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# *Pesticide Formulations and Delivery Systems, 26th Volume: Reassessing Pesticide Technologies*

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Editors:

Greg Lindner, Masoud Salyani, and Craig Martin

**STP 1478**



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***Pesticide Formulations & Delivery  
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Pesticide Technologies***

*Greg Lindner, Masoud Salyani, and Craig Martin, editors*

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## Foreword

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This publication, *Pesticide Formulations and Delivery Systems, 26th Volume: Reassessing Pesticide Technologies*, contains papers presented at the aforementioned symposium held on October 17-20 of 2005, in Dallas, Texas. The symposium sponsor was ASTM International Committee E35 on Pesticides and Alternative Control Agents. With the successful conclusion of the 2005 event, the E35 Committee Symposium is one of ASTM's longest running Symposia.

Greg Lindner, Uniqema, was this year's Symposium Chairman. The editorial staff for this Special Technical Publication (STP 1478) includes the current Symposium Chair, Mr. Lindner, as well as the Chair of the 2004 Symposium and Editor of the 25th Volume, Masoud Salyani of the University of Florida, and Craig Martin of FMC Corporation who is the Chair of the 2006 Symposium and Editor of the 27th Volume.

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## Overview

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Since its formation in 1973, the ASTM E35 Committee on Pesticides has tracked and forecasted the development of pest control technologies, while adapting to dramatic changes in the agricultural industry. The Committee has jurisdiction over 80 standards that are published in the Annual book of ASTM Standards, Volume 11.05. Since its inception, the E35 Committee's Symposium has tried to focus on identifying and sharing best options for pest control using the best of current and newly developed technology.

This year the goal of the ASTM E35 Committee Symposium was to refocus on its primary customers and markets to further define "reassessment of the technology" and target the more immediate needs of the agricultural production community. As a result, this year's theme was Reassessing Pesticide Technologies. The 26th Symposium was well attended, with registration up 20% over the 25th. Feedback indicated the program content was excellent and included the introduction of two new standard test methods.

There were six invited speakers for the 26th Symposium including the ASTM Chairman of the Board, N. David Smith, who delivered the opening presentation which focused on three major areas where improvements have been made in reducing risks and addressing negative public perceptions around pesticides. These areas were identified as implementation of the Food Quality Protection Act, improved awareness and control of pesticide drift, and sustained efforts at improving pesticide container collection and recycling.

By design, invited speakers started off many of the technical presentation sections that were focused on differing aspects of pesticide formulation, application, or evaluation. The first invited speaker on the first day of the symposium after Mr. Smith was Bob Young of the Farm Bureau who spoke about the technology needs of the grower community and who covered these needs from a perspective that included relevant market economics.

On the second day of the Symposium, the first invited speaker was Jim Jones of EPA who was paired to speak before Warren Stickle of CPDA. Together they spoke about Reassessment Policy and Performance under the Food Quality Protection Act from the perspective of both the regulators and the regulated community, respectively. Later on during the program, the Symposium audience also heard commentary from Ed Ready of the United Soybean Board regarding the current status of Asian soybean rust in the United States including the efforts underway to improve intelligence, reporting, and coordination of responses to outbreaks of the disease.

The final day of the program saw two additional invited speakers, the first being Kerry Leifer of the US EPA who spoke about the newly updated risk assessment process being applied to inert ingredients used in food-applied pesticide formulations. The second speaker was David Cleavinger of the National Association of Wheat Growers who discussed policy issues relating to crop protection that were pending in Congress.

Session I of the 26th Symposium, entitled Method Development, was moderated by Greg Volgas of Helena Chemical and included the first two technical papers. In these papers two newly adopted ASTM Test Methods were introduced. The first, presented by Alan Stern of Huntsman, described a qualitative method for the evaluation of agents used to control undesirable foam in dilute, aqueous surfactant solutions. The second, presented by Robin Dexter of FMC Corporation, described the development of an ASTM method for measurement of the extensional viscosity of dilute polymer solutions.

These papers were followed by the second session entitled Adjuvants I which was moderated Allison Forster of PPC NZ. Three papers on adjuvant product technology were presented. Hans de Ruiter of SurfaPLUS presented a crystalline urea adduct of specific nonionic surfactants that was effective at reducing the application rate of the plant growth regulator daminozide. Jim Hazen of Akzo Nobel presented the adjuvant performance of proprietary alkoxyated alkylamine adjuvants in strobilurin fungicide applications to turf and fruit crops. The final paper in the session was presented by Paul Bially of Aquatrols who described the structure-property performance relationships for surfactant block copolymers used in soil wetting applications.

