Comparison of Initial Deposition and Residue Dissipation for Conventional vs. Reduced-Volume Pesticide Applications

HS-1793

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Study Dates

Study Initiation	May 13, 1998
Field Monitoring Start	May 28, 1998
Field Monitoring Completion	August 25, 1998
Lab Sample Analysis Start	June 30, 1998
Lab Sample Analysis Completion	October 26, 1998
Study Completion	December 2, 1999

[i] All raw data related to sample collection
[ii] All raw data related to sample analyses and test/reference substances

Approved by: *[original signed by Bernardo Z. Hernandez]* [*10-1-99*]
Bernardo Z. Hernandez, Environmental Research Scientist, Study Director — Date

[original signed by Chuck Andrews] [*10-1-99*]
Chuck Andrews, Branch Chief, Worker Health and Safety Branch — Date

[original signed by Karen Heisler] [*12-2-99*]
United States Environmental Protection Agency, Sponsor — Date

QUALITY ASSURANCE STATEMENT: Project Number 9701

The study was audited at the following intervals:

Field Activities

Audit Date	Phase	Study Director Notified	Management Notified
07/27/98	Field Monitoring	08/26/98	08/26/98
07/28/98	Field Monitoring	08/26/98	08/26/98
09/21/99	Raw Data	09/21/99	09/21/99
09/21/99	Final Report	09/21/99	09/21/99

[original signed by M. Kathryn Orr] [*10-1-99*]
M. Kathryn Orr, Quality Assurance Officer — Date

Laboratory Activities

Audit Date	Phase
07/28/98	Sample receipt, DFR wash out
07/29/98	DFR extraction
7/30/98	DFR concentration
10/22/99	Data handling

[original signed by Terry Jackson] [*10-1-99*]
Terry Jackson, Quality Assurance Officer, CDFA, Center for Analytical Chemistry — Date

Executive Summary

Reduced-volume spray technology is used by an increasing number of growers. The equipment used in reduced-volume applications uses less pesticide diluted in less water compared to conventional applications and delivers a greater percentage of the pesticide to the target area. Growers often achieve comparable pest control with half the amount of pesticide active ingredient (AI) per acre and 10% - 50% the amount of water used for conventional applications. Reduced-volume technology has many potential advantages. Not only are there environmental and economic benefits from reduced pesticide and water use, but also less time and labor are required for spray operations. Reduced use of pesticides and water conservation is consistent with the goals and missions of both the United States Environmental Protection Agency and the Department of Pesticide Regulation (DPR). However, DPR cannot recommend reduced-volume technology until differences in initial deposition and residue decay rates for reduced-volume vs. conventional spray application are characterized.

This study compares the initial deposition and foliar residue dissipation in lima beans following three applications methods: (1) conventional dilute application at full label rate, (2) reduced-volume electrostatic application at full label rate, and (3) reduced-volume electrostatic application at half label rate. Each set of four treatments (three pesticide treatments and a control) composed a trial. Four trials were conducted, with two paired trials each for dicofol and dimethoate. The pesticides evaluated were Dimethoate 257 (dimethoate; full label rate = 1.5 pints/acre) and Kelthane MF (dicofol; full label rate = 3 pt/acre) applied as a tank mix.

For both the dicofol and dimethoate trials, the initial foliar deposition for the conventional applications was significantly greater than for the reduced-volume applications at full label rate, which was in turn greater than initial deposition for the reduced-volume applications at half label rate. For dicofol, foliar residue dissipation was multi-phasic, with longer initial half-lives, while dimethoate exhibited a constant dissipation rate. For both pesticides, the respective dissipation pattern was observed consistently among all three treatments.

The magnitude of initial deposition off-target (on the soil) compared to on-target (foliar) differed by pesticide. For dicofol, off-target deposition was significantly greater than foliar deposition for all treatments. For dimethoate, off-target initial deposition was only marginally greater than initial foliar deposition.

Introduction

In July and August of 1998, the California Environmental Protection Agency, Department of Pesticide Regulation (DPR), Worker Health and Safety Branch (WH&S), conducted a cooperative study with the United States Environmental Protection Agency (US EPA). All activities were conducted in accordance the Quality Assurance Project Plan (QAPP) for the study. The study evaluated differences in initial deposition and foliar residue dissipation for conventional vs. reduced-volume pesticide applications. Pest Control Advisors and University of California Extension Service will use the results in making recommendations concerning reduced-volume applications. Results may also be used in making regulatory decisions concerning potential worker exposure.

Reduced-volume spray technology is used by an increasing number of growers. Some studies report that only 10 to 50% of the pesticides applied by conventional ground applications reach the target area[1]. Reduced-volume applications use less pesticide diluted in less water compared to conventional applications and deliver a greater percentage of the pesticide to the target area. Growers often achieve comparable pest control with half the amount of pesticide active ingredient (AI) per acre and 10 - 50% the amount of water used for conventional applications[2]. Some reduced-volume equipment incorporates electrostatic charging of the spray droplets. The charged droplets have an affinity for the leaf surfaces and are drawn to the leaf, resulting in more pesticide reaching the target[3]. Studies indicate that reduced-volume, charged droplet techniques provide greater insect and disease control with lower application rates compared to non-electrostatic reduced-volume equipment[1].

Reduced-volume technology has many potential advantages. Foremost among these are the environmental and economic benefits accrued from reduced pesticide and water use, reduced time and labor required for spray operations, and reduced negative impacts on beneficial insect populations. Reduced use of pesticides and water conservation is consistent with the goals and missions of both the US EPA and DPR. However, some reduced-volume technology has the potential to increase initial deposition and thus worker exposure. DPR cannot recommend reduced-volume technology until differences in initial deposition and residue decay rates for reduced-volume vs. conventional spray application are characterized.

This study compares the initial deposition and foliar residue decay (dissipation) in lima beans following three applications methods: conventional dilute application at full label rate, reduced-volume electrostatic application at full label rate, and reduced-volume application at half label rate. Each set of four treatments (three pesticide treatments and a control) composed a trial. Four trials were conducted, with two paired trials each for dicofol and dimethoate.

