AG AVIATION EXPO
NATIONAL AGRICULTURAL AVIATION ASSOCIATION
Savannah, GA | 2026

Aerial Application Technology Research Session

Date: Mon, November 16, 2026 ***Time:*** 10:00 AM – 12:00 PM ***Venue:*** Savannah Convention Center ***Note:*** *This session consists of 7 consecutive presentations as specified below*	***Session Description:*** At this meaty session, you'll get a science-based overview of the cutting-edge research underway to support your operations from some of the industry's top aerial application researchers. Researchers have been working on most of these projects over the past several years and are eager to help make your applications more efficacious, make you an even better environmental steward and your application business even more advanced. To get a sample of what to expect, check out presentations from recent years

Presentation #1 | 10:00 – 10:20 AM

The Impact of pH on Applications

Author: Greg Kruger, PhD

Abstract: Spray-water pH can influence pesticide stability, solubility, compatibility, and overall application performance. However, its importance varies among active ingredients, formulations, water sources, and tank mixtures. This presentation will explain how pH affects spray applications, distinguish pH from hardness and alkalinity, and discuss when buffers, acidifiers, or water conditioners may be useful. Practical guidance will help applicators make informed, product-specific water-quality decisions.

Bio: Dr. Greg Kruger is Vice President at Rosen's Inc. and formerly led the Pesticide Application Technology Laboratory at the University of Nebraska–Lincoln. His work focuses on pesticide application technology, spray drift, adjuvants, water quality, and improving application performance.

AG AVIATION EXPO
NATIONAL AGRICULTURAL AVIATION ASSOCIATION
Savannah, GA | 2026

Presentation #2	10:20 – 10:40 AM

From Droplet Impact to Spray Coverage: Understanding Spray Deposition

Author: Brad Fritz, PhD

Abstract: Spray deposition is often described in terms of coverage or application volume, but these measurements capture only part of what occurs when droplets reach a target. This presentation will examine how droplet size, velocity, and target shape influence impact and collection efficiency, along with the roles of splash, spreading, retention, and surface characteristics. The relationships among deposited volume, droplet number, and surface coverage will also be explored, including why similar deposited volumes can produce very different coverage patterns. The presentation will provide a practical framework for understanding and interpreting spray deposits.

Bio: Dr. Brad Fritz is an agricultural engineer and serves as the Research Leader of the USDA ARS Aerial Application Technology group in College Station, Texas. His areas of research include spray drift measurement and methods of mitigation, understanding the role spray nozzles and formulations play in the droplet size being applied and optimizing aerial application technologies and methods to enhance on target deposition and reduce off target impacts.

AG AVIATION EXPO
NATIONAL AGRICULTURAL AVIATION ASSOCIATION
Savannah, GA | 2026

Presentation #3	10:40 – 11:00 AM

What Makes Aerial Herbicide Applications Successful?

Author: Tommy Butts, PhD

Abstract: This presentation will explore a variety of themes aimed at maximizing the effectiveness of aerial herbicide applications. On-going research exploring coarser droplet sizes and reduced spray volumes from manned aircraft for effectively applying desiccants will be discussed. Further topics may include mixing recommendations, weather-related impacts on herbicides, and other "If a failure occurs, is it always the aircraft's fault?" discussion points. Knowledge gained from this presentation will aid in appropriately setting up aircraft for optimizing herbicide use, as well as a better understanding of herbicide applications in general, which can benefit all applicators.

Bio: Dr. Tommy Butts is a Clinical Assistant Professor, Extension Weed Scientist with Purdue University. Dr. Butts and his program's research, teaching, and Extension efforts focus on identifying and providing recommendations for novel, applied weed management strategies including the use of precision agriculture and application technologies. Further emphasis is placed on increasing herbicide application knowledge, safety, and effectiveness, while reducing off-target movement, both from ground-based and aerial (manned and remotely piloted) applications. His and his team's overall goal is to generate research-supported, effective weed management tools and educational materials to be used by all agriculturalists to battle complex weed problems. Tommy is supported by his wife, Liberty, and three little kiddos, Brooker (6), Brinley (5), and Bennett (2).

