrcene (22.32 %) and tetramethylpyrazine (21.1 %), and the matured leaves had higher benzeneacetaldehyde (26.39 %), followed by tetramethlypyrazine (23.89 %) and myrcene (19.67 %).

ID105

Oral

Graduate Science - Agriculture

Detection of Personal Care Products (PCPs) in Surface Water of Collins River in Warren County, Middle Tennessee

Personal care products have been detected nationwide in different environmental matrices including wastewater effluents and surface water. The potential for these chemicals to pollute our rivers even at trace levels abounds. We conducted a monitoring study to detect the presence of personal care products in Collins River, Warren County. Collins River is a six-order river that drains a large portion of Warren County including McMinnville, Tennessee. Grab water samples were collected from Collins River for three seasons: (summer and fall of 2014 and 2015 and winter of 2015 and 2016) each year. Water quality parameters were also determined in situ using EurekaTM multi-parameter sondes. Water samples were analyzed for the presence of personal care products using GC-MS. Chemical Abstract Service Registry Numbers (CASRN or CAS) and subsequent use or descriptions of the detected chemical compounds were identified. Personal care products detected included flavor and fragrance agents, skin conditioning agents, surfactants in cosmetics, shampoos, moisturizer, antiperspirant, and deodorants. While the actual concentrations of these compounds were not determined in this study, their presence in surface water is noteworthy.

ID106

Poster

Graduate Science - Agriculture

Proteomic Analysis of Biofilm Associated Proteins from Novel Bacillus licheniformis Strain YNP5-TSU Isolated from Yellowstone National Park

The Industrial fermentation industry relies heavily upon unique microorganisms to carry out production of relevant bioproducts. In the case of second generation biofuels there is a need for novel cellulolytic thermophiles. They have the potential to survive many environmental stressors while successfully generating high value bio-end-products. Yellowstone National Park is home to thousands of natural hot springs, each capable of sustaining microbiomes where these thermophiles of interest might be found. In a recent field study under permit# YELL-2015-SCI-6074 several of these hydrothermal areas were sampled using a non-invasive approach to isolate unknown culturable bacteria and fungi. From this a novel strain, Bacillus licheniformis YNP5-TSU, was isolated. Thermophilic conditions were confirmed through growth curve analysis and suggested optimal growth between 45°C and 60°C. A defined cellulosic media was created to optimize cellulase production during fermentation. From this, Bacillus licheniformis YNP5-TSU demonstrated that optimal cellulase production occurred only when a mature biofilm was present. By testing individual media components it was determined a mature biofilm developed only in the presence of magnesium. LC-MS/MS analysis was used to compare control cultures to those incubated in media with low magnesium concentrations, identifying upregulated and downregulated biofilm associated proteins. These proteins can potentially be targeted to reduce biofilm formation via cell attachment on plants, plastics and food products in order to reduce the use of preservatives and antibiotics.

ID107

Oral

Graduate Science - Agriculture

Analyzing Proteome of Bacillus cereus tsu1 for PHB Production Study

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Abstract

Bacterium Bacillus cereus tsu1 was cultured in Rapeseed cake substrate (RCS, 25g/L) for continuous 12, 24 and 48 hours. Microscopy method was used to inspect intracellular PHB accumulation status. PHB accumulation was observed starting at early exponential phase and PHB degradation started after 12 hours at stationary phase. Bacterial cell pellet was collected by centrifugation at 12, 24 and 48 hours. Intracellular protein was extracted following SDS_Phenol_Based protein extraction protocol. Protein samples were quantified, 100 Î¼g protein from each sample was subjected for downstream proteome change study using TMT labeling followed by nanoLC-MS/MS analysis. All MS/MS raw spectra were processed and searched against Bacillus cereus tsu1 protein database. Principle component analysis (PCA) were conducted first followed by quantification analysis, in which the intensities of the constituent peptides were log2-transformed and subjected for normal distribution t-test (General linear model). A total of 2789 proteins were identified, out of which 144 proteins expressed a significant difference (p < 0.05) between bacterial cultured for 12 and 48 hours. Proteins involved in PHB biosynthesis regulation (PhaR and PhaC) expressed variation over time. Protein involved in cell division, endospore formation, signaling transduction pathways were found significantly changed. Results from this study, in addition revealing mechanism of PHB intracellular accumulation, provide systematic bacterial proteogenome analysis.

ID108

Oral

Graduate Science - Agriculture

Bio-Industrial Relevant Enzymes Identified From Metagenomic Analysis in Rumen Environment

Bio-Industrial Relevant Enzymes Identified From Metagenomic Analysis in Rumen Environment

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Microbial genome mining is a potential alternative route to traditional laboratory methods for the discovery and development of novel bioactive compounds and numerous biotechnological applications. The goat rumen harbors an assembly of microbes hypothesized to comprehend a rich source of lignocellulose degrading enzymes that could be exploited to enhance the bio-conversion efficiency of cellulosic ethanol production. The predominant cellulolytic bacteria and the fibrolytic mechanism(s) in the rumen remain elusive. This study aimed to isolate, identify and characterize the genes encoding novel cellulases in the goat rumen metagenome. To accomplish this goal, we extracted metagenome DNA from the goat rumen and sequenced using next-generation sequencing. Following assembly and annotation, several gene clones encoding for cellulases, hemicellulases and xylanases have been cloned and further sub-cloned using TOPO cloning strategy. Gene sequences were confirmed using Sanger sequencing and submitted to NCBI database. The genes encoding endo 1, 6 beta D-glucanase was functionally expressed in Escherichia coli and tested for clear halo zone formation around the colonies on the Phytagel plate containing the medium amended with CMC (carboxymethyl cellulose) demonstrating cellulolytic activities. The bio-functional enzymes were purified using NI-NTA purification method and further characterized through DNS assay. This finding corroborates that these multi-functional enzymes could impart potential industrial applications.

ID109

Oral

Graduate Engineering

The Analysis of Aerodynamics and Optimization Design of Wind Turbine Blade

Wind turbines have become an economically competitive form of clean and renewable power generation. In the United States and abroad, the wind turbine blades continuing to be the target of technological improvements by the use of highly effective and productive design, materials, analysis, manufacturing and testing. Wind energy is a low density source of power [1]. The objective of this research is to develop a computational fluid dynamics (CFD) analysis for SERI-8 composite blade as it is shown in Figure 1 in order to maximize the aerodynamic efficiency of the wind turbine blades. The variables considered related to the aerodynamic performance of the wind turbine blade were the twist distributions of each profile and the pitch angle of the blade. Wind turbine blades are designed with a twist angles so they can present at an angle that takes advantage of lift and drag forces ratio. Those parameters can cause significant change value of the power coefficient (wind turbine efficiency). The achievement of the aerodynamic efficiency will be determine by the power output generated from the wind turbine blades. Finally, the obtain results of the CFD analysis are compared with an experimental reference SERI-8 model results.

ID110

Evaluation of Molecular and Biochemical Mechanisms Underlying the Beneï¬•cial Interactions between Biological Control Agents and their Hosts in Tomato

ReEtta Catlin-Brown, Afona, Irabor, Christine A. Ondzighi-Assoume, Margaret T. Mmbaga and Suping Zhou. Funding Capacity Building Grant, USDA

Pesticides provide remedy to fungal problems, however, they also cause toxicity hazards to humans, non-target organisms and environmental quality. The use of selected biological control agents (BCAs), instead of pesticides, can reduce these toxicity hazards since BCAs seem to have different modes of action including boosting plant defense by inducing systemic resistance to pathogens, antibiosis and parasitism. The primary purpose of this study is to identify and evaluate the molecular mechanism underlying the beneficial interactions between the selected BCAs and its plant host by using gene expression analysis (Dual RNA sequencing). The secondary purpose is to characterize biochemical mechanisms that will lead us to identification of potential novel metabolites/gene-products involved in the beneficial interactions between BCA-Pathogen, and BCA-BCA. In our study we utilized tomato plants as the host, however we expect the results to have broad applications on diverse crops and pathogens. In addition, the anticipated outcome of our analyses can possibly be used to identify specific BCAs as alternative products to conventional fungicides. The experimental design of our study employs 2-week-old tomato plants grown from seed treated with eight different strain of BCA. Leaves and roots from 2-week-old host plants were harvested and analyzed through qRT-PCR for the evaluation of the expression of genes involved in the beneï¬•cial interactions between the selected BCAs and its tomato plant host. Current molecular and biochemical analyses are in progress to evaluate the response of tomato plants to the selected BCAs.

ID111

Oral

Graduate Science - Agriculture

Controlling Powdery Mildew on Cucurbit Crops through Biological Control Agents

Cucumber and squash are cucurbits that have nutritional and medicinal benefits. These two crops contain essential provitamin, vitamins, and minerals such as potassium, iron, calcium, magnesium, manganese, copper, phosphorous, and calcium. In Tennessee, these cucurbit crops are affected by several major infectious diseases including anthracnose, Cercospora leaf spot, cucumber mosaic, downy mildew, Phytophthora fruit and crown rot, Septoria leaf spot, squash mosaic, Verticillium wilt and powdery mildew which severely reduce their productivity. Powdery mildew is ranked as the most severe disease of these cucurbits. Symptoms of powdery mildew appear as a white powdery residue on the upper leaf surface with circular patches or spots. Infected leaves become brown and shriveled and defoliate prematurely and infected fruits remain small and do not develop fully. Thus, the yield is reduced due to a decrease in the size or number of fruits and/or a decrease in the length of the harvest period. The purpose of this study is to control/treat powdery mildew in cucumber and squash using Biological Control Agents (BCAs). BCAs are known to reduce disease incidence directly or indirectly by inhibiting the development and activities of pathogens and/or promoting plant growth. The BCA mechanisms of actions include direct antagonism of the pathogens by selectively attacking pathogens through hyper-parasitism, production of antibiotics and/or lytic enzymes, competition for space and food source and by inducing systemic resistance in the host plants. Our study focuses in evaluating the effect of five previously isolated BCAs in controlling powdery mildew using weekly foliar sprays on cucumber and squash plants. Our preliminary results show a decrease in powdery mildew disease severity after four BCA applications. Extensive analysis of plant growth response to BCA applications is in progress. Funding Evans Allen, USDA

ID112

Oral

Graduate Science - Agriculture

Improving Bioenergy Lignocellulosic Feedstocks Traits and Properties through CRISPR-Cas9 Technology in Switchgrass (Panicum virgatum L.)