Materials and Methods

Field Sample Collection

The study was designed to determine, characterize and compare differences in initial foliar deposition, initial deposition off-target (ground), and foliar residue dissipation for pesticide AI(s) applied by four treatments: conventional spray application with the pesticide AI at full label rate, reduced-volume electrostatic spray application with the pesticide AI at full label rate, reduced-volume electrostatic spray application with the pesticide AI at half label rate, and an untreated control.

WH&S field staff conducted the study during July and August 1998, in a 36-acre lima bean field in Merced County, California, about 5 miles south of Gustine, on the west side of Highway 33. Planting took place on June 10 - 11; Dompe large lima beans were planted 4 - 6 inches apart (105 pounds of seed per acre), in double rows. Beds were 60" wide, center to center. Twice during the study, the field was furrow irrigated; approximately 0.5 acre-foot of water was applied on July 7 and July 31.

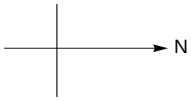
Block, trial and treatment design are presented in Figure 1. Sampling design within trial is presented in Figure 2. The field was situated north-south (N/S) along Highway 33; the rows ran east-west (E/W) and were approximately 1265 feet long. Field staff flagged the field N/S to define 4 blocks of approximately 9 acres each. From north to south, the first and third blocks were assigned to trials, with the second and fourth blocks unassigned. The pesticides evaluated were Dimethoate 267[iii] (AI, dimethoate; full label rate = 1.5 pints/acre) and Kelthane MF[iv] (AI, dicofol; full label rate = 3 pt/acre) applied simultaneously as a tank mix. Each assigned block contained two trials, one trial each for dicofol and dimethoate. The southern block contained trials 1 (dicofol) and 3 (dimethoate); the northern block contained trials 2 (dicofol) and 4 (dimethoate). The two dicofol trials (trials 1 and 2) and the two dimethoate trials (trials 3 and 4) were treated as replicates. Each trial consisted of four treatments per pesticide:

- full label rate applied by **conv**entional sprayer, hereafter referred to as "CONV",
- **f**ull label rate applied in a **r**educed-**v**olume electrostatic spray application hereafter referred to as "FRV",
- **h**alf label rate applied in a **r**educed-**v**olume electrostatic spray application hereafter referred to as "HRV",
- and an untreated **c**on**tr**o**l**, hereafter referred to as "CTRL".

[iii] 30.5% active ingredient (O,O-dimethyl S-[N-methylcarbamoyl)methyl] phosphorodithioate); Wilbur Ellis, EPA Reg. No. 2749-41-2935

[iv] 42% active ingredient (1,1-Bis(chlorophenyl)-2,2,2-trichloroethanol), Rohm and Haas, EPA Reg. No. 707-202

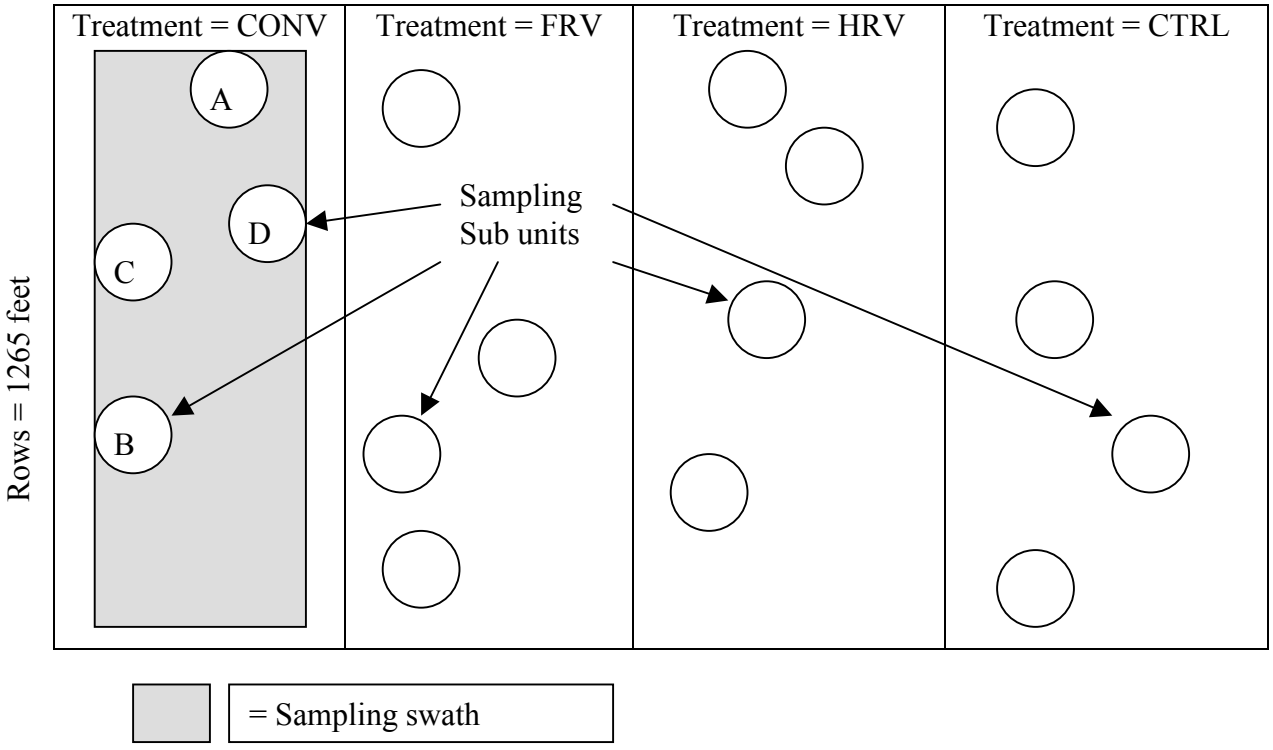
Figure 1. Conventional vs. Reduced-Volume Pesticide Applications: Block, Trial and Treatment Design



