doi: 10.25778/8AVE-WP88

Proceedings 94th Annual Meeting,
Virginia Academy of Science
University of Mary Washington
MAY 18-20, 2016

Agriculture, Forestry, and Aquaculture

VIRGINIA AGRICULTURE: LOOKING BACKWARD AND FORWARD. Sandra J. Adams, Virginia Department of Agriculture and Consumer Services. Agriculture, the number one private industry in Virginia, contributes $52 billion annually to Virginia's economy and supports 415,000 jobs. Though Native Americans grew crops and instructed the Jamestown settlers in New World agricultural practices, farming in Virginia is dated to 1614, the year of the first tobacco exports to Europe. Virginia has made and continues to make incredible contributions to the development and modernization of agriculture. George Washington was a pioneer in crop rotation and his meticulous record-keeping led to many agricultural innovations. Thomas Jefferson's introduction of new agricultural products and new growing practices had an effect on American agriculture that endures to this day. Other famous agricultural products and innovations include Cyrus McCormick's development of the mechanical reaper; *Fragaria virginiana*, the first cultivar of the modern strawberry; country hams and Virginia style peanuts; *Crassostrea virginica*, Virginia's native oyster that was noted in the journals of Captain John Smith and today has made a dramatic comeback from near extinction; and famous animals such as Secretariat and Elevation the bull, the progenitor of 10 percent of the world's Holstein population. To remain viable in the future, Virginia agriculture must make a profit, care for the planet in new and different ways, utilize new technologies such as gene modification and gene editing, grow food in new places and educate the public about its production methods. Concerns for the future include fear of genetically modified organisms, a growing distrust of traditional production methods and attempts to over regulate them, public acceptance of new technologies, and the ways we will feed a world population of more than nine billion by the year 2050.

INJURY TO APPLES AND PEACHES AT HARVEST FROM FEEDING BY *HALYOMORPHA HALYS* (STÅL) (HEMIPTERA: PENTATOMIDAE) NYMPHS EARLY AND LATE IN THE SEASON. A. L. Acebes-Doria[1], T. C. Leskey[2] & J. C. Bergh[1], Alson H. Smith Jr[1],

[1]Agricultural Research and Extension Center, Virginia Tech, Winchester, VA 22602 and [2]USDA-ARS, Appalachian Fruit Research Station, 2217 Wiltshire Rd, Kearneysville, WV, 25430. *Halyomorpha halys* adults and nymphs feed on tree fruits. Feeding injury from adults has been characterized but the injury from nymphs has not been

examined systematically. Since the four plant-feeding instars of *H. halys* (second through fifth) differ substantially in size, it is plausible that the effects of their feeding on fruit injury and injury expression may differ among them. We compared feeding injury at harvest from young nymphs (second plus third instars), older nymphs (fourth plus fifth instars), and adults that were caged on 'Smoothee Golden' apples and 'Redhaven' peaches in early June (peach and apple), late July (peach), and late August (apple). Individual apples and peaches were caged at fruit set and assigned to the following treatments (n = 28/treatment): 1) control (no *H. halys*), 2) young nymphs or 3) adults early in the season, and 4) young nymphs, 5) older nymphs or 6) adults later in the season. Fruit in each treatment were exposed to 3-4 young nymphs, two older nymphs or 1-2 adults placed in the cages for 96 h and evaluated for external and internal feeding injury within 36 h after harvest. No injury was recorded from unexposed peaches or apples. The percentage of injured fruit and number of injuries per fruit varied significantly among the exposed treatments. Early season feeding by young nymphs yielded the least injury to peaches and apples. In apples, the highest percentage of injured fruit and number of injuries per fruit were caused by late season feeding. by adults. In peaches, early season adult feeding produced the highest percentage of injured fruit and injuries per fruit. More internal than external injury was recorded on peach and no such difference was observed on apple. These findings have implications on *H. halys* management in fruit orchards. This study is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number #2011-51181-30937.

DETECTING ANTIBIOTIC RESIDUES IN AQUACULTURE USING A COMMERCIAL TEST KIT. M. David Crosby & Louis Landesman, Cooperative Extension, P.O. Box 9081, Virginia State University, Petersburg, VA 23806. Today's consumers are concerned with food safety. Consumers do not want food containing antibiotic residues. HACCP guidelines for fish processing list antibiotic and pesticide residues as a hazard for consumers. Premi®Test is an over-the-counter commercial test kit that is used to detect antibiotic residues in meats, poultry, eggs and milk. The test kit is fairly inexpensive costing about $140 for 25 tests. The kit uses thermophilic bacteria (*Bacillus stearothermophilus var. calidolactis*) for detecting the presence of antibiotics. A pilot study was conducted to investigate the feasibility of using Premi®Test to detect antibiotics used in the aquaculture industry. Catfish and tilapia were fed antibiotic feed containing either Romet -30® or Aquaflor® which are used in the aquaculture industry. The test kit detected Romet-30® in the muscles of the catfish and tilapia but not Aquaflor®. The test kit detected both antibiotics in the feed.

Premi®Test showed some promised as low cost detection system that can be used by small scale fish processors.