Increasing greenhouse gas emissions (GHG) due to the use of fossil fuels has a negative impact on the climate, with an estimated increase in global temperature. To combat this increasing GHG, particularly CO_2, biofuels have been proposed as replacement for petroleum-based fuels in transportation. Biofuels, energy sources generated from biomass have emerged as a potential route to meet energy demand and avoid political instability and environmental issues that could result from fossil fuel-related conflicts worldwide. Switchgrass (Panicum virgatum L.), a native North America grassland species is considered as an excellent bioenergy feedstock due to its high biomass yield, wide climatic adaptation, as well as its low energy input for production. However, there are major limitations of using switchgrass for biofuels including (i) the difficulty in degrading the main constituents of cell wall biomass, which in some instances is due to its recalcitrance behavior, (ii) difficulty in convectional breeding due to self-incompatibility and varied ploidy levels of the grass. These obstacles limit exploitation of this crop as a lignocellulosic biofuel, thus necessitate the development of genetic manipulation strategies to produce improved cultivars with better biomass quality. To achieve this, high-throughput efficient in-vitro cell culture systems capable of genetic transformation and regeneration are necessary for studying gene functions and germplasm improvement. Thus, our study focuses in developing reliable transformation and regeneration methods for switchgrass to enable cloning of biosynthetic lignin cell wall genes with CRISPR-Cas9 technology. This will lead us to a better understanding of lignin role in the recalcitrance of switchgrass biomass and provide fast and reliable methods to alter cell wall biosynthesis and improve biomass digestibility/conversion of this crop. Currently, we have established cell lines that are being used for transformation and regeneration.

ID113

Oral

Undergraduate Engineering

Design of a Remote Presence Device For Law Enforcement Agency and Road Safety

Intercepting vehicles to control drivers is an important day-to-day task performed by law enforcement and security personnel. However, such a task of intercepting vehicles and controlling drivers can be difficult and dangerous for the law enforcement personnel, the drivers, as well as civilians that may be present in the surrounding area where the interception is taking place. To this end, conventional law enforcement equipment that protects law enforcement personnel from injuries, such as bulletproof vests or other kind of body armors, or that slows down the progression of vehicles to be intercepted, such as road barriers or speed bumps, are employed. Although such conventional law enforcement equipment is employed, they present important drawbacks. Notably, this conventional law enforcement equipment provides limited efficiency as they require the law enforcement personnel to be in contact or in close distance with the drivers and or the vehicles to be intercepted or can be impracticable in highly dense traffic conditions. Thus, design a remote presence device for law enforcement and road safety that solves the aforementioned limitations of safety and efficiency is desired. Such a remote presence device has been designed and built as part of this project.

ID114

Assessing Root System Architecture of Wheat Seedlings Using High-Throughput Root System Phenotyping

Root system architecture (RSA, the spatial distribution of root system in the soil) is a vital part of the plant for anchorage, nutrient storage, plant-microbe associations, water and nutrient uptake. RSA has been shown to vary between species and within species based on genotypic or response to environment. The root traits of wheat (Triticum sp.) seedlings is critical for the establishment and evidently linked to plant height and seed yield. However, plant breeders have not efficiently developed the role of RSA in wheat selection due to the difficulty of studying root traits in the soil. We set up a root phenotyping platform to characterize root system phenotyping in 30 wheat parental lines (PL). The phenotyping pipeline consists of the germination paper-based moisture replacement system, image capture units, and root-image processing software. The 30 PL of wheat were characterized in ten replicates. This method is allowing us to characterize wheat seedling traits that can be further examined in the field.

ID115

Poster

Undergraduate Engineering

Design of Power Efficient Stirling Engine

Efficiency optimization of the Stirling Engine presents the opportunity for expanding the use of renewable energy resource. Improvements upon this technology are made through modern approaches to material selection and mechanical design. This study is to investigate analytically how this can be done inexpensively and effectively. The Stirling Engine is currently a small-scale solution to the global problem of disengaging our reliance on carbon-based fossil fuels. The engine cycle has been shown to reach upwards of forty percent of Carnot efficiency, if not greater in personal projects. There have been many improvements upon the original engine patent presented by Robert Stirling; including breakthroughs made by Ivo Kolin and Jame Senft, with designs of a hand-held version of the engine known as the "ringbom" configuration. The ringbom configuration offers up the opportunity to change design elements such that the operation nature of the engine (expansion of gas in a volume upon heat exertion) can be optimized in the smallest versions taking vantage of lower temperature differentials. The analytical method in this study utilizes programs/simulations compiled by renown Stirling enthusiasts whom based such programs off different mathematical models estimating power output and efficiency. Results are compared and collectively show that heat capacity of the working gas and regenerator mesh/material distinctively impact engine performance across models. The volume of the gas is a minimal factor in performance, if properly sealed along displacer with proper room to sweep between the two temperature reservoirs. Influence of conductive materials regarding this fact is being studied. Research is also being done to find out scaling factors and issues that may arise in increasing the surface area of the heat flux entering the system and potential losses. Scaling optimization is crucial for future work within this project in regards to application of energy harvesting in the na

ID116

Oral

Undergraduate Engineering

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ID117

Poster

Graduate Engineering

Examining the performance of Weather Research and Forecasting (WRF) model to forecast Hurricane Harvey's wind field

The challenge posed by the 2017 hurricane Harvey has highlighted the urgent need for the development and adoption of advanced hurricane prediction models. Harvey made its first landfall on 25 August 2017 and caused devastating impact on the middle and upper Texas coast resulting in over $ 180 billion in damages, more than any other natural disaster in U.S history. Contrary to many hurricanes that quickly weaken after landfall, Harvey was unique as it did not move inland quickly but instead stalled over the South and South-East Texas coast for days, producing torrential rainfall, flash and river flooding which were the major cause of devastation. For most hurricanes, wind is the primary meteorological parameter driving the storm surge as it directly forces the wave and storm surge models, and hence the accuracy of their forecast. Different techniques are available for forecasting hurricane winds. Most applications are based on analytical parametric formulations such as the Holland model which represent radial profiles of hurricane winds. However, a typical hurricane is rarely circular making such models often to underpredict the storm surge. In this study, the performance of Weather Research and Forecasting (WRF) model to forecast hurricane Harvey's wind field is examined. The results of this study are compared with published early advisories for hurricane Harvey provided by National Hurricane Center (NHC) to validate our results.

ID118

Developing hearth healthy soybeans through mutation breeding

Soybean (Glycine max (L.) Merrill) is considered a key crop of modern agriculture due to its seed's high protein and oil content. However, the high percentage of polyunsaturated fatty acids in soybean oil limits its stability and shelf life. Also these polyunsaturated fats results in an increase in cardiovascular diseases and there is high demand for soybeans with heart healthy fatty acid profile. Modification in the fatty acid composition can improve its stability and nutritional quality. Mutagenesis is a useful tool to induce genetic and phenotypic variation for trait improvement and discovery of novel genes. This study aimed to identify mutants with high oleic and low linolenic acid content, and to screen for mutations in the fatty acid desaturase (FAD2) and microsomal omega-3-fatty acid desaturase (FAD3) genes. JTN-5203 (MG V) soybean mutant population was generated using an induced ethyl methane sulfonate (EMS) mutagenesis. Optimum concentration of EMS was used to treat 15,000 bulk JTN-5203 seeds producing a total of 1,820 M1 individuals. Fatty acid profiles such as oleic acid, linoleic, and linolenic acid were measured in the M2 lines with more than 12g seeds using near-infrared spectroscopy. Oleic acid content in some mutants was increased by up to 40% from 25% in wild type (WT). Linoleic acid in five mutants was reduced to 35% from 49% in WT. Mutants with reduced linolenic acids to 2.9% (WT:7.6%) were also recovered. Moreover, DNA was extracted from the selected top and bottom five lines and primers covering the FAD2 and FAD3 genes were designed. Multiplexing indices and sequencing adaptors will be attached to the PCR products and sequencing will be performed using Illumina Miseq with the paired-end multiplexed library. Through mutagenesis and high-throughput sequencing, the novel alleles underlying the mutations observed in mutants with reduced polyunsaturated fatty acids will be identified, thereby producing an improved soybean with a healthier oil.

ID119

Oral

Graduate Engineering

A Comparative Study: Aerodynamics of Morphed Airfoils Using CFD Techniques and Analytical Tools

This paper presents an aerodynamics study of wing morphing by creating a Computational Fluid Dynamics (CFD) model using ANSYS FLUENT. First, known National Advisory Committee for Aeronautics (NACA) 2410 and 8410 profiles of airfoils are modeled. Models are run using prescribed initial and boundary conditions to simulate the morphed wing and flow around it. The Shear Stress Transport (SST) ð•'˜â^'ð⊠œ" turbulence model is used to obtain an accurate comparison with the analytical results. Once satisfied with validation, variable cambers between NACA 2410 and 8410 are used in two ends of a wing to mimic a morphed wing situation. Drag and lift coefficients are analyzed for this configuration to understand effects of the airfoil shape on aerodynamic performance. A refined mesh is created near the airfoil wall to capture the flow details. This study is a step forward towards understanding how to accurately model the dynamic morphing of an airplane wing.

ID120

Poster

Graduate Science - Agriculture

Influence of Veterinary Antibiotics in Micronutrient Oxyanion Mobility in the Environment

Influence of Veterinary Antibiotics in Micronutrient Oxyanion Mobility in the Environment

Authors: Christopher Anuo#, Sudipta Rakshit*, Bharat Pokharel, and Ankit Patras.

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Fate of veterinary antibiotics (VA) can be linked to the fate of micronutrient oxyanions such as borate. Long-term persistence of VA in the environment can cause antibiotic resistance and toxicities to plant and aquatic organisms. Likewise, the environmental mobility of oxyanions of micro- (borate) nutrients is important to assess. The VA and micronutrient oxyanion can co-exist in situations, in which animal manure is applied in the agricultural land, fertilizer is applied after manure application, antibiotics is run off or leached from the confined animal feeding operations (CAFOs) to the agricultural land, and untreated surface water or wastewater contaminated with antibiotics is used for irrigation. In these scenarios, strong retention of VA on soil minerals can potentially affect the natural interactions of micronutrient oxyanion with soil surfaces, thereby affecting their fate. Thus, assessing competitive sorption interactions of borate and antibiotics in a binary mixture is exceedingly important. We propose to evaluate the effect of surface retention mechanisms of selected common VAs on model soil minerals and soil clay fractions in mobilizing borate under a range of environmentally relevant solution properties. Macroscopic sorption studies will be coupled with in situ attenuated total reflectance Fourier transform infrared (ATR-FTIR) spectroscopic probes to improve understanding of the surface interaction mechanisms.

ID121

Poster

Undergraduate Science - Life

White-eyed Drosophila are a model of rapid aging

White-eyed Drosophila are a model of rapid aging. Phyllicia Hemphill2, V. Weake1, Purdue University. S. Nahashon, and T. Taylor, Department of Agricultural and Environmental Sciences, College of Agriculture, Human and Natural Science, Tennessee State University, 3500 John A. Merritt Blvd. Nashville, TN 37209.