	Trials 1 and 3					Trials 2 and 4			
Untreated	CONV	FRV	HRV	CTRL	Untreated	CTRL	HRV	FRV	CONV

Each block = 9 acres
Trials 1 and 2 = dicofol
Trials 3 and 4 = dimethoate

Figure 2. Conventional vs. Reduced-Volume Pesticide Applications: Sampling Design within Trial



The CONV treatments were 18 rows wide, and the FRV, HRV and CTRL treatments were each 28 rows wide. Sampling swaths were restricted by five rows on the north and south edges of each treatment. These rows were excluded from sampling and served as a cross-contamination buffer between the sampling rows and the adjacent treatment. The first and last 100 feet of row (E/W) were similarly excluded from sampling. Initial deposition and residue dissipation were evaluated for each treatment and trial. Treatment-wise comparisons were made between replicate trials.

Dislodgeable Foliar Residue (DFR) Samples and Field Quality Control (QC): Complete trial and treatment information is presented in Table I. Sampling strategy, sample selection criteria and selection of sampling intervals were developed using the guidelines of Edmiston[4], et al. and Iwata, et al.[5]. Sample collection was conducted in accordance with WH&S standard operating procedures (SOPs). Chain of custody controls were maintained for all samples from collection to receipt by the laboratory, and throughout the laboratory storage, extraction and analysis processes. All samples were analyzed for both dimethoate and dicofol. DFR and fallout card results were reported as µg/sample; test substance and tank mix sample results were reported as percent by weight.

DFR was evaluated at 8 time intervals (pre-application, 8 hr post-application and days 1, 2, 3, 7, 14 and 21 post-application). Four sampling areas, sub-units A – D, were randomly-assigned[6] within the sampling swath of each treatment. Each sub-unit was four rows wide by 100 feet long. At each sampling interval, field staff used a leaf punch[7] to collect one DFR sample from every sub-unit A – D within each of the three pesticide treatments per block[4]. A sample consisted of 40 one-inch-diameter leaf discs, with a total area of 400 cm^2. All mature, healthy, previously unsampled leaves within the sub-unit were available for sampling at each interval. Following collection, each sample was capped with a Teflon-lined lid, labeled, sealed into two Ziploc® bags, and placed on ice in an insulated cooler. The leaf punches were cleaned between samples. Separate leaf punches were used for each block. Rinse water was discarded back into the field.

Quality control consisted of both untreated and fortified samples. Since the grower treated all acreage, all CTRL and field QC DFR samples were collected prior to the applications. The surface residues were dislodged by consecutive surfactant washings, which were combined for each sample. The resultant extracts were stored, then thawed, extracted and analyzed with the respective DFR samples for each treatment and sampling interval. For each sampling interval, 4 extracts were analyzed as CTRL samples and 3 extracts were fortified in the laboratory.

Off-Target Deposition Samples and Field QC: Fallout card samples were used once, to evaluate initial off-target *vs.* foliar residue deposition among treatments. Each card was constructed of laminated lab bench paper[8] and measured approximately 10 cm x 10 cm. The cards were backed with aluminum foil and paper-clipped to a 5" x 8" index card. A hole was punched near the center of each 5" edge so that the cards could be secured to the sub-unit with marker flags. Each sample consisted of four cards with a total sampling area of 400 cm^2, the same area as the DFR

samples. Prior to spraying, the cards were affixed along the center of the beds, between the twin planting rows, in random locations (A – D) within each sub-unit (16 samples per block; Table 1).

Table I. Conventional vs. Reduced-Volume Pesticide Applications: Treatment Design

Treatment	Sub-unit	Trials 1 and 3		Trials 2 and 4	
		Sub-unit section: ft from east edge of field	Rows within sampling swath	Sub-unit section: ft from east edge of field	Rows within sampling swath
CONV	A	900 - 1000	8 - 11	900 - 1000	6 - 9
	B	500 - 600	9 - 12	500 - 600	9 - 12
	C	600 - 700	7 - 10	300 - 400	11 - 14
	D	1000 - 1100	6 - 9	1100 - 1200	7 - 10
FRV	A	400 - 500	9 - 12	400 - 500	19 - 22
	B	1000 - 1100	8 - 11	700 - 800	14 - 17
	C	400 - 500	15 - 18	700 - 800	10 - 13
	D	300 - 400	19 - 22	1000 - 1100	19 - 22
HRV	A	300 - 400	16 - 19	200 - 300	12 - 15
	B	900 - 1000	11 - 14	300 - 400	9 - 12
	C	600 - 700	10 - 13	800 - 900	13 - 16
	D	500 - 600	8 - 11	1000 - 1100	13 - 16
CTRL	A	300 - 400	17 - 20	100 - 200	15 - 18
	B	800 - 900	8 - 11	600 - 700	9 - 12
	C	100 - 200	17 - 20	1000 - 1100	15 - 18
	D	1000 - 1100	13 - 16	800 - 900	19 - 22

The cards were collected approximately 8 hours post-application. Study staff removed the bench paper and aluminum foil squares as a unit from each card and discarded the index cards. The four component bench paper/foil squares comprising each sample were paired with exposed sides facing, sealed within two Ziploc® bags, labeled, then placed on dry ice in an insulated cooler.

Table II provides the fortification information for the fall-out cards. For each block, QC for the fallout cards was conducted once and consisted of four blank control samples and eight fortified samples (48 samples per block). Four replicates were fortified with both dicofol and dimethoate at a high rate and four replicates were fortified with both AI's at a low rate to encompass the range of expected pesticide residues. Once dry, fortification samples were handled, labeled, and stored in the same manner as the exposure samples, as described above. Fortification standards were evaluated both before and after their use in the field. All fallout card samples were extracted, the extracts split, and one extract each analyzed for dicofol and dimethoate; thus, each sample provided two analytical results.