ELUCIDATING THE ANOREXIGENIC MECHANISM OF ALPHA-MELANOCYTE STMULATING HORMONE. M. S. Delp, M. A. Cline & E. R. Gilbert, Department of Animal and Poultry Sciences, Virginia Tech, Blacksburg VA 24060. Alpha-melanocyte stimulating hormone (α-MSH), a member of the melanocortin family, causes decreased food intake in both mammals and birds. However, little is known about the central mechanism mediating this response in non-mammalian species. Therefore, we started to elucidate the central mechanism of α-MSH using 5-day post hatch chicks as models. Firstly, c-Fos immunohistochemistry was measured in key hypothalamic nuclei mediating appetite, and α-MSH was associated with increased reactivity in the paraventricular nucleus (PVN), dorsomedial nucleus (DMN), lateral hypothalamus (LH), and arcuate nucleus (ARC). From the hypothalamus, samples of each nucleus were collected following injection of α-MSH and the abundance of several appetite-associated mRNA was quantified. In the ARC, mRNA levels of neuropeptide Y (NPY), oxytocin receptor, and agouti-related peptide all increased. In the PVN, there was a reduction of NPY receptor sub-type 1 mRNA levels, while in the DMN, there was an increase of NPY and dopamine decarboxylase mRNA abundance. These results indicate the central mechanism of α-MSH may be mediated through and elicit a response in multiple hypothalamic nuclei. (Supported by: Virginia Tech Phi Sigma Undergraduate Research Grant and The Virginia Academy of Science).

NUTRITIONAL QUALITY AND IN-VITRO PROTEIN DIGESTIBILITY AND SOLUBILITY OF CHICKPEA AS AFFECTED BY DIFFERENT PROCESSING METHODS. M. Obielodan, A. Cartier, K. Jordan, T. Hairston, A. Shannon, E. Sismour & Y. Xu, Agriculture Research Station, Virginia State University, Petersburg VA 23806. Chickpea is an important food legume and is a major ingredient in many human diets. The effect of different processing methods on chemical composition, amino acid profile, mineral content, anti-nutritional factors, protein solubility and *in-vitro* digestibility of chickpeas were investigated. All processing methods improved the amino acid profile, with the greatest increase caused by soaking with microwave cooking. Processing significantly reduced mineral, tannin and phytate contents among all treatments. Soaking with microwave cooking resulted in the largest reduction of tannins whereas soaking with pressure cooking resulted in the highest reduction of phytate. Soaking with microwave cooking also resulted in the highest increase in *in-vitro* digestibility. *In-vitro* protein digestibility was positively correlated with total amino acid content ($r = 0.774$) and

total essential amino acid content (r = 0.838), but was negatively correlated with total macroelements (r = -0.925), tannins (r = -0.847) and phytate (r = -0.818).

EVALUATING A POTENTIAL AREA-WIDE IPM STRATEGY FOR MANAGING HEMLOCK WOOLLY ADELGID IN THE EASTERN UNITED STATES. Kenton Sumpter[1], Scott Salom[1], Carlyle Brewster[1], Troy Anderson[1], Albert Mayfield III[2] & Tom McAvoy[1], [1]Virginia Polytechnic and State University and [2]USDA Southern Research Station. Use of the neonicotinoid insecticide, imidacloprid, has been found to be highly effective in suppressing hemlock woolly adelgid, *Adelges tsugae* Annand, (HWA). Similarly, *Laricobius nigrinus* Fender (Coleoptera: Derodontidae) has been found to be a likely candidate for biological control. Each control tactic has different objectives and outcomes. In an attempt to utilize the best of both approaches, a project was designed to develop a pest management strategy that utilizes both tactics concurrently within the same sites. The goal of this project is to assess the efficacy of a combined chemical – biological control strategy designed to reduce HWA populations and improve the health of hemlock forests as well as achieve recovery of *L. nigrinus*. The project is being conducted across three states; Kentucky, West Virginia and Tennessee, and began in 2010 with data having been collected annually through 2016. Data collected describe tree health, HWA population and recovery of *L. nigrinus* predators. Thus far, tree health has declined across all sites regardless of treatment type, and HWA population indices have been shown to be highly variable. *L. nigrinus* was initially recovered from its release plots (KY = 2010-2013, WV = 2011-2013) however, there have been no successful recoveries in 2014 and 2015 at any site.

EFFECT OF SEED PELLETING ON GERMINATION AND SURVIVAL OF SELECT SMALL-SEEDED SPECIES. Tiffany Patrick, Andrew Thomas, and Laban K. Rutto, Agricultural Research Station, Virginia State University, P.O. Box 9061, Petersburg, VA 23806. Crop species with exceedingly small seed present handling and singulation challenges during planting. They are also characterized by poor germination and seedling survival because of poor contact with growth media. These qualities force growers to sow large quantities of seed in order to achieve desired plant populations or to invest in labor intensive production techniques, e.g. use of greenhouse-raised transplants. One solution to this problem is seed pelleting, a process whereby mean seed diameter is significantly increased by coating individual seed with an inert, usually hydrophilic substrate to aid in handling and to facilitate mechanized planting. In this study, we evaluated germination in pelleted and non-pelleted seed from a select

group of small-seeded grains (finger and brown top millets) and vegetables (jute, amaranth, cat's whiskers). Seed pelleting was done using a Satec Concept ML2000 pellet mill (Satec Handelsges MBH, Elmshorn, Germany) with Seedworx Pellet Mix as the coating agent and 50% (v/v in water) Seedworx StixL-Neutral polymer as the binder (Aginnovation, Walnut Grove, CA). Germination tests were conducted in a bench-top incubator at 25 ^{o}C and seed was observed over a period of 10 days. Pelleting increased seed size by about 33-150% and a significant improvement in germination was observed for pelleted seed. Our results show that seed pelleting benefitted the dicots more than the grasses. Future work will compare survival and vigor in seedlings from coated and uncoated seed.