Humans are more susceptible to ocular disease and macular degeneration as they age. Drosophila melanogaster (fruit flies) are a model organism used to study photoreceptor aging. Blue-light is a known stressor of cellular components in photoreceptors. Due to their lack of pigment, white-eyed flies are more sensitive to light stress than red-eyed flies. Based on previous studies, when comparing 10 versus 40 day old red-eyed flies, phototaxis decreased two-fold. When 1 day old white-eyed flies were exposed to eight hours of blue light only 1% had rhabdomere loss, while 6 day old flies under the same condition had a more drastic phenotype of 62%. However, there has not been an assessment of their visual function as they age under normal light conditions. The current study assesed a time-course of white-eyed flies aged from 1 to 6 days using a phototaxis assay. We hypothesized that white-eyed flies will have a more rapid decline in phototaxis than red-eyed flies as they age due to their increased sensitivity to light stress. Our results showed, white-eyed flies phototaxis decreased noticeably in the six day time course when compared to the red-eyed control replicates. In conclusion, using a phototaxis assay showed over time white-eyed flies phototaxis decreased implying that drosophila melanogaster could be a possible model to study photoreceptor aging. (REU Program)

ID122

Developing heart healthy soybeans through mutation breeding

Soybean (Glycine max (L.) Merrill) is considered a key crop of modern agriculture due to its seed's high protein and oil content. However, the high percentage of polyunsaturated fatty acids in soybean oil limits its stability and shelf life. Also these polyunsaturated fats results in an increase in cardiovascular diseases and there is high demand for soybeans with heart healthy fatty acid profile. Modification in the fatty acid composition can improve its stability and nutritional quality. Mutagenesis is a useful tool to induce genetic and phenotypic variation for trait improvement and discovery of novel genes. This study aimed to identify mutants with high oleic and low linolenic acid content, and to screen for mutations in the fatty acid desaturase (FAD2) and microsomal omega-3-fatty acid desaturase (FAD3) genes. JTN-5203 (MG V) soybean mutant population was generated using an induced ethyl methane sulfonate (EMS) mutagenesis. Optimum concentration of EMS was used to treat 15,000 bulk JTN-5203 seeds producing a total of 1,820 M1 individuals. Fatty acid profiles such as oleic acid, linoleic, and linolenic acid were measured in the M2 lines with more than 12g seeds using near-infrared spectroscopy. Oleic acid content in some mutants was increased by up to 40% from 25% in wild type (WT). Linoleic acid in five mutants was reduced to 35% from 49% in WT. Mutants with reduced linolenic acids to 2.9% (WT:7.6%) were also recovered. Moreover, DNA was extracted from the selected top and bottom five lines and primers covering the FAD2 and FAD3 genes were designed. Multiplexing indices and sequencing adaptors will be attached to the PCR products and sequencing will be performed using Illumina Miseq with the paired-end multiplexed library. Through mutagenesis and high-throughput sequencing, the novel alleles underlying the mutations observed in mutants with reduced polyunsaturated fatty acids will be identified, thereby producing an improved soybean with a healthier oil.

ID123

Poster

Graduate Science - Agriculture

Assessing Root System Architecture of Wheat Seedlings Using High-Throughput Root System Phenotyping

Root system architecture (RSA, the spatial distribution of root system in the soil) is a vital part of the plant for anchorage, nutrient storage, plant-microbe associations, water and nutrient uptake. RSA has been shown to vary between species and within species based on genotypic or response to environment. The root traits of wheat (Triticum sp.) seedlings is critical for the establishment and evidently linked to plant height and seed yield. However, plant breeders have not efficiently developed the role of RSA in wheat selection due to the difficulty of studying root traits in the soil. We set up a root phenotyping platform to characterize root system phenotyping in 30 wheat parental lines (PL). The phenotyping pipeline consists of the germination paper-based moisture replacement system, image capture units, and root-image processing software. The 30 PL of wheat were characterized in ten replicates. This method is allowing us to characterize wheat seedling traits that can be further examined in the field.

ID124

Oral

Graduate Engineering

A Survey of Team Mission Planning of Autonomous Sensor-based UAVs

Meeting emerging mission challenges, increasing accuracy in execution of mission, and eliminating the risk of failure requires newly crafted methods and technologies to increase autonomy and intelligence of UAVs which are already being tested by a number of civilian universities and military research institutions. To become truly autonomous, UAVs will need to get far better at sensing obstacles and reacting in time to avoid a collision. Fusion of data acquired from various sensors available in today's drones gives the possibility to plan missions of multiple UAVs for completion of tasks in a more autonomous, durable, secure, adaptable, and integrated manner. Implementation of image processing algorithms in navigation helps UAVs to efficiently tackle dynamic threats and unplanned events. This paper presents the recent technological advances enabling successful navigation of autonomous UAVs in complex environment. A particular focus is devoted to control schemes, sensing, and team mission planning of UAVs operating in complex environments. Particularly, this paper discusses challenges associated to imaging and remote sensing of UAVs with adaptive learning.

ID125

Poster

Graduate Science - Health

Nature-based Therapeutic Media

Problem and Purpose. Many types of therapeutic media seem foreign or unfamiliar to patients in rehabilitation due to highly specified and utilitarian design characteristics. This can be overwhelming or off-putting for patients causing them to have a low self-efficacy about interacting with therapeutic media successfully. It is hypothesized that a therapeutic task involving nature-based media will improve mood leading to higher perceived self-efficacy and better compliance over traditional therapeutic media.

Methods: Three separate groups of participants will complete three separate tasks that mimic a therapeutic exercise. Subjects will be adults of any sex, aged 50 or over who are legally independent (have no legal guardian) and who have full upper extremity function. The first task will involve interacting with live natural media in the form of plants. The second will involve interacting with pictures of nature. The third will involve interacting with traditional media that is non-natural.

Results: The expected results will show that interacting with pictured or live natural media will provide patients with a higher sense of self efficacy and thereby increase their willingness to complete rehabilitation tasks that involve nature-based media over traditional media.

ID126

Prescribed Burning and Thinning Impacts on Soil pH and Conductivity in Managed Pine-Harwood Forests of the Southeastern United States

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Prescribed Burning and Thinning Impacts on Soil pH and Conductivity in Managed Pine-Harwood Forests of the Southeastern United States

Forested ecosystems play important societal and ecological needs. When managed in accordance with historical disturbance regimes, forests provide habitat for wildlife and ecosystem services for societal needs. When forests are not managed correctly, they no longer provide ecosystem function due to overcrowding, disease, and competition for light and nutrients. Prescribed fire and thinning are two widely applied management techniques that can prevent and/or restore degraded forests. Soil samples from the William B. Bankhead National Forest located in northwestern Alabama, USA were collected in September of 2016 and 2017 to evaluate the impacts of two forest management strategies of soil pH and conductivity. We collected a total of 2 soil samples from each of 18 forest stands during both study years. We determined post-management impacts of management via a mixed model analysis of variance and results will be presented. Findings from this study will be incorporated into results from small mammal and tick survey efforts that are currently ongoing in the same research stands. As soil chemistry and nutrient dynamics are important for all forested ecosystem processes, it is important to understand the ecological impacts of repeated forest disturbances.

ID128

Characterizing and predicting site productivity using geocentric approach

Site productivity is a measure of primary productivity potential of a forest ecosystem. It is characterized by an interaction of biotic and abiotic factors such as climate, soil and topography. An accurate site productivity characterization allows for efficient land use allocation, integrated ecosystem planning, and prescribed ecosystem management. Site productivity can be evaluated by using phytocentric, geocentric, and phytogeocentric approaches. Phytocentric approach â€" site index or the height of dominant or co-dominant trees at a reference age, is an important proxy of site productivity and has traditionally been used in many conceptual and simulation models of ecosystem dynamics; however, it assumed that forest management history has no effects on site productivity. Indeed, forest site productivity is dependent on both site and management related factors. Better management of under-utilized woody biomass from forest such as treetops, branches, twigs, bark, and limbs could be potential sources of feedstock in order to meet the Energy Independence and Security Actâ€™s target to significantly increase biofuel production over the next 15 years. We hypothesized that intensive forest management practices will not only reduce the amount of soil nutrients present, but also affect the site productivity of the managed ecosystem. This study aims to develop predictive models using geocentric approach by pairing Forest Inventory and Analysis (FIA) plot data with forest management history, climate, topography, and soil data across the state of Tennessee. It is important to find a balance between forest management practices and maintaining forest productivity in order to meet the increasing demand for woody biomass, and ensure it will remain a sustainable resource for the future.

ID129

Oral

Graduate Science - Agriculture

Identification of long non coding RNAs in chicken divergently selected for leanness

Long non-coding RNAs (lncRNAs) are non-protein coding transcripts that are more than 200 nucleotides long. They lack an open reading frame of more than 100 amino acids and usually have one or two exons. Of all the transcripts from humans, only ~2% code for proteins. Until recently, the non-coding transcripts were thought of as "junk DNA". LncRNAs play crucial roles in transcriptional regulation of biological processes. The objective of this study was to identify and characterize lncRNAs from adipose tissue of chickens divergently selected for leanness. 59,884,218 and 26,240,352 paired end sequence reads generated using Illumina platform using total RNA from adipose tissue of fat line (FL) and lean line (LL) respectively were downloaded from National Centre for Biotechnology Information's (NCBI) SRA website were used. FastQc was used to analyze the quality of the reads and the high quality reads were retained for further processing. Cufflinks software was used to assemble the transcripts which were then submitted to Flexible Extraction of long non-coding RNAs (Feelnc) software to distinguish non-coding from the coding transcripts using a user generated coding potential score of 0.523. We predicted a total of 8986 putative lncRNAs from adipose tissue of the HF chicken. Of these, 4436 were further classified as genic while 4540 were classified as intergenic. The project adds to the database of chicken lncRNAs. Comparison between the expression of lncRNAs in the FL and LL chickens will help in highlighting the specific lncRNAs that may have regulatory roles in adipogenesis. These will provide targets for further analysis into their mode of action.

ID130

How much forest biomass do we have in Tennessee?

Forests are the sources of cellulosic feedstock that can be used for production of renewable energy. In Tennessee, more than half of land area is covered by the forest; however, the total available aboveground dry forest biomass is unknown. Mapping spatial distribution of woody biomass is prerequisite for a continuous supply of feedstock for biofuel production. Field based inventory is costly and time consuming; thus, there is an opportunity to use remote sensing data for mapping biomass availability at a given time. And, it was hypothesized that variables derived from remote sensing data could be important predictors while estimating biomass from pixel to landscape level. Landsat 5 TM satellite imagery, national land cover dataset, and digital elevation model for Tennessee were acquired. Different vegetation indices were derived using Landsat data. Forest Inventory and Analysis (FIA) data from 2007 to 2011 were used to calculate plot level biomass using Jenkins equation. Biomass data were extracted by pairing FIA plot with spatially referenced layers. Non-parametric approach â€" random forests was used to build predictive model for biomass. The models explained 39% of variability for biomass with RMSE of 18.46 tons per acre. Canopy cover, vegetation indices from leaf-on period such as Normalized Difference Vegetation Index (NDVI), and Simple Ratio Index (SRI), and tasseled cap (wetness) were found to be important variables for biomass prediction. Map modeling method was used to generate a continuous gridded biomass raster map across the state of Tennessee, which can be useful for long-term planning of forest-based woody biomass.