Table II. Fortification for Fallout Card Samples (Off-Target Deposition)

	Dicofol		Dimethoate	
Fortification	**per card**	**per sample (4 cards)**	**per card**	**per sample (4 cards)**
High Rate	1.5 mg	6 mg	500 µg	2 mg
Low Rate	150 µg	600 µg	100 µg	400 µg

Test Substance Sampling: Study staff collected approximately 125 mL of the one lot number used per product (Dimethoate 267, lot number 16325; Kelthane MF, lot number T-2836). A sample from each product was poured directly from the container into a 250-mL polyethylene bottle. The bottle was capped, labeled, sealed into two Ziploc® bags, then placed on dry ice in a separate insulated cooler from the exposure samples. Samples were analyzed solely to confirm the presence of the respective AI.

Spray Mix Sampling: Study staff used a drum thief to collect approximately 250 mL from each of the three tank mixes applied (one sample per treatment). The sample was placed in a 500-mL Nalgene® bottle, from which two 1-mL sub-samples were pipetted into 4-mL glass vials. All sample containers were capped, labeled, sealed into two Ziploc® bags, then stored on dry ice in a separate insulated cooler from the exposure samples. The 1-mL samples were submitted for analysis and the larger samples retained in frozen storage. Samples were analyzed solely to confirm the presence of the respective AI.

Application Equipment and Treatment Information

The study monitored the first pesticide application to the field for the 1998 season. Table III provides application and treatment information. For each treatment, both trials were sprayed from the same tank mix. Additional data on sprayer specifications and tank mix components is provided in Appendix 1. All applications took place between 4 and 6 AM on July 28. At application, the plants were approximately 5 weeks old, stood 10 - 15 inches tall, and were beginning to flower. The time to complete each CONV application averaged 1 minute, 48 seconds $\pm$ 0.5 seconds. The time to complete each FRV and HRV application with the electrostatic sprayer averaged 3 minutes, 21 seconds $\pm$ 3 seconds and 3 minutes, 26 seconds $\pm$ 2 seconds, respectively.

Table III. Conventional vs. Reduced-Volume Pesticide Applications: Application Information for each Treatment and Active Ingredient (AI)

				Dimethoate		Dicofol	
Treatment	Sprayer	Acres Treated	Spray Rate (gal/ac)	App. Rate (lb AI/ac)	Total AI (lb)	App. Rate (lb AI/ac)	Total AI (lb)
CONV	dilute	1.3	26	0.5	0.65	1.5	1.95
FRV	electrostatic	2	4	0.5	1.0	1.5	3.0
HRV	electrostatic	2	4	0.25	0.5	0.75	1.5

Quality Assurance (QA)
WH&S Quality Assurance Officer (QAO) reviewed the study protocol and conducted in-process inspections of the fallout card placement and collection, the pesticide applications, and DFR sampling. The in-process inspection findings were detailed in a signed report. The QAO also conducted a raw data and final report audit; the findings are also in a signed report.

Analytical Methods, Quality Control and Assurance, and Analytical Method Validation[9,10]
DFR: After estimating the limit of detection (LOD; at least three times the signal to noise ratio), the extracts of five samples of lima bean leaf discs were evaluated for dicofol and dimethoate recovery at three standard levels over a three-day period: the limit of quantification (LOQ; at least 10 times the signal to noise ratio or 3.33 times the LOD), 2 x LOQ, and 5 x LOQ. The LOQ for both dicofol and dimethoate was 5 µg/sample. Dicofol was present in the standard as a 6:1 ratio of p,p':o,p' isomers to mimic dicofol as formulated in Kelthane MF (residues for each isomer were summed and reported as total dicofol per sample). All levels showed acceptable recoveries. Analytical standards in both solvent and matrix extract were also evaluated at the LOQ, 2 x LOQ and 5 x LOQ levels. Method validation data are summarized in Table IV.

Fallout Cards: Because these samples evaluated initial off-target deposition, residue levels were expected to be considerably higher than the LOQ. Thus, a practical quantification limit (PQL) of 200 µg/sample was established. Extracts of 5 fallout card/aluminum foil samples were evaluated at the PQL, 2 x PQL and 5 x PQL. When sample analyses showed lower than expected residues of dimethoate on the fallout cards, method validation was also conducted at 40 µg/sample. All levels showed acceptable recoveries. Method validation data are summarized in Table IV.

Table IV. Limit of Quantification (LOQ), Practical Quantification Limit (PQL) and Mean Percent Recoveries for Dicofol and Dimethoate

Fortification Level	Matrix Recoveries: % ± SD			
	DFR (LOQ)		Fallout Cards (PQL)	
	Dicofol	Dimethoate	Dicofol	Dimethoate
LOQ/PQL	105.9 ± 9.5	99.7 ± 7.5	105.8 ± 5.0	96.1 ± 4.1[/a] 100.6 ± 8.3[/b]
2 X LOQ/PQL	94.4 ± 9.9	108.8 ± 6.9	109.5 ± 3.3	94.1 ± 3.4[/a]
5 X LOQ/PQL	96.4 ± 13.6	108.1 ± 12.6	106.6 ± 3.1	97.4 ± 3.6[/a]
LOQ/PQL	5 µg	5 µg	200µg	a 200µg b 40 µg

DFR Analyses and On-going QC: Dicofol and dimethoate were dislodged from the foliar discs by rotating each sample 3 times for 30 minutes each with 50 mL of distilled water containing 0.02% surfactant. The wash solutions were decanted and combined for each sample. Each combined wash was extracted 3 times with 50 mL water-saturated ethyl acetate. All non-control DFR samples were extracted within 12 hours of collection.

All on-going QC and blank samples were submitted prior to the pesticide application. The washes were frozen until study staff submitted samples for each sampling interval. The respective washes were thawed, extracted and analyzed concurrently with the exposure samples for each sampling interval. Eight matrix blanks and six matrix fortifications were analyzed with each set of 24 DFR samples per sampling interval. The blank control samples collected from the two CTRL treatments served as matrix controls. The on-going QC sample washes were fortified at anticipated DFR levels. Results were reported as µg/sample dimethoate and dicofol.