AG AVIATION EXPO
NATIONAL AGRICULTURAL AVIATION ASSOCIATION
Savannah, GA | 2026

Presentation #4	11:00 – 11:15 AM

Economic Value of the Agricultural Aerial Application Industry in the United States Delineated by Crops Grown and State

Author: Senarath Dharmasena, PhD

Abstract: Application of liquid and dry materials via air have been used in the United States for producing a safe, affordable and abundant supply of food, fiber, forestry products and bioenergy, as well as to control pests. According to a 2019 National Agricultural Aviation Association (NAAA) survey, the agricultural aviation industry in the United States treats about 127 million acres of cropland each year, which is approximately 28% of the total commercially treated U.S. cropland. Hughes, Dharmasena and Martin (2025) estimated value of the agricultural aerial application industry for selected four states, Arkansas, Indiana, New York and California, considering the costs at both farmgate and input supplier level for five major crops grown. They found that there is about 9 percent loss of producer revenue and about 27 percent of input sector revenue loss in the absence of agricultural aerial applications in the states considered. The general objective of this study is to expand the economic analysis of Hughes, Dharmasena and Martin (2025) and estimate the total economic value of the agricultural aerial application industry in the United States delineated by various crops grown considering revenue loss at farmgate, input supplier and other stages of the agricultural value channel. Data provided by the National Agricultural Aviation Association (NAAA) and the USDA Economic Research Service will be used to develop an economic model using cutting-edge econometric tools and stochastic simulation modeling tools to estimate the value of the agricultural aerial application industry for each state's economy of the United States, delineated by different crops. This model will aid decision-making for aerial applicators, regulators, and legislators with the aim of quantifying the value of the industry to the economies of all states considering multiple stages of the agricultural production and food distribution channel.

Bio: Currently, Dr. Dharmasena is Associate Professor, Department of Agricultural Economics, Texas A&M University. Also, he is Associate of the Agribusiness, Food and Consumer Economics Research Center (AFCERC) at Texas A&M University. Dr. Dharmasena's current research interests are in the areas of Consumer Economics and Applied Demand Analysis, Agribusiness and Food Market Analysis, Behavioral Economics, Health and Nutrition Economics, Economics of Food Security, Food Environments and Obesity, Causality Modeling, Probability Forecasting and Forecast Evaluation, and Market Integration and Price Discovery. He is an expert in applied econometric modeling, both structural and time-series. He has papers published in leading national and international peer-reviewed journals including Empirical Economics, Health Economics, Food Policy, Agricultural and Resources Economics Review, Journal of Agricultural and Applied Economics, Journal of Agricultural and Resource Economics, Energy Economics, Energy Policy, Journal of Food Distribution Research, and Resources, Energy and Development. He is member of several national and international professional associations including, Agricultural and Applied Economics Association, Western Agricultural Economics Association, and Southern Agricultural Economics Association. Dr. Dharmasena is an elected representative of Texas A&M University Faculty Advisory Council and associate editor of a top-tier international agribusiness journal.

AG AVIATION EXPO
NATIONAL AGRICULTURAL AVIATION ASSOCIATION
Savannah, GA | 2026

Presentation #5	11:15 – 11:30 AM

Ag Aviation Nozzle Analysis

Author: Dennis Gardisser, PhD

Abstract: Session will compare the droplet spectrums developed from most of the common nozzles being utilized for both fixed and rotary wing options. There are a number of aerial nozzle additions available on the market. This will provide a comprehensive one stop graphical portrayal of the characteristics over several speeds and orientations. A discussion of how to tell if individual nozzle selections and setups will meet specific label guidelines. This presentation is intended to provide applicators with easy to understand information to pair specific nozzles to their individual needs.