ID131

SKP2 Knockdown Regulates AR/FOXA1 Expression and Inhibits Cell Proliferation in PCa

Increased levels of SKP2 (S-phase kinase-associated protein 2), an E3 ubiquitin ligase, are associated with prostate cancer (PCa) progression. This correlation is due to the ubiquitin-mediated degradation of key cell cycle regulators including p27 as well as regulating androgen receptor (AR) activity. However, the mechanisms involved in SKP2's proto-oncogenic effects remain elusive. The pioneer transcription factor, FOXA1 (Foxhead box protein A1) is known to interact with AR inducing its activity and modulating downstream target genes. Dysregulation of the AR/FOXA1 complex contributes to the progression of PCa and castration-resistant prostate cancer (CRPC). We hypothesized that SKP2 impacts the function of the AR/FOXA1 complex contributing to the growth of CRPC. With application of shRNA technology, we established stable SKP2 knockdown PCa cell lines to investigate the effects of SKP2 on CRPC growth. Our results demonstrated that SKP2 plays a critical role in the regulation of AR and FOXA1 expression in CRPC cell lines. SKP2 knockdown resulted in an increase in both AR and FOXA1 levels in C4-2B and 22RV1 cells, two CRPC cell lines. Importantly, SKP2 knockdown led to a significant reduction in cell proliferation of both C4-2B and 22RV1 cells. Our findings present a potential SKP2-AR/FOXA1 signaling pathway that may be targeted as a therapeutic approach in the control of CRPC malignancy.

ID132

Oral

Graduate Science - Agriculture

Evaluation of Bacterial isolates for Powdery Mildew Control in Cucumbers (Cucumis sativus)

Powdery Mildew is one the world's most frequently encountered plant disease, infecting leaves, stems, flowers and fruits of nearly 10,000 species of angiosperms. Powdery mildew is particularly important and very common in cucurbits grown under field and greenhouse conditions in most areas of the world. The cucurbitaceae family (cucurbits) comprised of 90 genera and 750 different species include important vegetable crops such as cucumber, squash, water melon, bitter melon and others and powdery mildew is one of the most important diseases in these crops. Management of powdery mildew is limited to mostly chemical fungicides, and this practice is causing great concern to growers and vegetable consumers alike due to toxicity hazards posed by chemical fungicides to growers who apply the chemicals, to consumers and also to non-target organisms and environment. Public awareness on the hazards posed by pesticides has resulted in great demand for organic produce; hence, organic production of vegetables is the fastest growing sector in agricultural production systems. However, disease control is one of the biggest challenges in organic production systems and there is a need to actively develop alternative products for controlling such diseases. The objective of this study was to evaluate microbial isolates for the control of powdery mildew disease in cucumbers. In this study, five bacterial isolates previously selected for biological control of powdery mildew on other crops were tested on powdery mildew disease control of cucumbers and compared with chemical fungicide and non-treated control. Out of the five bacterial isolates tested one treatment, Bacillus sp. (Psl) showed significant disease suppression of powdery mildew of cucurbits and require further evaluation.

The 40th Annual University-Wide Research Symposium

April 2-6th, 2018

ID133

Oral

Undergraduate Science - Agriculture

Evaluation of the characteristics of Vimentin in French Pearl Guinea Fowl and the Effects on Gene Expression

Evaluation of the characteristics of Vimentin in French Pearl Guinea Fowl and the Effects on Gene Expression Justin McKinnie, Samuel Nahashon, and Thyneice Taylor, Tennessee State University , College of Agriculture, Human and Natural Science , Animal Biotechnolgy Lab, 3500 John A. Merritt Blvd. Nashville, Tn 37209

Vimentin is a protein that is encoded by the VIM gene in humans. Vimentin is a type III intermediate filament (IF) protein that is expressed in non- epithelial cells and mesenchymal cells and is attached to the nucleus, endoplasmic reticulum, or mitochondria and the protein encoded by this gene is responsible for maintaining cell shape, integrity of the cytoplasm, and stabilizing cytoskeletal interactions. It is involved in the immune response, and controls the transport of low-density lipoprotein (LDL)-derived cholesterol from a lysosome to the site of esterification. The objective of this research is to characterize and sequence the vimentin gene in guinea fowl. In this study we used Blast to align and compare expressed vimentin sequences in various avian species to find similarities that influence the function of Vimentin. Recently the guinea fowl genome has been sequenced, making primer design to further specific for vimentin. In this study we will be designing vimentin primers using NCBI which are specific to align with French Pearl Guinea Fowl. Extracted muscle tissue from guinea fowl was used to perform DNA extraction. The purified DNA was as the template to carry out polymerase chain reaction (PCR) with the primers that were designed specifically for vimentin. PCR samples are run on a 1.2% agarose electrophoresis gel and the presence of bands represents that ability of the primers to amplify the vimentin gene in guinea fowl. Then the purified PCR product will be used to sequence the vimentin gene in guinea fowl. These finding may lead to understanding the role vimentin may play in adipogensis.

ID134

Oral

Graduate Science - Life

FOXO3 regulates genome methylation by functioning as a competing endogenous RNA of DNMTs in chicken LMH cells

FOXO3 is an important transcription factor that belongs to the O subclass of the forkhead family. It plays multiple roles in cellular progression, including cell proliferation and differentiation, cell-cycle control, energy metabolism, protein degradation, DNA damage repair, oxidative stress response, and apoptosis. Several reports suggest that circFOXO3 is involved in cell growth and progression. DNA methylation exerts a crucial role in many biological processes like gene expression regulation, disease development, cellular homeostasis, DNA damage repair, cell differentiation, proliferation, and apoptosis. Three DNA methyltransferases (DNMTs), DNMT3A, DNMT3B, and DNMT1, have been implicated in the establishment or maintenance of DNA methylation. Both FOXO3 and DNA methylation is strongly associated with human longevity as well. The objective of the current study was to elucidate the relationship between FOXO3 and DNA methylation since these two factors have so many function overlaps. First, we cloned the full-length mRNA of chicken FOXO3 (cFOXO3) by 5′ rapid amplification of cDNA ends (5′RACE), and validated the existing of circular FOXO3 RNA (circFOXO3). After aligning the sequence with other species, we found that cFOXO3 and circFOXO3 had the same cellular functions as it in human and mouse by using flow cytometry analysis. Second, by using dual luciferase assay, we found that gga-miR-29-3p family (miR-29a-3p, miR-29b-3p, miR-29c-3p) could binding cFOXO3, circFOXO3, DNMT3A, DNMT3B and DNMT1. Third, Biotin pull-down assays showed that cFOXO3 and circFOXO3 competed with DNMT3A, DNMT3B and DNMT1 when combined with miR-29-3p family. Lastly, we found that over-expression of cFOXO3 and circFOXO3 could increase the protein expression of DNMT3A, DNMT3B and DNMT1 by using western blot, and 5-mC level of the genome was changed after over-expressed or knocked-down cFOXO3 and circFOXO3. Our results demonstrated that cFOXO3 and circFOXO3 regulate genome methylation by functi

ID135

Oral

Graduate Science - Life

Preparation and testing of hsCAS9 lentiviral vector for genetic modifications chicken cells and embryos

Although the CRISPR-Cas9 technology has been successfully applied to a variety of mammalian cells and organisms, modifications in vivo to the chicken genome using this technology have proven to be more challenging, due to the sensitive nature of the developing chicken embryo which is protected within an egg shell and surrounded by a thick membrane critical for development. The single cell stage of avian zygotes is also hardly accessible. Based on the CRISPR-Cas9 technology, we designed a lentiviral vector utilizing a humanized Cas9 enzyme from Staphylococcus aureus, which has a short peptide sequence and has been demonstrated to have less toxicity effects on sensitive cell and tissue types. When paired with a separate gRNA vector, the Cas9 enzyme will become active, allowing for precise and efficient genetic knockout activity. For genetic modifications to take place in live chickens, we have prepared bacterial Cas9 gene cloned in a lentiviral vector. To validate the vector for its ability to transfer genes to chicken cells, we are testing the effectiveness of the vector to infection chicken embryonic fibroblast cells and preadipocytes. We are also developing microinjection techniques to deliver the hSaCas9 vector to target chicken primordial germ cells. We are also modifying methods that can be conveniently used to bring the microinjected chicken embryos to hatch.

ID136

Oral

Undergraduate Engineering

Survey of Skin Design for Morphing Wing Aircraft: Status and Challenges

The main objective of this paper is to lay out current passive skin design efforts for morphing applications, their status, challenges, and a proposed approach to design a skin for a morphing wing. Passive lattice, corrugated, and elastomeric structures are considered for potential use. An approach to bridging the gap between the skin structure properties and application to a morphing wing is proposed. As a case study, stress and strain generation in a morphed wing under structural and aerodynamic loadings is studied using ANSYS Static Structural and ANSYS FLUENT. Structural loading that causes the morphing of the wing and skin is found to produce large stresses and strains, which must be considered during the skin design. The highest Von-Mises stress of 147MPa occurred at the leading edge of the free end of the wing skin as it morphed from a NACA 2410 to NACA 8410 profile when simulating a 5-mm thick polyethylene skin. Aerodynamic loading, on the other hand, seems to have a limited effect within the scope of this study.

ID137

Oral

Undergraduate Science - Agriculture

Molecular Attenuation of the Porcine Reproductive Respiratory Syndrome Virus toward Vaccine Design

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Abstract

In the early 1900’s, Porcine Reproductive Respiratory Syndrome (PRRS) was simultaneously recognized in North America and Europe. PRRS is a significant disease devastating the swine industry worldwide and cause about $800 million loss in the USA only. Nearly 40-50% of swine farms in the United States test positive for this virus. There is a lack of effective vaccines able to provide broad protection across heterologous PRRS viral strains (PRRSV). This project is designed to optimize vaccine protection by molecular manipulation of the viral genome. We hypothesize that molecular manipulation, through a reverse genetic approach, will facilitate our ability to attenuate the viral pathogenicity for generation of ideal vaccine backbones. Using a PRRSV infectious cDNA clone, we have engineered a PRRSV strain to express exogenous genes, which include fluorescent proteins and some antiviral cytokines (interferons) to essentially debilitate the engineered virus. Our current research is to attenuate the PRRSV strain using molecular handling to enrich the CG (cytosine and guanine)-dinucleotide content in the viral genome. This will elicit the zinc-finger antiviral protein’s (ZAP) response to suppress the viral replication and pathogenicity in animal cells. We expect that laboratory generated attenuated strains will be produced to fulfill the need for vaccine production.

ID138

Oral

Graduate Science - Life

Isolation of transposon GFP-tagged mutants of Pectobacterium carotovorum in host signal-regulated genes

Pectobacterium carotovorum, a widely distributed gram negative enterobacterium is responsible for soft rot diseases in over 80 plant species. The major virulence factors are plant cell wall degrading exoenzymes (PCWDE) including pectate lyases, polygalacturonases, cellulases and proteases resulting in tissue maceration. Pathogenicity factor production is induced in the presence of plant host extracts. However molecular mechanisms of disease development are not completely understood. The goal of this research was to construct transposon mutant library of P. carotovorum in host signal regulated genes that may contribute to pathogenesis. Using a promoter-less green fluorescence protein (GFP) transposon, pCKD100 we constructed a pool of Chloramphenicol resistant mutants of P. carotovorum strain KD100 and selected 5264 for screening. The mutants were initially screened qualitatively for differences in the levels of GFP fluorescence in minimal media supplemented with and without host extract from celery (CE). Of this, 266 mutants were selected and screened further in the following round for quantitative GFP expression in the presence or absence of CE. We obtained 48 mutants with high GFP activity on CE. Five mutants also had high activities of extracellular protease. These are being analyzed to determine the identify the mutant genes.