Fallout Card Analyses and On-going QC: Dimethoate and dicofol were removed from the fallout card/foil samples by agitation in acetone using a bench-top shaker. The extract was exchanged to ethyl acetate and concentrated or diluted as necessary to bring into linear range of the standard curve. Matrix spikes, fortified at the LOQ level, were analyzed with every ten exposure samples; at least one confirmation analysis, by MSD, was conducted for every 10 positive exposure samples. Field fortification and blank control sample extracts were analyzed concurrently with exposure samples to simultaneously evaluate storage stability. Results were reported as µg/sample dimethoate and dicofol.

Instrument Conditions for DFR and Fallout Cards:

Dicofol

Hewlett Packard 6890 gas chromatograph equipped with autosampler
Detector: Mass selective detector in SIM mode at m/z 139, 250, 252
Injection volume: 2 µL
Column: HP-1, 12 m x 200 µm x 0.33 µm
Data system: Hewlett Packard Chemstation
Temperatures
    Oven: 90 °C, hold 1 min; 30 °C/min to 160 °C, 10 °C/min to 250 °C; hold 3 min
    Injector: 250 °C
Flow rates:
    Helium, 1 mL/min, flow controlled;
    Splitless injection, 25 mL/min; vent time, 5 min
Retention times
    o,p': 6.8 min
    p,p': 7.3 min

Dimethoate

Hewlett Packard 5890 gas chromatograph with autosampler
Detector: Flame photometric in phosphorus mode
Column: Restek Stabilwax 15 m x 0.53 mm x 0.5 µm
Data System: Hewlett Packard 3396 Series II with Integrator
Temperatures
    Injector: 220 °C
    Detector: 250 °C
    Oven temperature program: 175 °C, hold 2 min, ramp 20 °C/min to 220 °C, hold 4 min for DFR, 3 min for fallout cards

Column pressure: Helium, 5 psi for DFR, 10 psi for fallout cards
Detector flows:
Air: 100 mL/min
Hydrogen: 30 mL/min
Auxiliary: 5 mL/min
Injection Volume: 2 µL
Retention time: 3.4 min for DFR; 3.6 min for fallout cards

Quality Assurance: The laboratory Quality Assurance Officer reviewed the study protocol and the method validation reports and conducted in-process inspections of sample receipt, handling, extraction and analysis. The laboratory supervisor reviewed all raw data before submitting it to the study director.

Data Analysis

Data were entered into an Access™[11] database and exported to an Excel™[6] spreadsheet for preliminary analysis. The statistical analyses of deposition and dissipation were done using the SAS® General Linear Models procedure, PROC GLM, or the SAS Regression procedure, PROC REG[12]. All significance tests were done at the 0.05 level. The dependent variable in each analysis was the natural logarithm of the arithmetic mean of $\mu g/cm^2$ DFR for the four samples taken in each sub-unit on each day. The two dicofol trials (trials 1 and 2) and the two dimethoate trials (trials 2 and 4) were treated as replicates. All dimethoate residues were nondetectable by Day 7, so the statistical analysis was restricted to Days 0-3. Dicofol was detected in one trial through Day 21, but in the other trial, only one of the three treatments had any positive detections on Day 14. The analysis was therefore restricted to Days 0-7.

Preliminary Analysis: A three-way (Chemical by Treatment by Day) ANOVA was done to determine whether there were significant differences between the two chemicals in the way treatment affected deposition and dissipation. The ANOVA model had two repeated measures (Chemical and Day) and one between-replicates factor (Treatment)[13], and was implemented using PROC GLM. Significant Chemical x Treatment x Day and Chemical x Day interactions indicated that the outcomes were complex and differed between chemicals. Therefore, and because comparing the chemicals was not of importance, the remaining analyses were done separately for each chemical.

Dissipation and initial deposition: The effect of type of spray treatment on the deposition and dissipation of DFR was analyzed for each chemical separately by fitting the regression model:

$$ln\ \mathrm{DFR} = \beta_0 + \beta_1 \mathrm{day} + \beta_2 \mathrm{day}^2 + \beta_3 T_1 + \beta_4 T_2 + \beta_5 \mathrm{day}{*}T_1 + \beta_6 \mathrm{day}{*}T_2 + \beta_7 \mathrm{day}^2{*}T_1 + \beta_8 \mathrm{day}^2{*}T_2.$$

The variables T_1 and T_2 are 0-1 dummy variables representing the CONV and FRV treatments, respectively. T_1 has the value 1 for CONV, 0 for others; T_2 has the value 1 for FRV, 0 for others.

The interpretation of the coefficients of the model is as follows:

β_0	intercept of HRV
β_1 and β_2	linear (slope) and quadratic components of time for HRV
β_3	difference between intercepts of CONV and HRV
β_4	difference between intercepts of FRV and HRV
β_5	difference between linear terms for CONV and HRV
β_6	difference between linear terms for FRV and HRV
β_7	difference between quadratic terms for CONV and HRV
β_8	difference between quadratic terms for FRV and HRV
$(\beta_3 - \beta_4)$	difference between intercepts of CONV and FRV
$(\beta_5 - \beta_6)$	difference between linear terms for CONV and FRV
$(\beta_7 - \beta_8)$	difference between quadratic terms for CONV and FRV.

The intercepts reflect initial deposition, while linear and quadratic components of time reflect dissipation rate.

Effects were tested by adding each term to the model in a stepwise manner and testing whether the reduction in the error sum-of-squares were significant at the $\alpha = 0.05$ level.