Bio: WRK has been a leader on aircraft patternization, application efficacy, drift mitigation, and related educational information. Dennis is recognized for the give me the facts, easy to understand, presentations. One should expect information that is directly applicable and beneficial to their application needs.

AG AVIATION EXPO
NATIONAL AGRICULTURAL AVIATION ASSOCIATION
Savannah, GA | 2026

Presentation #6	11:30 – 11:45 AM

Interference of adjuvants in the droplet spectrum generated by rotary nozzles

Author: Ulisses Antuniassi, PhD

Abstract: The objective of this work was to evaluate the interference of surfactants and oil-based adjuvants in the droplet spectrum generated by rotary nozzles used in manned and unmanned aerial spraying systems. This research was developed using the high-speed wind tunnel at the AgroEfetiva's laboratory in Botucatu/SP, Brazil. The rotary nozzles were installed in the wind tunnel and subject to air flow to simulate several different spraying scenarios. The AgroEfetiva's wind tunnel is equipped with a Sympatec Helos particle analyzer. The rotary nozzles were the ones provided by DJI on the T40 model and XAG on the P60 model (multirotor drones), as well as the cage rotary nozzle provided by Pyka on the Pelican 2 (a fixed wing unmanned aircraft) and the AU5000 provided by Micronair. The experiment was conducted with the nozzles being first adjusted to generate fine and medium droplets when spraying water. Data collection included solutions based on SC, WG and SL formulated pesticides, all mixed with adjuvants based on a modified seed oil and a non-ionic surfactant and adjusted to the label dose rates and a spray volume of 10 L/ha. Droplet spectrum data was analyzed the calculation of the following parameters: the volume median diameter, the percentage by volume composed of droplets smaller than 100 µm and the relative spam. The results showed that there was interference from the adjuvants according to each commercial product formulation and nozzle design. The performance of the different rotating nozzles was affected by the pesticide formulation and the adjuvants, with significant interactions observed.

Bio: Dr. Ulisses Antuniassi is a professor of agricultural engineering at São Paulo State University (UNESP) in Botucatu, Brazil. He has more than 30 years of experience in pesticide application technology, with research focused on ground and aerial application, spray drones, adjuvants, formulations, spray drift, precision application, and good application practices. Dr. Antuniassi earned his agronomy degree from Londrina State University and his master's and doctoral degrees from UNESP.

AG AVIATION EXPO
NATIONAL AGRICULTURAL AVIATION ASSOCIATION
Savannah, GA | 2026

Presentation #7	11:45 AM – 12:00 PM

Exploring LiDAR as a New Tool for Preflight Mapping and Hazard Awareness

Author: Chenghai Yang, PhD

Abstract: LiDAR is an advanced remote sensing technology increasingly used for high resolution, 3D mapping of terrain and vegetation in many applications. Its ability to generate detailed digital terrain models and canopy height models offers new potential for supporting preflight mapping in areas with complex terrain and obstacles relevant to low altitude aerial application. This presentation introduces how drone-based LiDAR data can assist preflight planning by revealing wires, poles, trees, and terrain features that may be difficult to recognize in conventional 2D images or during fast, low altitude operations. Using real data from crop fields with nearby powerlines and scattered trees, we demonstrate how terrain models, object height maps, and hazard layers can help applicators better understand field conditions before flying. The goal is to show how LiDAR can complement today's tools and practices by improving situational awareness, reducing surprises, and supporting safer, more consistent application planning.

Bio: Dr. Chenghai Yang is a Research Agricultural Engineer with the USDA-ARS Aerial Application Technology Research Unit in College Station, TX. His research focuses on the development and application of remote sensing technologies for precision agriculture, pest management, and aerial application. Dr. Yang serves in several national and international professional societies and is a Fellow of the American Society of Agricultural and Biological Engineers (ASABE).