On the second day of the 26th Symposium with the initial presentation by the invited speaker, the third session entitled Regulatory I opened with moderation provided by Chip Collins of Stepan. Two of the three papers in the session have been described already and had led off the session. They were followed by a paper presented by Arlean Medeiros of Exxon Mobil which described the development of a new approach to modeling risks associated with the use of volatile solvents in formulated pesticides where the fugacity of the material was considered along with measured losses from evaporation.

The fourth session entitled Formulations I was moderated by Arlean Medeiros and included three technical papers. The first was a review of attapulgite clays as rheology modifiers in aqueous suspension products and was presented by John Wolford of Englehard Corporation. Greg Volgas followed with a paper describing the use of 2,4-D acid and carfentrazone in a novel liquid pesticide formulation where surfactants provided the necessary solvency. The final paper was provided by Dan Haggard of Akzo Nobel who described the development of new naphthalene sulfonate formaldehyde condensate dispersants where improved performance was seen at reduced use rates in pesticide formulations.

Beginning after lunch on the second day of the Symposium program, Paul Bially moderated the fifth session which was identified as Formulations II. Two technical presentations were given in this session starting with Howard Stridde of Huntsman who described the development of a new cationic surfactant based emulsifiable oil adjuvant that exhibited improved properties upon dilution in high electrolyte spray mixtures. The second paper of the session was given by Han Rieffe of Croda who covered the development of new trimer acid based polymeric surfactants which showed some benefits in resistance to wash-off based on the evaluation method that was applied.

The sixth session containing four technical papers was entitled Adjuvants II and was moderated by Jim Hazen. The leading paper was provided by Peter Baur of Bayer CropScience. It described work conducted to determine droplet spreading behavior on synthetic and natural surfaces and expressed relationships that emerged between the average droplet area on plant surfaces and the spread diameter for larger drops on parafilm. Pat McMullan of AgroTechnology presented the second paper in the session which described the interaction between adjuvants and spray nozzles and the resulting impact on herbicide efficacy. Sensitivity of air induction nozzles to the presence of oil adjuvants that either stabilize entrapped air or do not was described. Simon Rose of Ciba Specialty Chemicals presented the third paper which was on the use of ammonium sulfate adjuvants containing high molecular weight polymers as deposition aids for glyphosate spray solutions. The final paper in the session was provided by Donald Penner of Michigan State University who described the interaction of certain soluble micronutrients and water conditioners with glyphosate to induce antagonism in spray mixtures.

The third day of the 26th Symposium opened with the seventh session entitled Regulatory II/Application I with moderation provided by Pat McMullan. Chip Collins provided the first technical paper on the subject of the efforts made by the Surfactants Task Force to address the inert ingredient tolerance reassessment process in furtherance of the remarks initially made by

the invited speaker. The second technical presentation covered pesticide applications containing guar based polymers as drift reduction and deposition aids and was provided by Rajesh Pazhianur of Rhodia. The relative effect of these polymers on efficacy of fungicides on soybeans was discussed.

The eighth and final session of the Symposium was entitled Application II and was moderated by Craig Martin, the chair of the 27th Symposium, who also provided the 26th Symposium closing commentary at session end. The initial paper was given by Clint Hoffman of USDA who expressed the correlation established between three different laser-based droplet measurement techniques where two different spray nozzles were evaluated. Good correlation was found between techniques with important impact arising from differences in airspeed and spray adjuvants. The second paper was presented by Huseyin Guler of Ohio State University and described interactions between air induction nozzles, low pressure nozzles, and drift reduction adjuvants. Low pressure nozzle operation was found to have drift reduction potential along with air induction nozzles and some drift reduction adjuvants like xanthan gum. The final paper was presented by Allison Forster who described the construction of more strongly predictive mathematical spray retention models for plant foliage when plant morphology was considered.

While twenty three technical papers were presented along with the invited speakers, ten papers completed the peer and editorial review cycle and are published in this STP volume. It is important for the reader to note that most papers that were presented and described in this overview but were unpublished remained so because their associated manuscripts were not submitted in accordance with the ASTM Publications timelines. As a result, their failure to appear in this volume is not a reflection of any unacceptability for scientific or factual cause. Each of these unpublished manuscripts can and should be submitted for independent publication via the JAI Online process as they have the potential to improve the body of published scientific data on pesticide formulation, testing, application, and adjuvancy.

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