Using the selected regression model, predicted *ln* DFR was calculated for each day to 10 days after application. Predicted *ln* DFR was then backtransformed to predicted $\mu g/cm^2$ using the Bradu-Mundlak unbiased estimator of the mean of a lognormal distribution[14]. Prediction limits for $\mu g/cm^2$ DFR were calculated by simply exponentiating the limits for *ln* DFR. The 90 percent prediction limits define an interval in which 90 percent of trials would be expected to lie if the study were repeated many times.

Fallout cards *vs.* DFR: A two-way ANOVA (Treatment by Medium) was done to compare initial deposition on plant foliage and fallout cards, for each chemical separately. Treatment was a between-replicates factor and Medium was a repeated factor[13]. Means comparisons were done using Tukey pairwise comparisons.

Results[v]

Dicofol

Dissipation and initial deposition: The significant terms in the regression analysis were

$$ln\ \mathrm{DFR} = \beta_0 + \beta_1 \mathrm{day} + \beta_2 \mathrm{day}^2 + \beta_3 T_1 + \beta_4 T_2.$$

R^2 for the reduced model above was 0.903, compared to 0.916 for the full model including all parameters.

[v] All raw data are provided in Appendix 1.

The parameter estimates for the reduced model can be used to construct the regression equation for each treatment method (Table V).

Table V. Estimated Regression Parameters for Dicofol

	Intercepts				Slopes	
Parameter	**β_0**	**β_3**	**β_4**		**β_1**	**β_2**
Estimate	-0.7529	1.251	0.4288		0.0317	- 0.0566
CONV	β_0 +	β_3		= 0.4981	+ 0.0317 day	- 0.0566 Day^2
FRV	β_0 +		β_4	= -0.3241	+ 0.0317 day	- 0.0566 Day^2
HRV	β_0			= -0.7529	+ 0.0317 day	- 0.0566 Day^2

The significance of β_3 (the difference between the intercepts of CONV and HRV) indicates that initial deposition was significantly higher for CONV than for HRV. Similarly, the significance of β_4 indicates that initial deposition was significantly higher for FRV than HRV. In addition, the difference between β_3 and β_4 was significant and positive, indicating that CONV was significantly higher than FRV.

The significance of the Day^2 term indicates that there is statistically significant curvature to the dissipation profile, even on the log scale. The absence of significant Treatment by Day interactions means that the rate of dissipation is the same for all three treatments.

DFR Half-Lives: Because of the quadratic term in the model, half-life is not constant, as it is with the first-order decay model. Approximate dissipation half-lives can be determined by inspection of the predicted daily values in Table VII. For all three treatments, the first half-life is 3 - 4 days, the second is 1 - 2 days, and the next three are all about 1 day.

Fallout Cards *vs.* DFR: Mean dicofol deposition ($\mu g/cm^2$) on fallout cards and DFR (Day 0) is given in Table VI. The ANOVA showed that the differences among treatments were significant, with CONV being significantly higher than FRV or HRV, which did not differ from each other. Cards were significantly higher than DFR, but there was no significant interaction. This means that while the absolute amount of deposition was much greater on cards, the relationship between treatments was the same in both media.

Table VI. Dicofol Treated Fallout Card Results ($\mu g/cm^2$)

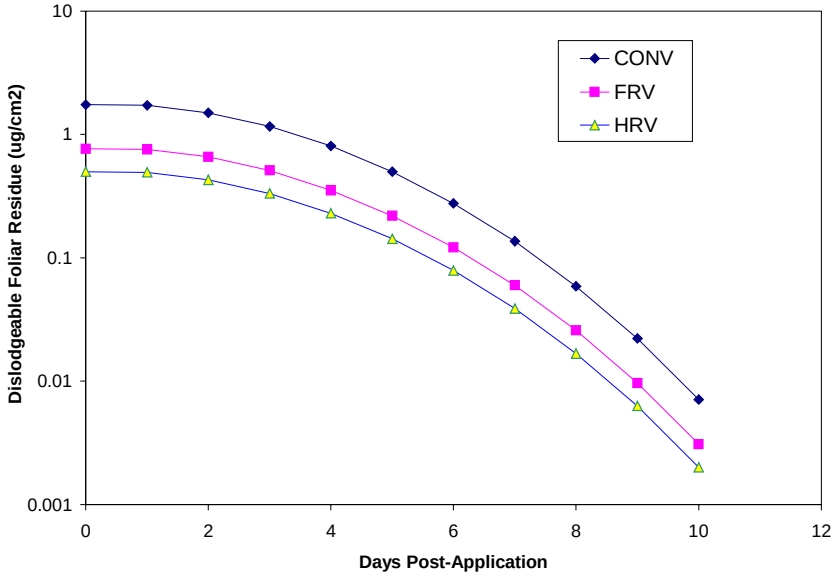
Treatments	Cards	DFR	Combined
CONV	34.24	1.416	17.83
FRV	7.334	0.7750	4.054
HRV	6.491	0.4662	3.479
Combined	16.02	0.8858	

Table VII. Dicofol Predicted DFR (μg/cm^2) and 90% prediction intervals by day after application

	CONV			FRV			HRV		
Days after application	Lower limit	Predicted mean	Upper limit	Lower limit	Predicted mean	Upper limit	Lower limit	Predicted mean	Upper limit
0	0.7987	1.745	3.393	0.3509	0.7666	1.490	0.2285	0.4993	0.9707
1	0.8051	1.720	3.202	0.3537	0.7556	1.407	0.2304	0.4921	0.9162
2	0.7024	1.497	2.784	0.3086	0.6578	1.223	0.2010	0.4284	0.7966
3	0.5370	1.160	2.202	0.2359	0.5097	0.9675	0.1536	0.3320	0.6302
4	0.3640	0.8041	1.566	0.1599	0.3532	0.6881	0.1042	0.2301	0.4481
5	0.2216	0.4989	0.9892	0.0973	0.2192	0.4346	0.0634	0.1427	0.2830
6	0.1226	0.2764	0.5482	0.0538	0.1214	0.2408	0.0351	0.0791	0.1568
7	0.0624	0.1360	0.2633	0.0274	0.0598	0.1157	0.0178	0.0389	0.0753
8	0.0295	0.0589	0.1083	0.0130	0.0259	0.0476	0.0085	0.0168	0.0310
9	0.0132	0.0222	0.0377	0.0058	0.0097	0.0166	0.0038	0.0063	0.0108
10	0.0056	0.0071	0.0110	0.0025	0.0031	0.0048	0.0016	0.0020	0.0031

Figure 3 shows the DFR dissipation for dicofol using the predicted mean DFR from Tables VII.

