
Pesticide Formulations and Application Systems

Tenth Volume

Bode/Hazen/Chasin, editors



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***Pesticide Formulations
and Application Systems:
10th Volume***

L. E. Bode, J. L. Hazen, and D. G. Chasin, editors



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The quality of the papers in this publication reflects not only the obvious efforts of the authors and the technical editor(s), but also the work of these peer reviewers. The ASTM Committee on Publications acknowledges with appreciation their dedication and contribution of time and effort on behalf of ASTM.

Foreword

This publication, *Pesticide Formulations and Application Systems: 10th Volume*, contains papers presented at the Tenth Symposium on Pesticide Formulations and Application Systems held in Denver, Colorado, on 25–26 October 1989. The symposium was sponsored by ASTM Committee E-35 on Pesticides and by its subcommittee E35-22 on Pesticide Formulations and Application Systems. L. E. Bode, University of Illinois, served as symposium chairman, and J. L. Hazen, BASF Corporation, and D. G. Chasin, ICI Specialty Chemicals, served as symposium cochairmen. These men served as coeditors of this publication.

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Overview

The purpose of this tenth symposium on pesticide formulations and application systems was to continue and build on the exchange of information and research data among pesticide formulators and application scientists that has been established by the nine previous symposia (STP 764, 795, 828, 875, 915, 943, 968, 980, and 1036). The aim was to:

1. Provide a forum for exchange of ideas and data among chemists and engineers working to improve the efficiency of pesticide use.
2. Provide a data base to support ASTM Committee E35 in development of guides and standards.
3. Serve as a guide to Subcommittee E35.22 members in their future efforts to address the issues related to the use of pesticides.

This volume, in addition to previous symposia proceedings, adds significantly to the available resources on the important subject of pesticides. Subjects in this STP include the technical aspects of pesticide application and formulation research, including equipment and concepts contributing to the effective and responsible use of pesticides. Regulatory aspects of pesticides are included as an integral part of pesticide development and use. Direction and suggestions for the development of several standards were made available from material in this volume.

The 21 papers in this STP are organized into three sections. The first section, *Perspectives on Pesticide Risks*, includes two papers from the keynote session regarding risk assessment and how risk assessment imparts the regulatory actions of pesticide registration. Papers from two other keynote speakers are not available in this volume: R. L. Denny, USEPA, discussed the regulatory policies of how formulations impact on waste minimization and disposal. J. A. Graham, Monsanto Company, presented insight on how modern analytical chemistry impacts on perceptions of pesticide risks.

The second section, *Formulation Technology and Characteristics of Uptake*, includes research regarding pesticide formulation technology and efficiency of pesticide uptake into target pests. Eleven papers on the application of pesticides comprise the final section—*Application Systems*. This section includes research on sensors and controls for precise application, off-target losses from application of pesticides, and new techniques for applying pesticides.

Perspectives on Pesticide Risks

Pesticide risk assessment is a significant component of most environmental risk management programs, both in industry and government. The papers in this section describe risk assessment issues relevant to several new regulatory initiatives of EPA. The keynote session presented an overall view of risk, including the potential human health and environment/ecological risks of using agricultural chemicals. Issues examined include pesticide risks asso-

ciated with generation and disposal of hazardous waste, use of inerts in formulating pesticides, and how new analytical procedures for detecting residues on food and water are affecting perceptions of pesticide risks.

Rachman described quantitative risk assessment as a tool for regulating potentially carcinogenic chemicals. Risk assessment is a methodology for estimating the "true risk" of a toxic substance. To maximize protection of public health, regulatory attention needs to focus and reduce those human risks that are most likely to be significantly large.

The issue surrounding inerts testing has become some of the highest profit issues affecting pesticide formulations today. Curcio focused on several aspects of the regulations which have become apparent as the industry moves forward in understanding and implementing the new pesticide procedures.

Formulation Technology and Characteristics of Uptake

Wing and Dailey present recent breakthroughs in microencapsulation and cyclodextrin complexes with special emphasis on how they effect contamination of groundwater. Moechnig describes the properties of a new inert granular carrier that maintains its integrity during formulation, yet disintegrates readily when exposed to rainfall. Raymond evaluated several techniques to measure airborne dust to determine which are suitable for determining the dustiness of inert carriers. His work will serve as a basis for the development of an ASTM standard procedure for measuring airborne dust.

Characteristics of spray deposit and pesticide uptake were examined by Lutrell, Manthey, Salyani, and Sundaram. Advantages and limitations of various approaches used to estimate the relative influences of spray deposits and resulting efficacy of the pests were evaluated. Results on the affect of petroleum solvents on cuticular wax and leaf-cell permeability will be useful in selecting solvents for pesticide and adjuvant formulations. Research in this area has progressed to the point of validating in field experiments responses predicted by models of spray deposits.

Application Systems

Sensors and controls for precise application were investigated by Sudduth, Gaultney, and Leedahl. Systems are now available for on-the-go sensing of soil organic matter with the adjustment of chemical rate based on input from the sensor. Field impregnation of pesticides on granular fertilizer and application with pneumatic spreaders is being accepted as a technique for minimizing the environmental impact from pesticides.

Particle dynamics affects the deposition efficiency of spray droplets. Young, Adams, and Akesson examined the dynamics of droplet spray clouds from the time of droplet formation until deposition on the target. The formation of vortices around the spray sheet were clearly demonstrated with a proposed method for measuring drift potential.

Hall and Riley discussed the low efficiency of active chemical that actually reaches the target and present techniques for reducing the level of spray drift. Regression equations are used to predict the amount of off-target deposits during application of pesticides. Krishnan studied the effect of wind conditions and boom bounce on the uniformity of application.

Ozkan has developed a technique to inject pesticides into turfgrass in order to reduce potential contamination of people, pets, and wildlife. Appel presents a procedure to treat mounds and effectively control fire ants.

These papers confirm that the objectives of the symposium were met. This STP (in con-

junction with previous symposia STPs) provides a database of information regarding pesticide formulations and application systems that will guide ASTM Committee E35.22 members in the development of necessary standards.

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