ID139

Oral

Graduate Science - Agriculture

Hairy Root Transgene Expression Analysis of a Secretory Peroxidase (PvPOX1) from Common Bean Infected by Fusarium Wilt

Plant peroxidases (POXs) are one of the most important redox enzymes in the defense responses. However, the large number of different plant POX genes makes it necessary to carefully confirm the function of each paralogous POX gene in specific tissues and disease interactions. Fusarium wilt is a devastating disease of common bean caused by Fusarium oxysporum f. sp. phaseoli. In this study, we evaluated a peroxidase gene, PvPOX1, from a resistant common bean genotype, CAAS260205 and provided direct evidence for PvPOX1's role in resistance by transforming the resistant allele into a susceptible common bean genotype, BRB130, via hairy root transformation using Agrobacterium rhizogenes. Analysis of PvPOX1 gene over-expressing hairy roots showed it increased resistance to Fusarium wilt both in the roots and the rest of transgenic plants. Meanwhile, the PvPOX1 expressive level, the peroxidase activity and hydrogen peroxide (H2O2) accumulation were also enhanced in the interaction. The result showed that the PvPOX1 gene played an essential role in Fusarium wilt resistance through the occurrence of reactive oxygen species (ROS) induced hypersensitive response. Therefore, PvPOX1 expression was proven to be a valuable gene for further analysis which can strengthen host defense response against Fusarium wilt through a ROS activated resistance mechanism.

ID140

Poster

Graduate Science - Agriculture

Genotyping by Sequencing (GBS) Polymorphisms in Grain Amaranth and Close Relatives

The genotyping by sequencing (GBS) method has become a molecular marker technology of choice for many crop plants because of its simultaneous discovery and evaluation of a large number of single nucleotide polymorphisms (SNPs) and utility for germplasm characterization. Genome representation and complexity reduction are the basis for GBS fingerprinting and can vary by species based on genome size and other sequence characteristics. Grain amaranths are a set of three species that were domesticated in the New World to be high protein, pseudo-cereal grain crops. The goal of this research was to employ the GBS technique for diversity evaluation in grain amaranth accessions and close relatives from six Amaranthus species and determine genetic differences and similarities between groupings. GBS complexity reduction by ApeKI and 25 Gb of Illumina sequencing information with over 10 X coverage were used to detect SNPs based on sequence alignment. A total of 10,668 SNPs were discovered in 94 amaranth accessions and were used in current analyses. The distance matrix based on shared alleles provided information on the relationships of two of the related grain species from Mexico, Amaranthus cruentus and A. hypochondriacus, and their relationship to another grain amaranth, A. caudatus, originally domesticated in South America, and its relative A. quitensis, compared to an outgroup with two wild species, A. powellii and A. retroflexus. The information generated was very useful for diversity evaluation and produced SNP sequences that can be used for marker development in this "ancient crop" which is being rediscovered as a healthful alternative to monocot grains.

ID141

Oral

Graduate Science - Agriculture

Studies of Photosynthetic Efficiency In Eastern Redbud Varieties Important to the Ornamental Nursery of Tennessee

The Eastern Redbud Cercis canadiensis L. is a medium sized leguminous tree native to the forests of Tennessee and found growing as an ornamental throughout the Eastern United States and Canada. The objective of this research has been to evaluate the adaptation and limitations to redbud growth in nursery and greenhouse settings. Apart from a few biotic constraints, redbud is a very vigouros tree species with a fast growth rate. Redbud species and genus are a basal clade in the phylogeny of Papillinoid legumes, meaning that they are among the evolionarilly most ancient legumes within this subgroup of the second largest plant family on earth (the legumes). As such, redbud is a model species of photosynthetic and nutrient use efficiency in legumes and in trees more generally. The objective of this research, therefore, is to evaluate the photosynthetic and leaf mineral concentration differences existing in different genotypes of the redbud tree. The materials used included four different clonally reproduced varieties of redbud used by commercial nursery owners/growers in southern Tennessee and a population of wild collected seed reproduced trees of native redbuds from Kentucky. The varieties varied in leaf colors and growth habit including purple leafed weeping type "Ruby Falls", the yellow leafed upright type "Rising Sun", the dark green dwarf type "Ace of Hearts" and the light green upright type "Don Egoff". All varieties were purple flowered and pure bred C. canadiensis varieties except for Don Egoff which was produced by backcrossing white flower color from C. chinensis, the Chinese Redbud into C. canadiensis, the Eastern (American) Redbud. The first two genotypes were transplanted from root limiting cloth bags and placed with nursery-grade potting mix in 15 gallon plastic containers like the other varieties which were already growing in 7.5 gallon plastic pots. The varieties were arranged in a randomized block design with five (5) replicates, each replicat

ID142

Poster

Graduate Science - Health

The Effects of Low-Intensity Isokinetic Training Using Blood Flow Restriction Protocol to Reduce Recovery Time in Individuals with Achilles Tendinopathy

Objective: To investigate the physiological and biochemical effects of blood flow restriction (BFR) exercise on muscles and tendons to determine its potential implications for those with Achilles tendinopathy.

Design: Systematic review

Background: It has been documented that BFR promotes improvements in muscle strength and hypertrophy after bouts of low-intensity exercise (20-40% 1RM) by simulating high-intensity training (70% 1RM) through occluding venous blood flow from the limb with a pressurized cuff. This effect is elicited by the body's inflammatory and protective responses to the increased metabolic demand. Although these effects are well established, the exact chemical mediators and their intimate relationship are still unclear and documented effects of BFR on tendon mechanobiology alone are scarce. The healing timeline of lower extremity tendinous injuries can be prolonged if external stimuli are not strong enough to elicit adaptational responses. Correspondingly, those with Achilles' tendinopathy injuries are often limited in the amount of external input due to weight bearing and exercise restrictions. BFR allows one to exercise at intensities low enough to protect healing tissues while maintaining high-intensity stimuli to increase adaptational responses potentially decreasing overall time in rehab.

Methods: Evidence review (Level 1 and 2).

Results: This review incorporates 23 Randomized Control Trials (RCTs) and 9 Systematic Reviews (SRs).

Conclusion: The present systematic review provides evidence on the benefit of blood flow restriction on muscle and tendon repair. The data leads us to believe that an Achilles' tendinopathy would benefit from BFR exercise. Future research needs to be focused on the long term safety of such application.

ID143

Oppression and Microaggressions during Adolescence

Current U.S. public-school enrollment consist of 52% of students from historically marginalized cultures and is projected to continue to increase through fall 2026 (NCES, 2017). As of Fall 2017, over 1/3 of the diverse student population reports an African American or Black cultural background (NCES, 2017). The CRT framework has been widely used as a framework to study the impact of microaggressions on the learning experiences of students in the academic setting. Researchers suggest that experiences of social pain and interpersonal violence during adolescence can have negative and pervasive impacts on student cognitive, emotional, and social development (Eisenberger, 2011; Steinberg, 2008). The current study seeks to understand how behavioral microaggressions can manifest in the academic setting and impact adolescent development according to the experiences of African American students during the transition from middle school to high school. A mixed methods design will be used to gather qualitative information on student perceptions of microaggressions and learning outcomes in the academic context. The Strength and Difficulties Questionnaire will be used to gather information on behavioral outcomes according to teacher reports and self-reports. It is anticipated that structural equation modeling analyses will be used to predict emotional problems and hyperactivity across four separate time points from 6th grade to the end of 9th grade. Thematic coding analyses will provide more in-depth information to enhance lthe development of culturally cultivating systemwide and classroom interventions. Implications for educators, psychologist, and community advocates are discussed.

ID144

Poster

Graduate Science - Environmental

Analysis and Valuation of Ecosystem Services Provided by Urban Trees in Centennial Park, Nashville, TN

Analysis and Valuation of Ecosystem Services Provided by Urban Trees in Centennial Park, Nashville, TN

Victoria Franklin1, Solomon Haile1*, De'Etra Young1, and Richard Link1

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Abstract

Growing urban population and scientific city planning is a unique feature of the 21st century. Urban trees play a greater role in the general wellbeing of the urban population through their influence on thermal comfort, energy use, and air quality by providing shade, transpiring moisture, and reducing wind speeds. This research seeks to evaluate the ecosystem services of tree in Centennial Park and discuss the tree benefits in light of the urban setting ecological framework. Data on tree species and their conditions were collected via complete inventory from geocoded 1322 trees in Centennial Park. These field data, along with the local hourly air pollution and meteorological data were used to quantify forest structure, environmental effects, and estimate the value of trees to communities. The i-Tree Eco 6 model was developed by the U.S. Forest Service, Northern Research. With a total tree cover of 17.34 acres and structural values of $2.61 million tons, the results show that, the trees in Centennial Park remove 851.3 pounds/year ($1.56 thousand/year) of pollution, store 788.8 tons ($102 thousand worth) carbon, produce 45.96 tons/year oxygen, avoid 36.51 thousand cubic feet/year ($2.44 thousand/year) of risk of runoff. The information gathered at the locations will contribute to the body of knowledge of tree benefits in urban settings.

Keywords: Centennial Park, Urban Trees, Ecosystem Services, i-Tree Eco Model, National Tree Benefit Calculator Model, GIS- Geospatial Information Systems

ID145

Oral

Undergraduate Science - Agriculture

Biological Controls Agents against Botryosphaeria dothidea

Biological Controls Agents against Botryosphaeria dothidea

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Botryosphaeria dothidea is an economically important pathogen known to cause the formation of cankers on a wide variety of tree and shrub including dogwood (Cornus florida L). It has broad geographical distribution as a pathogen, but it has also been identified as an endophyte, existing in association with plant tissues on which disease symptoms were not observed. Previous studies reported that B. dothidea causes canker in dogwood branches leading to its die-back. Currently chemical fungicides are used for management of this disease. Concerns over harmful effects of chemical fungicides have led to extensive search for environmentally friendly alternative products including the use of microorganisms as biological control agents (BCAs). Pathogenicity of B. dothidea using detached leaf assay confirmed its pathogenicity on dogwood. The objective of this study was to evaluate microbial agents for biocontrol of B. dothidea previously isolated as an endophyte from stems of C. florida. Eight bacterial isolates previously reported to have potential as biological control agents of plant diseases were used in this study: B17A, B17B, IMC8, A2B1, PS, PSL, Prt and E. These bacterial BCAs were evaluated for biocontrol activity against B. dothidea using in vitro dual culture technique. All eight BCAs had the ability to inhibit the mycelium growth of B. dothidea. Percentage of inhibition growth ranged from 38.18 to 59.88 percent with Bacillus spp. expressing maximum inhibition of B. dothidea mycelium growth. In-vivo studies using C. florida seedlings in growth chamber and greenhouse conditions will be used to confirm bioactivity of these biocontrol agents against B. dothidea.