Figure 3. Dissipation of Dicofol Dislodgeable Foliar Residues



Dimethoate

Dissipation and Initial Deposition: The significant terms in the regression analysis were

$$ln\ \text{DFR} = \beta_0 + \beta_1 \text{day} + \beta_3 T_1 + \beta_4 T_2.$$

R^2 for the reduced model above was 0.948, compared to 0.964 for the full model including all the parameters.

The parameter estimates for the reduced model can be used to construct the regression equation for each treatment method (Table VIII).

Table VIII. Estimated Regression Parameters for Dimethoate

	Intercepts				Slopes
Parameter	β_0	β_3	β_4		β_1
Estimate	-1.223	1.318	0.573		-0.632
CONV	β_0 +	β_3		= 0.095	- 0.632 day
FRV	β_0 +		β_4	= -0.650	- 0.632 day
HRV	β_0			= -1.223	- 0.632 day

The significance of β_3 indicates that initial deposition was significantly higher for CONV than for HRV. The significance of β_4 indicates that initial deposition was significantly higher for FRV than HRV. There was a significant positive difference between β_3 and β_4 indicating that CONV was also significantly higher than FRV.

The nonsignificance of the terms β_5 through β_8 indicates that the rate of dissipation is not significantly different with the three treatments.

DFR Half-Lives: Approximate dissipation half-life can be determined by inspection of the predicted daily values, presented in Table X. For all three treatments, the half-life is about 1 day.

Fallout Cards *vs.* DFR: Mean dimethoate deposition ($\mu g/cm^2$) on fallout cards and DFR (Day 0) is given in Table IX. For the combined treatments, cards were almost significantly higher than DFR ($p = 0.0507$). The differences between the treatments were not significant, nor was the interaction.

Table IX. Dimethoate Treated Fallout Card Results ($\mu g/cm^2$)

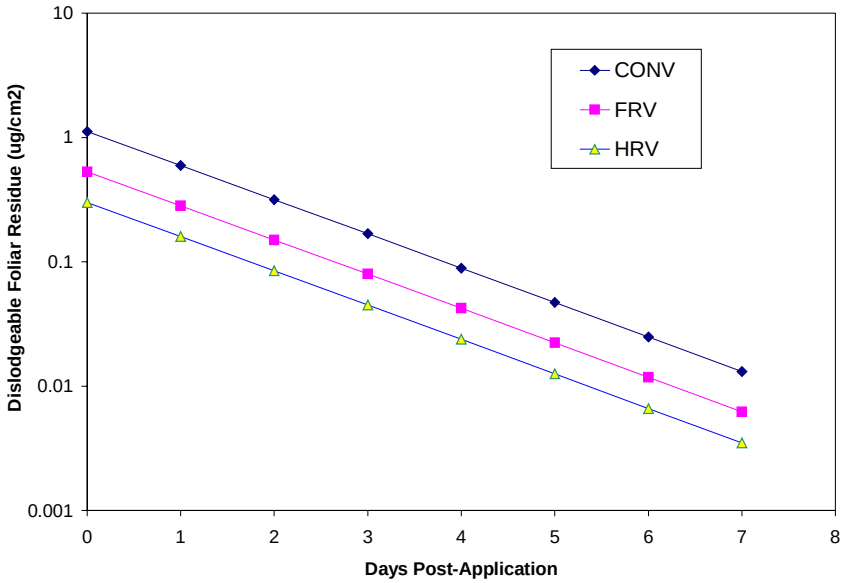
	Cards	DFR	Combined
CONV	2.24	0.670	1.46
FRV	0.391	0.456	0.424
HRV	0.975	0.269	0.622
Combined	1.20	0.465	

Figures 4 illustrates the DFR dissipation for dimethoate using the predicted mean DFR from Table X.

Table X. Dimethoate Predicted DFR (μg/cm^2) and 90% prediction intervals by day after application

	CONV			FRV			HRV		
Days after application	Lower limit	Predicted mean	Upper limit	Lower limit	Predicted mean	Upper limit	Lower limit	Predicted mean	Upper limit
0	0.7442	1.1193	1.625	0.3533	0.5314	0.7714	0.1992	0.2996	0.4349
1	0.4013	0.5961	0.8513	0.1905	0.2830	0.4042	0.1074	0.1600	0.2278
2	0.2135	0.3169	0.4520	0.1014	0.1504	0.2146	0.0571	0.0848	0.1210
3	0.1121	0.1684	0.2432	0.0532	0.0798	0.1154	0.0300	0.0450	0.0651
4	0.0581	0.0890	0.1326	0.0276	0.0423	0.0629	0.0155	0.0238	0.0355
5	0.0297	0.0471	0.0733	0.0141	0.0224	0.0348	0.0079	0.0126	0.0196
6	0.0150	0.0248	0.0410	0.0071	0.0118	0.0195	0.0040	0.0066	0.0110
7	0.0075	0.0131	0.0233	0.0035	0.0062	0.0110	0.0020	0.0035	0.0062

Figure 4. Dissipation of Dimethoate Dislodgeable Foliar Residues



Quality Control and Assurance

On-going matrix recovery data are summarized in Table XI. Excluded are 10 DFR samples that were not suitable for analysis due to either matrix interference (n = 2), pipette malfunction (n = 6) and accidental laboratory spills (n= 2). All blank control samples (dfr, n = 128; fallout cards, n =32) had no detectable residues.

