

Selected Technical Papers

STP 1558

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# Pesticide Formulations and Delivery Systems: 32<sup>nd</sup> Volume, Innovating Legacy Products for New Uses

Editor:  
Mark L. Bernards

# **Selected Technical Papers STP1558 Pesticide Formulations and Delivery Systems: 32nd Volume, Innovating Legacy Products for New Uses**

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100 Barr Harbor Drive  
PO Box C700  
West Conshohocken, PA 19438-2959

Printed in the U.S.A.

ASTM Stock #: STP1558

### **Library of Congress Cataloging-in-Publication Data**

**ISBN:** 978-0-8031-7544-0

**ISSN:** 1040-1695

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## Foreword

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THIS COMPILATION OF *Selected Technical Papers*, STP1558, on *Pesticide Formulations and Delivery Systems: 32nd Volume, Innovating Legacy Products for New Uses*, contains peer-reviewed papers that were presented at a symposium held November 1–3, 2011 in Tampa, FL. The symposium was sponsored by ASTM International Committee E35 on Pesticides, Antimicrobials, and Alternative Control Agents and Subcommittee E35.22 on Pesticide Formulations and Delivery Systems.

The Symposium Chairman was Mark L. Bernards, Western Illinois University, Macomb, IL, USA and the Co-Chairman was Bala Devisetty, Valent Biosciences Corporation, Long Grove, IL, USA. The STP Editor is Mark L. Bernards.



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## Overview

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The 32nd Symposium on Pesticide Formulations and Delivery Systems was held in Tampa, FL on November 1–3, 2011. It was sponsored by ASTM International Committee E-35 on Pesticides, Antimicrobials, and Alternative Control Agents and organized by Subcommittee E35.22 on Pesticide Formulations and Delivery Systems.

The theme of the symposium was “Innovating Legacy Products for New Uses.” The pace of new pesticide active ingredient commercialization has slowed over the past fifteen years. It is estimated that by 2014, 95 percent of the global agrochemical market will be comprised of pesticide active ingredients that are no longer patent protected. One of the keys to success in controlling pests and sustaining corporate profitability will be to develop new uses or improved performance of active ingredients that have been widely used for many years—legacy products. Two near term changes where legacy products will receive major innovations in performance characteristics and more widespread use will be the new formulations of 2,4-D and dicamba that will be approved for use on 2,4-D resistant corn and soybean and dicamba-resistant soybean. Increases in pesticide resistance among insects, weeds and fungal pathogens will necessitate additional innovations of legacy products to provide new tools for practitioners to manage these pests.

The purpose of the symposium was to provide a forum where innovations in pesticide formulation and delivery and updates on regulatory issues related to the use of pesticides could be presented and discussed. Each speaker left a few minutes at the conclusion of his/her presentation and the session moderator used this time to facilitate a discussion on the presentation in order to increase the understanding and application of the information among the participants.

The Symposium consisted of 31 papers contributed by national and international speakers representing the agrochemical industry, academia, and government research and regulatory agencies. The symposium was divided into six sessions. Topics included innovations on legacy products, new test methods, updates on regulations and product terminology, advances in drift reduction technologies, new developments in formulation technology for pesticide active ingredients and tank-mix adjuvants, and the biological effect of different formulation, adjuvant and application technologies.

Three keynote addresses were delivered during the symposium. John Rabby of Rabby Enterprise opened the symposium with a talk entitled “Challenging the Same Game.” In it he described that there is good growth potential in the agrochemical market, and highlighted that one of the keys to success will be developing innovative formulations for generic active ingredients that will differentiate



them in positive ways (handling, performance, and environmental safety) from the competition. Andrew Hewitt of Lincoln University in Christchurch, New Zealand spoke on the “Spray Drift Task Force: Accomplishments and Opportunities.” He emphasized the importance of nozzle technology in reducing drift and the application of the task force results in developing drift reduction regulations. Jerry Green of Pioneer Hi-Bred addressed the topic “Transgenic Crops and the New Paradigm for Pesticide Use in Row Crops.” He reviewed how the commercialization of glyphosate-resistance and Bt technologies altered pesticide use among farmers, and how the evolution of pesticide resistance is creating the need for new ways to manage pests.

Sixteen papers presented at the Symposium completed the peer-review process and were accepted for this publication. They have been grouped into four topical sections.

### **Formulation Innovations**

Li et al. describes the rationale for and physical characteristics of the new 2,4-D and glyphosate premix developed for use on 2,4-D resistant corn and soybean. Kowalski et al. developed controlled release formulations of 2,4-D and dicamba and demonstrates how they compare to conventional 2,4-D and dicamba formulations in controlling broadleaved plants. Castelani and Pierobon present how a new rheology modifier compares to xanthan gum in preparing a stable, easy to use flowable (suspension concentrate) formulations of the insecticide carbendazin.

### **Spray Application and Drift Reduction Innovations**

Salyani et al. evaluated three systems used for applying insecticides in military environments and explains how their characteristics may influence application efficacy. Hoffmann et al. reviews atomization data and make recommendations on criteria that are critical for minimizing spray drift. The first Fritz et al. manuscript demonstrates the effect of active ingredients on spray droplet spectra from aerial nozzles, and the second Fritz manuscript reports on challenges associated with field validation relative to wind tunnel evaluation of new aerial drift reduction technologies. Elsik and Schweiner present performance data on a novel adjuvant that minimizes drift without increasing the range of the spray droplet spectra.

### **New Test Methods and Terminology**

Bernal describes a method developed to simulate the release of the insecticide terbufos from granular formulations and presents the results of release from three commercial formulations. Rea presents the work of her task force in developing new ASTM terminology relating to biorational products as an initial step in developing standards related to this new category of pest management products.

## **Biological Response to Adjuvants and Delivery Methods**

Green summarizes his presentation with an overview on use of genetically modified crops, changes in weed response to the herbicides used on the crops and potential modifications to how these species will need to be managed in the future. Boina et al. demonstrate that spray droplet size can have a significant effect on the success of fenpropathrin in controlling Asian citrus psyllid on citrus trees. Sun introduces a new adjuvant designed to fulfill two purposes – increase active ingredient penetration into the plant and reduce drift – and provides data on how the adjuvant affects spray droplet spectra and efficacy of clethodim and fluazifop on annual grass weeds. Zollinger et al. compares acidic water conditioner products to ammonium sulfate for their effect on glyphosate control of multiple species across several states. Penner et al. evaluates several water conditioners that are designed to be dual purpose – enhance glyphosate activity and provide manganese to manganese-deficient soybean – for their success in achieving both objectives.

I would like to thank R. Scott Tann (Secretary of E35.22) and Curt Elsik (Chair of E35.22) for the opportunity to serve as chair of this Symposium, and for their guidance in developing the program, and to Bala Devisetty for his service as Symposium Co-chair. A special thanks is due to all those who prepared excellent presentations and made the effort to write and submit manuscripts for this publication. Additional thanks are due to those who provided peer-reviews of the manuscripts, and to the ASTM staff who assisted in the physical arrangements for the symposium and in the process of reviewing and preparing the papers for publication.

It is my sincere hope that you will gain information from this publication that can be successfully applied to improve the effectiveness and safety of pesticide application for pest management in your sphere of influence.

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ISBN: 978-0-8031-7544-0

Stock #: STP1558