ID146

Poster

Graduate Science - Health

Case Report of a Pediatric Patient with GNB1 Disorder

Case Report of a Pediatric Patient with GNB1 Disorder

Keshia Agazuma-Johnson, SPT and Karen Coker, PT, DPT, CWS, WCC, C/NDT, FACCWS

Abstract

Background and Purpose. GNB1 disorder is a rare genetic condition caused by mutation on the gene encoding the guanine nucleotide-binding protein subunit beta-1, resulting in alterations of the transmembrane signaling systems of that particular gene. The mutation of the GNB1 gene was previously identified in cancer but has recently been linked to neurodevelopmental disorders. The purpose of this case report is to detail interventions, evaluative methods, and diagnostic tools in order to provide a comprehensive physical therapy plan of care to patients with this rare genetic condition.

Summary of Key Points.　The patient, a 2-year-old female, was diagnosed with GNB1 genetic disorder, a condition characterized by abnormal muscle tone, developmental delay, seizures, and visual impairment. A physical therapy examination and evaluation administered at 7 months of age revealed generalized muscle weakness and delayed milestones. The patient progressively attained her goals, but remained delayed in age equivalent gross motor milestones. Suggested pathway is to continue to modify plan of care pursuant with changes in patient's condition to progress toward higher level gross motor skills.

Recommendations for Clinical Practice.　For patients with a diagnosis of GNB1 genetic disorder who present with significant hypotonia, physical therapy is an integral component of advancing a child's progress toward age-equivalent milestones. In addition to physical therapy, integration of occupational therapy, feeding therapy, speech therapy, and attainment of equipment, such as a Sensory Dynamic Orthosis (SDO) and ankle-foot orthoses (AFOs), may be necessary to provide a comprehensive treatment approach to maximize the patient's success.

No funding sources were utilized.

ID147

TSU Student Housing Study

Housing students on campus is a necessary part of student success but can be problematic and costly to the institution. This study attempts to evaluate the Tennessee State University student housing program and gather student perspectives pertaining to their experiences living in student housing. A mixed-methods design will be utilized. Responses will be collected through an online survey concerning students' experiences and attitudes with regards to their housing placement. PhotoVoice submissions will also be collected through email to capture student perceptions on the impact of dorm conditions. Additionally, the researchers will attempt to analyze the current budget allocated to student housing. The sampling method for this study will be purposive. Recruitment fliers containing the website address of the survey and PhotoVoice submission email account will be placed in every student residence facility according to TSU policy. The results of this study will report on student housing budget performance, univariate statistics describing the data set, bivariate comparisons of demographic factors, and selected PhotoVoice submissions that best represents other data collected. Conclusions will help identify ways Tennessee State University can improve student success, retention, graduation rates, and make its student housing program more efficient.

ID148

Oral

Graduate Engineering

Modelling and Analysis of Micro-grids with Energy Storage Systems, with emphasis on Lithium-ion batteries for Load Balancing Applications.

Title: Modelling and Analysis of Micro-grids with Energy Storage Systems, with emphasis on Lithium-ion batteries for Load Balancing Applications

By

Frank Ajieh

Graduate Student

Department of Mechanical and Manufacturing Engineering

The traditional source of power from fossil fuel generators comes at significant cost and risk from the required huge logistics tail for fuel, heavy maintenance requirements, noise and environmental impact. This generally has led to coupling both renewables and fossil fuel with long-duration energy storage, thereby reducing the dependence and environmental impact of fossil fuel generators. Storage devices can provide frequency regulation to maintain the balance between the network's load and power generated, and they can achieve a more reliable power supply for industrial facilities. Also, batteries are required in order to advance towards smart electric grids that integrate discontinuous energy flow from renewable sources, optimizing the performance of clean energy sources as they balance micro-grids to achieve a good match between generation and load. In this research, study and analysis is done using HOMER and COMSOL software. HOMER is used for the economic analysis of the micro-grid system, while COMSOL is used for the analytic synthesis of the physical components of the lithium-ion battery, which would involve analyzing the capacity fade of the battery in order to predict the life-cycle of the battery and investigation into the state of charge estimation of the battery system.

ID149

Poster

Undergraduate Humanities

The Inclusion of LGBTQ Students Attending an HBCU

It is important for LGBTQ students to feel comfortable if they are to be successful students. This project conducts program evaluation to assess LGBTQ student perceptions about how inclusive they feel the supports and services provided by Tennessee State University are in regards to helping them feel safe and supported. A convenience sample of 30-50 currently enrolled TSU students who identify as LGBTQ will participate in a brief survey that assesses their feelings about various factors related to inclusion. Findings will present univariate descriptions of the study sample, along with bivariate comparisons of responses by relevant demographic groups. Conclusions will identify best practices that TSU could implement in order to meet student needs, thus promoting retention, graduation, and overall student success for TSU's LGBTQ students.

ID150

Oral

Undergraduate Science - Life

A Comparison of Leaf Chlorophyll Content Measurements by Different Chlorophyll Meters on Switchgrass under Different Precipitation Treatments

A Comparison of Leaf Chlorophyll Content Measurements by Different Chlorophyll Meters on Switchgrass under Different Precipitation Treatments

Denton Musick, Sunil Gurung, Kripa Dhakal, Katherine Miller, and Dafeng Hui

Leaf chlorophyll content is an important indicator of leaf N status, plant stresses, and photosynthetic capacity. Fast and non-destructive measurements are needed for field experiments. In this study, we used three chlorophyll meters (SPAD-502, CCM 200 and At-Leaf) and measured switchgrass leaf chlorophyll contents under different precipitation treatments. Results showed that readings of SPAD-502 and At-Leaf were significantly correlated at both leaf and plot mean levels, but readings of CCM 200 were lower and had no correlations with SPAD-502 and At-Leaf. Precipitation treatment had no significant influences on leaf chlorophyll contents measured by all three meters. The SPAD-502 and At-Leaf appeared to produce better estimation of precipitation effects on leaf chlorophyll contents of switchgrass. Further studies will be conducted to investigate the measurements at different environmental conditions and plant growth stages.

ID151

Oral

Undergraduate Science - Life

Responses of Switchgrass Ecosystem Productivity to Precipitation Changes

Responses of Switchgrass Ecosystem Productivity to Precipitation Changes

Katherine Miller, Qi Deng, Chih-Li Yu, Denton Musick, and Dafeng Hui

The quantification of ecosystem productivity response to climate change has been heavily investigate. However, it is still not clear how grassland ecosystem productivity respond to precipitation changes. A degree of controversy exists in the literature as to whether the relationship is linear or nonlinear and asymmetric or symmetric. We conducted two experiments to investigate ecosystem productivity and soil CO_2 emission responses to precipitation changes in switchgrass, Panicum virgatum, over two growing reasons. One is a mescosom (big pot) study in a greenhouse and another one is field precipitation experiment. Both experiments used randomized complete block design with 5 precipitation treatment levels (-50%, -33%, ambient, +33%, and +50%). The results demonstrated consistent changes, though there was variation between the field and greenhouse experiments. Precipitation changes highly influenced the physiology, growth, and soil respiration of switchgrass. Responses of (ANPP) were indeed nonlinear and asymmetric. Yet, responses of soil respiration to precipitation were close to symmetric and linear. Future research should focus on further testing of the double asymmetry model with more precipitation levels and longer time frames.

ID152

Microbiological Safety of Fresh Produce Collected From Small-Acreage Farms Across Tennessee

The role of fresh produce in human exposure to antimicrobial-resistant bacteria is a growing food safety concern. However, contribution of these bacteria by produce from small produce farms is still unclear. This study assessed the microbial quality in produce and food safety practices in small-scale farms. The microbial quality of produce collected from 15 farms was determined by standard quantitative and biochemical techniques. The antimicrobial-susceptibility of bacteria was determined by Kirby-Bauer's disc diffusion method. The mean Aerobic Plate Count (APC) ranged from 3.1 to 6.3 log CFU/g. The APC count in leafy produce and herbs (5.2 to 6.1 log CFU/g) was significantly higher (P < 0.05) than that of fruit type produce (3.2 to 4.0 log CFU/g). Total coliforms in carrots (3.6 CFU/g) were significantly higher (P < 0.05) than in lettuce (2.9/CFU/g), strawberries (2.5 CFU/g), and apples (2.1 CFU/g). Escherichia coli levels for most produce were extremely low and typically below the detection limit ($\leq$ 10 CFU/g). The results demonstrated that produce harbored diverse bacterial communities which was dominated by Escherichia coli (29.7%), followed by Serratia liquefacians (13%), Klebsiella pneumoniae (11.4%), Proteus mirabilis (10.8%), Pantoea spp. (8.1%), among others. Salmonella (2.7%) and Shigella (0.5%) were also isolated from the produce. No Escherichia coli O157:H7 was recovered in any fresh produce. Overall, Antimicrobial resistance was highest for erythromycin (22.3%), followed by ampicillin (19.6%), streptomycin (12.8%), and amoxicillin (10.3%). Our findings indicate that fresh produce from small farms harbor antibiotic resistant bacteria and could position consumers at greater risk for foodborne illnesses. Food safety education and written food safety plans are important steps toward minimizing the risk of produce contamination on small produce farms.

ID153

Poster

Undergraduate Humanities

The Journey to Graduate: Behind the Scenes and the Experiences of Transfer Students to Tennessee State University and into The Social Work Program

This project uses the science of program evaluation to inform the development of improved techniques and processes governing the transfer process at Tennessee State University. It is imperative that TSU receives transfers students well who are finishing the free two years from a community college. This study is conducted in service to the Director of TSU's Social Work Program by Social Work students and focuses on better understanding the transfer experience for our program. Our sampling frame consists of students who transferred into TSU's Social Work program as early as Fall of 2015. Using a mixed methods approach, this project offers all 18 of these students an opportunity to complete an online survey and six of these students to participate in face to face interviews. The surveys seek to understand student perspectives on the transfer process in relation to relevant policy requirements, and the interviews seek to understand the deeper meaning of the transfer process for students. Findings will present descriptive statistics describing the evaluation survey data, along with themes as they emerge from student experiences captured in the interview process. Conclusions will point towards policy and practice solutions that can improve the transfer process for Social Work students, thus promoting retention, graduation, and overall student success.

ID154

Poster

Undergraduate Humanities

Systematic Literature Review: Best Practices for Collegiate Recovery Communities

Collegiate Recovery Communities are an emerging best practice with a growing evidence base. These communities support students in or seeking recovery from alcohol and other drug addic-tion. The Collegiate Recovery Communities and its programs allow students to have an authentic college experience while maintaining their recovery. These programs would be beneficial to HBCUs as research is emerging showing the negative effects of drug and alcohol on these campuses. There is a small body of research and writings on this topic. This systematic literature review of these writings will apply a Social Work framework to analyze available knowledge. Findings will identify and summarize current best practices for Collegiate Recovery Communities along with a discussion of areas where continued research is needed to ensure these communities are effective in supporting students who are managing and/or at risk for developing problems with substance misuse, abuse, or addiction. Conclusions will point to ways that Social Workers and Universities can utilize these best practices to promote student retention, graduation, and overall student success.

