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# Pesticide Formulation and Delivery Systems: 40th Volume, Formulation, Application, and Adjuvant Innovation

STP 1627  
Editor:  
Curtis M. Elsik



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**SELECTED TECHNICAL PAPERS**

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ASTM STOCK #STP1627  
DOI: 10.1520/STP1627-EB

ISBN: 978-0-8031-7700-0

ISSN: 1545-9004

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Printed in Batavia, NY  
October, 2020

## Foreword

THIS COMPILATION OF Selected Technical Papers, STP1627, *Pesticide Formulation and Delivery Systems: 40th Volume, Formulation, Application, and Adjuvant Innovation*, contains peer-reviewed papers that were presented at a symposium held October 22–24, 2019, in Houston, Texas, USA. The workshop was sponsored by ASTM International Committee E35 on Pesticides, Antimicrobials, and Alternative Control Agents, and Subcommittee E35.22 on Pesticide Formulations and Delivery Systems.

Symposium Chairperson and STP Editor:

Curtis M. Elsik  
*Indorama Ventures Oxides LLC*  
*The Woodlands, TX, USA*



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## Overview

The 40th Symposium on Pesticide Formulation and Delivery Systems: Formulation, Application, and Adjuvant Innovation, sponsored by the ASTM Committee E35 on Pesticides, Antimicrobials, and Alternative Control Agents, was held in Houston, Texas, on October 22–24, 2019. Organized under Subcommittee E35.22 on Pesticide Formulations and Delivery Systems, Dr. Curtis Elsik served as chair. The meeting focused on all aspects of technologies and methods that support the formulation and application of agrochemical products.

Twenty-seven presentations were delivered across multiple technical disciplines during the three-day program. There were sections concentrating on Application, Spray Drift Reduction, Formulation Development, and Adjuvants (both Tank-Mixed and Built-In). While the first three invited presentations did not result in publications, they are worthy of note here.

The keynote speaker was Namita Dodwadkar of GreenLight Biosciences in Medford, MA. She was the first person to present at this Symposium series on the topic of RNAi Formulations. This is a very exciting new technology and its realization in the agricultural market will clearly depend on its successful formulation into a physically and chemically stable system that gets delivered to its target.

The second invited speaker was Dr. Kerry Leifer, the new head of the pesticide inerts division at the U.S. EPA (Chemistry Inerts Toxicology Assessment Branch of the Registration Division in the Office of Pesticide Products). He provided an update on the pesticide regulatory program in the United States.

The third invited speaker was Dr. Scott Tann, now the North America Business Manager Agrichemicals at Lamberti USA. He provided a history of the E35.22 Symposium on its 40th anniversary. He discussed how the subcommittee is responsible for developing and maintaining standards and terminology critical to the function and performance of agrochemical formulations.

The first group of talks were focused on application. Several of these were submitted for publication: Liming Chen described the application of pesticide in ornamental nurseries and fruit farms using a laser-guided intelligent sprayer. Zhihong Zhang retrofitted a premixing in-line injection system on a variable-rate orchard sprayer. Xiaojing Yan could not secure a visa to attend from China in time, so Susan Sun volunteered and did an admirable job giving her presentation on using unmanned aerial vehicles (UAVs) to control crop insects and disease in China.



The second group of talks were focused on drift reduction technologies. This session was chaired by Liz Rea. The talks that were submitted for publication include: Ulisses Antuniassi described the droplet spectra generated by air induction nozzles when spraying tank mixtures containing adjuvants, glyphosate and dicamba. Steven Fredericks presented a diameter-resolved velocity correction for laser diffraction calibration and wind tunnel measurement of spray droplet size. Brad Fritz discussed standardizing methods for determination of effective swath width and spray drift potential from unmanned aerial systems. Narayan Raman detailed a vinyl ester dispersion stabilized combination oil/polymer adjuvant for drift reduction.

The third group of talks were focused on formulation development. This session was chaired by Dan Wright. Only one presentation was submitted for publication: Poliana Cardoso-Gustavson talked about the development of microbial-containing formulations all the way from the selection of components to the final foliage application.

The fourth and last group of presentations were focused on built-in and tank mix adjuvants. This session was chaired by Patrick McMullan. Patrick graciously volunteered to serve as the Chair for the 41st Symposium. Several topics were submitted for publication: JohnPaul Abbott determined the effects of leaf surface roughness and adjuvant type and concentration on the adhesion of impacting droplets. Brian Malys looked at the distribution of herbicides in plant tissues using laser ablation electrospray ionization mass spectrometry. Caroline Woelfle-Gupta looked at ways to improve rainfastness and UV resistance of microbial pesticides. Caroline Woelfle-Gupta also presented a paper by her Chinese colleagues on sticker adjuvant development with enhanced performance in rainfastness and efficacy.

I want to express my sincere thanks to the ASTM staff for their support that enabled both a successful symposium program and this STP publication. I'd also like to share my appreciation for the past chairpersons who have fostered, grown, and sustained the E35.22 symposium over its past 40 years. In closing, thank you to all the authors, invited speakers, presenters, session chairs, and reviewers whose efforts made this symposium and STP possible. It was both a privilege and honor to serve as your 40th Anniversary Chair.

Symposium Chairperson and STP Editor:

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ISBN: 978-0-8031-7700-0  
Stock #: STP1627

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