ID155

Poster

Undergraduate Humanities

Student Experiences with Financial Aid

Most students at Tennessee State University rely on financial aid to attend college and many may find that what is available to them is still not adequate. Accessing funds from grants, loans, and other sources allow students to purchase books and other materials needed for class. Delays or problems in the disbursement of funds may make vulnerable students even more vulnerable and could result in students failing or dropping out. This project seeks to evaluate the impact of financial aid policies and practices on students at TSU. A convenience sample of six currently enrolled students who receive financial aid will participate in face to face interviews that seek to understand their experiences with receiving financial aid and how it has impacted their performance academically. Findings will present themes about the experiences of students gathered during the interviews. Conclusions will identify the needs of students in regards to financial aid products and services and will highlight student strengths in persevering limited incomes. Implications drawn will include policy and practice solutions that could improve the financial aid experience for students at TSU, thus promoting retention, graduation, and overall student success.

ID156

Poster

Undergraduate Science - Health

Assessing vocabulary skills: Is Type Token Ratio a valid assessment measure?

Type Token Ratio (TTR), which is a measure of lexical diversity, has long been accepted as a way to analyze a speaker's vocabulary skills. Specifically, the TTR analysis aims to measure vocabulary richness by differentiating between the total words produced and total number of different words produced. However, there is research that suggests that TTR may not be a reliable or consistent measure. Despite the growing body of evidence against its usage, researchers in the field of Speech-Language Pathology continue to use this measure in their assessment procedures.

The purpose of this study is to add to the body of research examining the clinical relevance of Type Token Ratio as it pertains to the assessment of vocabulary skills of preschool children. Twenty three preschool children (ages 3-5) participated in this study. Vocabulary skills were measured via three methods: standardized testing, incidental word learning and TTR. This study aims to answer the following research questions:

Is there a significant difference between standardized test performance and TTR?

Is there a significant difference between incidental word learning and TTR?

ID157

Poster

Graduate Science - Health

Assessing the Language Production of Preschool Children-An exploration of Dynamic Assessment and Dialogic Reading

There has been much debate on the best way to assess culturally and linguistically diverse populations. Many studies suggest that static or standardized assessments are subject to cultural and linguistic bias. As a result, researchers have attempted to investigate other modes of assessment. Dynamic Assessment is an assessment process in which a "Test-Teach-Retest" format is used. This assessment procedure not only examines what a child knows, but examines what the child has the capacity to learn. It has been found to be an appropriate and useful measure, particularly when assessing culturally and linguistically diverse populations. The "teach" portion of the Dynamic Assessment paradigm consists of a Mediated Learning Experience (MLE), which is a period of providing guided instruction in a particular area. Dialogic Book Reading (Lonigan & Whitehurst, 1998) is an interactive method of reading that has been found to be an effective way to improve the oral language skills of preschoolers. The purpose of this study is to examine the impact of Dialogic Reading and Dynamic Assessment (test-teach-retest) on narrative production in preschool children. Language production skills will be measured using two analyses: Mean Length Utterance (MLU) and Incidental Word Learning (target word production). This study further aims to investigate the relationship between static and dynamic assessment results. The following questions will be answered:

Is there a significant difference between pre and post MLU scores?

Is there a significant difference between pre and post target word production?

Is there a significant difference between standardized test performance and incidental word learning?

ID158

Oral

Graduate Science - Agriculture

Prevalance of Antimicrobial Resistant Enterobacteriaceae in Almond Milk and Skins

Introduction: Consumption of plant-based milk is increasing rapidly as a result of increased health consciousness as well as changes in peoples' lifestyle. With the demand for plant-based milk on the rise, concern for its microbiological safety has also raised. Antimicrobial resistance has also become a health challenge to the public.

Purpose: The aim of this study was to evaluate the prevalence of antimicrobial resistant Enterobacteriaceae isolated from almond milk and skins.

Methods: Almond milk was processed form raw almonds purchased from local stores in Davidson County. Enterobacteriaceae was isolated from raw almond milk and almond skins and thereafter identified using API 20E method. The antimicrobial susceptibility of identified isolates was determined using the Bauer and Kirby disk diffusion technique. Enterobacteriaceae isolates were then subjected to a panel of eight antibiotics: vancomycin (30μg), novobiocin (30μg), erythromycin (15μg), tetracycline (5μg), cefpodoxime (10μg), kanamycin (10μg), nalidixic acid (30μg) and imipenem (10μg).

Results: The main Enterobacteriaceae species found in raw almond milk and skins were: Enterobacter cloacae (40.7% and 37%), Pantoea spp3 (29.6% and 25.9%), Klebsiella pneumoniae spp ozaenae (22.2% and 3.7%), respectively. Pantoea spp4 was isolated in 3.7% of almond skins and not in the milk. Enterobacteriaceae from milk and skin significantly ($P<0.05$) indicated higher resistance for vancomycin (100%), novobiocin (96.3% and 100%), erythromycin (100% and 96.3%), than tetracycline (70.4% and 74.1%), cefpodoxime (55.6% and 59.3%), and kanamycin (3.7% and 18.5%) respectively. All Enterobacteriaceae isolates were susceptible to nalidixic acid and imipenem.

Significance: Based on our findings, plant-based milk is a reservoir of antimicrobial resistant Enterobacteriaceae, hence a concern since many consumers consider it a healthier option. Good Agricultural and food safety practices are recommend for growers and consumers.

ID159

Poster

Undergraduate Science - Agriculture

Assessing Food Environment and Food Business Pattern around Metro Nashville Area: Implication for Nutritional Security of Households

USDA emphasizes on ensuring access to safe, nutritious, and balanced diet to everyone. Easy access to healthy food is a function of well-organized local food systems. Food retail environment and growth can be considered as an indicator of food demand in the area. This study aims to understand food retail structure, its pattern and growth in the Nashville metropolitan area. We used county business pattern data from US Census Bureau and zip-code level information for selected categories of food retails under industries in NAICS. Fruits and vegetable stores, food convenient stores, food groceries, farmers markets and food restaurant establishments by different size were examined and compared. Additionally, we discuss results and implications in reference to the economic and demographic settings.

ID160

Poster

Undergraduate Humanities

Do males and females experience post-incarceration differently in regards to housing and employment

This project presents findings from a community-engaged program evaluation conducted by a Tennessee State University student in service to a local organization serving former offenders in supporting them to re-enter society successfully so as to not recidivate. Specifically, this project seeks to better understand how program participants may experience services differently by their gender in regards to their ability to secure adequate employment and safe housing. Six participants will be recruited from those currently enrolled in the program. Face to face interviews will be conducted with three males and three females. Findings will present themes that emerged from the data along with an analysis of differences in the patterns of experiences with services by gender. Conclusions will seek to inform supports and services provided to former offenders and may reveal that males and females need different kinds of supports in regards to securing jobs and housing.

ID161

Esters from carboxylic acid through RCOOPdH species and styryltrifluoroborates

Palladium inserted hydridopalladium species is simply represented as RCOOPdH. Our focus is to use this species with potassium styryltrifluoroborates and to synthesize new kind of styryl carboxylate type ester compound. This kind of compound is largely unknown. In general, esters are chemical compounds with many practical uses. These uses include but are not limited to major industrial petrochemicals, medical inhibitors, and cosmetic ingredients. Esters are also found in the basic building blocks of life, animal cells. These are most commonly known as cholesterol esters, or neutral fats. One of the pioneer esterification reactions is called Yamaguchi esterification where anhydride is the initial product followed by reaction with alcohol and thus forms an ester. In our study, we explore an unprecedented approach for the synthesis of styryl esters. This new results and mechanism will be discussed.

ID162

Poster

Graduate Science - Life

A novel process of arachidonic acid ester by the cross-coupling of arachidonic acid organo halides in the presence of Pd-Catalyst

In response to receptor-dependent as well as receptor-independent stimulation in various cells, endogenous arachidonic acid is released from cell membranes and is converted to prostaglandins by cyclooxygenase metabolites. We are working on to synthesizing arachidonic acid ester by cross-coupling of arachidonic acid and organo halides in the presence of palladium-catalyst. Our goal is to examine the significant biological effect of these arachidonic acid esters and anandamide derivatives. In this work we outline the synthesis process of the esters and amides. Initial study is promising. This reaction process and mechanism will be displayed.

ID163

Palladium-catalyzed cross-coupling reaction of potassium alylBF3K and amines

Amine containing compounds have been important in pharmaceutical and organic chemistry due to their functional group properties. Allylated amines serve as building block for other pharmaceutical drugs. Due to the delocalized electrons of double bond on allyl moiety, allyl moiety is a highly reactive nucleophile. It can undergo radical reaction, polymerization, or other possible unintended side reactions. Potassium allyltrifluoroborate is a great media to transfer allyl moiety into target compounds. In this work we design a cross-coupling reaction of amine with potassium allyltrifluoroborate. Potassium allyltrifluoroborate (AllylBF3K) is a white crystal, robust, and more stable allyl boron compound compared to allyl boronic acid and allyl boronic ester. We have made a remarkable progress in cross-coupling between AllylBF3K and amine in the presence of palladium catalyst. These results are presented.

ID164

Oral

Graduate Science - Life

Organotrifluoroborates and discovery chemistry

Most important branches of organic chemistry are total synthesis, semi synthesis and methodology. Recently, we have discovered outstanding number of new reaction methodologies such as aroylation, nitration, C-H activation, aminoether synthesis, and amide styrylation in our laboratory at TSU. These new reaction methodologies and their mechanism will be displayed.

ID165

Poster

Undergraduate Science - Life

Highly Substituted Esters From ArCOPdCI and Tertiary Alcohols

Esters are incredible compounds that have a variety of applications in medicine, agriculture chemistry, polymer chemistry, and petrochemicals. In the Fischer Esterification, esters are formed when a carboxylic acid and an alcohol are heated in the presence of a catalyst. In the Yamaguchi Esterification, a reaction occurs between a carboxylic acid and the Yamaguchi Reagent resulting in the formation of a mixed anhydride. The anhydride is then introduced to an alcohol, in the presence of a catalyst, which produces the desired ester. In a direct cross-coupling reaction between benzoyl chlorides and tertiary alcohols and in the presence of a palladium catalyst, we will explore the possibility of making highly substituted esters.

ID166

Oral

Graduate Science - Agriculture

Physicochemical and functional properties of Pigeon Pea (Cajanus cajan) protein isolates and non-starch polysaccharides

Introduction:

Pigeon pea (Cajanus cajan (L.) Millsp.) is a nutritive pulse crop containing multi bioactive components and is an important ingredient in diet for disease prevention. The finctioanl properties of pigeon pea protein and non-starch polysaccharides could be very beneficial food ingredient with regards to their functional and biological properties due to the heath benefits of the components.

Method:

Protein isolates (PI) were obtained from locally grown GA-2 pigeon pea variety, employing alkaline extraction- isoelectric point (IEP) method. Non-starch polysaccharides were extracted sequentially followed by alcohol precipitation. HPLC and GPC were employed to analyze amino acid composition and molecular weight of the isolated protein and monosaccharide composition, molecular weight and conformation of the isolated non-starch polysaccharides. The physicochemical and rheological properties including surface tension, emulsification, viscosity, and gelation properties were evaluated. A tensiometer was used for measuring surface tension. Zeta-potential and droplet size distribution were determined using Zetasizer 90 (Malvern Instruments Ltd, USA). ARES-G2 Rheometer (TA Instruments, USA) was used to measure viscosity and gelation properties of the samples.

Significance:

Emerging consumer trends keep food industry in continuous search for inexpensive, healthier, and alternative protein and polysaccharides ingredients.

Results:

Pigeon pea protein accounts for about 20% and non-starch polysaccharides accounts for about 6% of total seeds. Protein isolates were soluble between pH values of 3 and 10. . Pigeon Pea protein isolates exhibited 14% least gelation concentration. Non-starch polysaccharides were classified as pectic polysaccharides with shear thinning properties. The results exhibited that both fractions could be potential ingredients as food emulsifiers and stabilizers in terms of emulsification properties and rheological properties.

ID167

Poster

Graduate Science - Agriculture

Carbon Sequestration Potential of Intercropping Biofuel Feedstock in Managed Loblolly

Abstract

Removing atmospheric carbon (C) and storing it in terrestrial biosphere is one of the potential options to alleviate greenhouse gas emissions. Agroforestry system, with its higher environmental benefits, has recently gained attention as a sustainable landuse strategy for biological C sequestration. The extent of C sequestrated in any agroforestry system highly depends on a number of site-specific, biological, climatic, soil and management factors. Intercropping of Switchgrass (Panicum vigratum L.) within loblolly pine stands offers potential synergy for biomass production and C sequestration on marginal land. Very few studies have quantified site specific potential of C sequestrated under the intercropping of the plants with divergent growth habit and architecture. The objective of this paper was to determine the potential C storage of intercropping system of loblolly pine and switchgrass flood prone area near the Cumberland River. A randomized complete block design; planted within three experimental blocks and three levels of the intercrop were used. The three levels of intercrop are; switchgrass interplant with pine trees, switchgrass without pine trees and pine trees without switchgrass. The study was conducted for five different soil horizon 0-10cm, 10-20cm, 20-30cm,30-50cm and 50-100cm. Preliminary results, suggests that intercropping stands has sequestrated higher amount of soil organic C (SOC) as compared to monocropping stands of respective crops. Assessment of the effects of intercropping Switchgrass with loblolly pine on C sequestration will essentially contribute to determine environmental and economic sustainability for wider geographical areas in south-east states of the United States.

Keywords: Agroforestry, Carbon sequestration, Switchgrass (Panicum vigratum L.), loblolly pine

ID168

Poster

Undergraduate Science - Life

Probing the Role of the Medial Prefrontal Cortex in Female Sex Behavior

It is typically thought that animals engage in sex primarily for means of reproduction. However, all animals, including humans, actually perform this motivated behavior for its rewarding consequences. Studies in the lab have demonstrated increased activity from sex in the nucleus accumbens (NAc), a key region of reward circuity, as well as in the medial prefrontal cortex (mPFC), an area known for its involvement in goal-directed behavior. Since the mPFC provides glutamatergic afferents to the NAc, our lab wanted to determine if activation that is seen in mPFC and NAc are related to the same circuitry. To do this, we examined the expression of c-Fos in inhibitory (GABA) and excitatory (glutamate) neurons in the mPFC to elucidate which cell type is activated during sex to determine whether the mPFC is driving the NAc activity. The mPFC neurons were labeled for both c-Fos, a marker of activation, as well as a marker for GABA, glutamic acid decarboxylase (GAD). Results suggests that sex activates c-Fos primarily outside of GABAergic cells in the glutamate neurons of the mPFC, neurons forming the primary output to the NAc. These results implicate the mPFC and NAc as integrated structures in reward circuitry in female sex behavior.

ID169

Identification of Iso-Preferred Reinforcers for Use in an Instrumental Reward Devaluation Task

The Rat Model of Binge Eating is utilized because of its ability to identify the binge eating phenotype through intermittent access to highly palatable food. Within the Rat Model of Binge Eating, there are three phenotypes that makeup a spectrum of BE including Binge Eating Prone (BEP), Binge Eating Neutral (BEN), and Binge Eating Resistant (BER). The Instrumental Reward Devaluation Teat (IRDT) which is a test of impulsive choice and habit was the focus of our behavioral research. Some performance on the IRDT showed a statistically insignificant preference for one palatable reward over the other. It was necessary to find an iso-preferred palatable reward combination that would diminish this slight preference to there being no observed preference between the two rewards. To accomplish this goal we used the two-bottle Choice Test and the one-bottle Acceptance Test to measure rats' consumption. After analyzing rat's consumption of their assigned reinforcer pairs for both tests by way of Dependent Sample t-tests, we found the consumption of the reinforcer pair of 20% Sucrose with Orange Kool-Aid and 20% sucrose with Lime Kool-Aid to be statistically insignificant across both tests. These results indicate this reinforcer pair as being iso-preferred.

ID170

Poster

Graduate Science - Health

Effectiveness of mobilizations versus manipulations on improving spinal disability

Effectiveness of spine mobilizations versus manipulations on improving spine disability.

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Intro

Neck and low-back pain are common disorders in the general adult population. The clinical question, which is comparing the effectiveness of mobilizations versus manipulations on spinal outcomes, is yielded from a review of literature on regarding the topic. Evidence from research on spinal manipulations versus mobilisations, as independent therapies for spinal disorders, is lacking. We wanted to compare how mobilizations and manipulations to the spine affect neck and low-back pain.

Methods

The PubMed, Google Scholar and EBSCOhost databases were searched with the following key words: manipulation, mobilization, oswestry, roland-morris, thrust, and high-velocity. The articles found and included were ranked according to a set criteria as strong, moderate or weak evidence.

Conclusion

There is evidence that both mobilizations and manipulations of the spine are effective at treating spine disability. There are is no conclusive evidence that manipulation or mobilization at one or multiple locations on the spine are significantly more effective than others.

ID171

Dendritic Spine Analysis of Striatal Spiny Projection Neurons in the Mouse Model of Fragile X Syndrome

Fragile X syndrome (FXS) is the most common form of inherited intellectual disability and the leading genetic cause of autism spectrum disorder. FXS is caused by a repeating CGG mutation in the FMR1 gene leading to a decrease in fragile X mental retardation protein (FMRP) and is highly expressed in neurons, especially in dendritic spines. Neocortical neurons from FXS patients and FMRI1 knock-out (KO) mice have an increased density of abnormally elongated dendritic spines, suggesting that the decrease of FMRP is linked to abnormal spine development, leading to alterations in synaptic transmission. The striatum is the input nucleus of the basal ganglia, a group of subcortical brain regions implicated in voluntary motor control and learning. In this study we performed two-photon laser scanning imaging of fluorescently labeled SP neurons from WT and Fmr1 KO mice. Image series in the z-plane of proximal and distal dendrites from SP neurons were used to count and classify dendritic spines into distinct subtypes based on shape and overall length. We hypothesize that the spine alterations seen in the neocortex of FXS patients and Fmr1 KO mice extends to the SP of the striatum and this morphological change can lead to alterations in synaptic transmission.

ID172

Poster

Undergraduate Science - Life

Effects of the Expression of Foxp2 in corticothalamic neurons on cortical development

Early studies identified mutations in Foxp2 that were associated with individuals who had developmental speech and language disorders. Human clinical studies suggest that Foxp2 is involved in the development of brain structures that are important for the ability to produce effective language, raising new questions about what role Foxp2 might play on the developing brain, Foxp2 is a DNA binding protein transcription factor, which has been implicated in the development of many structures in the human brain. To examine the role of Foxp2 we first sought to define the specific cortical neuron subtypes that express Foxp2 during development through a combination of retrograde tracing to identify neurons in the cerebral cortex that project to different targets, and immunohistochemistry to localize proteins that are well known markers of specific types of cortical neurons. We found, that Foxp2 was expressed more in corticothalamic neurons rather than corticocortical neurons. If Foxp2 is playing a role in cortical development, it should impact the corticothalamic neurons more. We used conditional Foxp2 knockout mice where we genetically deleted Foxp2 from the cerebral cortex. Using confocal microscopic imaging and cell counting methods, we are examine whether Foxp2 alters the number of the specific neurons subtypes.

ID173

Poster

Undergraduate Science - Life

Effects of Physical Activity and Sedentary Behavior on Brain Responses to High-Calorie Food Cues in Obese and Lean Young Adults

This research project examined the relationship between time spent performing physical activity/sedentary behavior, and the brain's response to high-calorie food cues, which is known as "junk food". The physical activity data was collected through the use of Physical Activity Recall Questionnaire (PAR). Participants were shown high calorie food cues and non-food cues, and brain activity data was gathered through the use of fMRI. Whole brain analysis, and ROI analysis were done to explore the relationship between MVPA minutes and neural food cue reactivity within the whole brain. After data analysis, it was shown that MVPA may have beneficial effects on brain regulation of feeding behavior in both lean and obese individuals by decreasing activation to high calorie food cues. Alternatively, SB was shown to contribute to higher food activity in obese people. This study and others can be used to further analyze the role of behavior on weight maintenance and cardiovascular health.

ID174

The Difference in Traumatic Brain Injury in Sham mice and Traumatic Brain Injury

Have you ever wondered what happens when football players and boxers get knocked out? Have you ever wondered how the brain was being affected? Or if it was causing traumatic brain injury (TBI)? While working in the lab we induced traumatic brain injury(TBI) in mice resulting in a concussion. The main purpose of the project was to run various behavioral tests, then analyze the data to determine if there was a difference between the mice that received concussions and the mice that did not. We ran behavioral tests such as the elevated plus maze which test risk taking behavior, the Morris water maze to test cognitive memory, and the t maze to test spatial cognitive memory. We found significant differences in the t maze. Data analysis will continue to be performed for these measures.

ID175

Poster

Undergraduate Science - Life

Are Vocal Tics in Tourette's Syndrome Speech-Like?

Tourette syndrome (TS) is a developmentally regulated neurobehavioral disorder characterized by involuntary, stereotyped, repetitive movements. Certain temporal and tonal properties of words during voluntary speech are predictable. Words shrink and stretch depending on where they occur in a prosodic phrase. The same word has shorter duration if it is distal from a prosodic boundary and longer duration if it is proximal to a prosodic boundary. Therefore, we wanted to examine if vocal tics in TS are Speech-Like. We used audio scripted speech and spontaneous vocal ticking that was recorded from a Ted talk Speaker in females that spoke a variety of British English with TS. Segments of audio were prepared into tic and non-tic portions. We used ? software to obtain measures of Tic and non-tic interval intonation and durations. Upon analysis, we found that vocal tic intonation disrupts surrounding utterance intonation. However, vocal tic intonation varies. The duration of tics inside prosodic phrases was more stereotyped than the duration of tics outside prosodic phrases (i.e. during pauses). In other words, vocal tic duration varies as a function of prosodic grouping. Future studies will examine if the vocal tics variation is systematic and is the variability in duration due to word duration.