Table XI. Matrix Recoveries (Mean % ± SD) for Dicofol and Dimethoate

	Dicofol			Dimethoate		
Matrix	Mean % ± SD	(n)	µg/sample fortification	Mean % ± SD	(n)	µg/sample fortification
DFR	101.93 ± 7.23	9	5	96.46 ± 14.94	11	5
	97.48 ± 9.47	9	10	80.49 ± 7.88	11	10
	81.35 ± 9.85	6	40	Fortification level not used		
	115.07 ± 22.59	6	50	95.59 ± 8.66	6	50
	84.61 ± 9.08	6	100	122.76 ± 10.04	6	100
	85.01± 8.75	5	500	103.13 ± 5.99	5	500
Fallout Cards						
Field	106 ± 3	8	600	98 ± 6	8	400
	105 ± 5	8	6000	101 ± 5	8	
Laboratory	101 ± 2	2	200	101 ± 12	5	40
	109 ± 1	2	400	102 ± 4	4	200
	107 ± 6	4	1000	100 ± 1	2	700
				105 ± 3	2	1000

Discussion

For both dicofol and dimethoate trials, initial foliar deposition was greater for CONV treatments than for FRV treatments, and initial deposition for FRV treatments was greater than for HRV treatments (CONV>FRV>HRV). Given that HRV treatments contained half the amount of pesticide compared to full rate treatment, initial deposition might be expected to be less than that for FRV and CONV treatments. Indeed HRV residues were lower, averaging 50 – 65% of FRV treatment residues and 30% of CONV treatment residues (Tables VI, IX). However, it is confounding that initial deposition for the FRV treatments was less than half that of the CONV treatments. From this work it appears that initial deposition, and thus worker exposure, is not increased by the use of electrostatic, reduced-volume application technology.

While DFR measured the amount of pesticide reaching the leaf, fallout cards were intended to highlight treatment differences in deposition off-target. Electrostatic sprayers positively charge the spray droplets, causing the droplets to be attracted to the leaf surface as compared to the soil. Conventional sprayers deliver non-charged droplets, which have no greater affinity for leaf surfaces compared to the surrounding soil. Thus, one would expect greater deposition off-target from conventional applications than from electrostatic applications. The fallout cards for the dicofol trials showed that, as expected, CONV residues were significantly greater than for FRV and HRV treatments (34.24, 7.33 and 6.49 ug/cm^2, respectively; Table VII). For the dimethoate trials, the differences between CONV, FRV and HRV treatments were not significant (2.24, 0.98 and 0.65 ug/cm^2, respectively; Table X). For all trials, initial deposition on the fallout cards was greater than for DFR.

The half-lives for dicofol treatments were multi-phasic, while dimethoate treatments exhibited a constant half-life of approximately one day (Tables VII, X). In the 1980's, WH&S conducted several studies of conventional applications of dimethoate in grapes and oranges at application rates 3 – 4 times higher than for the current study (1.5 – 2.0 lb. AI/acre) [15-18]. The previous studies were not designed to quantitatively assess degradation over time. However, qualitative estimations of half-lives were 0.5 – 1.5 days, similar to that found in this study.

Most studies that compare reduced-volume applications to conventional applications have focused on efficacy rather than on differences in initial deposition or dissipation. There appears to be much work to be done in this area. This report has raised several questions that may provoke future studies.

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Table 1. Dislodgeable Foliar Residue Results

Lab No.	Sample No.	Study Day	Results (µg/sample)	Pesticide	Treatment/ Sample
98-0157	JS11-1057	Pre-App	ND	Dicofol	CONV A
98-0158	JS11-1058	Pre-App	ND	Dicofol	CONV B
98-0159	JS11-1059	Pre-App	ND	Dicofol	CONV C
98-0160	JS11-1060	Pre-App	ND	Dicofol	CONV D
98-0161	JS11-1061	Pre-App	ND	Dicofol	FRV A
98-0162	JS11-1062	Pre-App	ND	Dicofol	FRV B
98-0163	JS11-1063	Pre-App	ND	Dicofol	FRV C
98-0164	JS11-1064	Pre-App	ND	Dicofol	FRV D
98-0165	JS11-1065	Pre-App	ND	Dicofol	HRV A
98-0166	JS11-1066	Pre-App	ND	Dicofol	HRV B
98-0167	JS11-1067	Pre-App	ND	Dicofol	HRV C
98-0168	JS11-1068	Pre-App	ND	Dicofol	HRV D
98-0169	JS12-1057	Pre-App	ND	Dicofol	CONV A
98-0170	JS12-1058	Pre-App	ND	Dicofol	CONV B
98-0171	JS12-1059	Pre-App	ND	Dicofol	CONV C
98-0172	JS12-1060	Pre-App	ND	Dicofol	CONV D
98-0173	JS12-1061	Pre-App	ND	Dicofol	FRV A
98-0174	JS12-1062	Pre-App	ND	Dicofol	FRV B
98-0175	JS12-1063	Pre-App	ND	Dicofol	FRV C
98-0176	JS12-1064	Pre-App	ND	Dicofol	HRV D
98-0177	JS12-1065	Pre-App	ND	Dicofol	HRV A
98-0178	JS12-1066	Pre-App	ND	Dicofol	HRV B
98-0179	JS12-1067	Pre-App	ND	Dicofol	HRV C
98-0180	JS12-1068	Pre-App	ND	Dicofol	HRV D
98-0258	JS12-1078	0	204	Dicofol	HRV B
98-0259	JS12-1079	0	168	Dicofol	HRV C
98-0260	JS12-1080	0	194	Dicofol	HRV D
98-0237	JS11-1069	0	430	Dicofol	CONV A
98-0238	JS11-1070	0	516	Dicofol	CONV B
98-0239	JS11-1071	0	381	Dicofol	CONV C
98-0240	JS11-1072	0	601	Dicofol	CONV D
98-0241	JS11-1073	0	474	Dicofol	FRV A
98-0242	JS11-1074	0	292	Dicofol	FRV B
98-0243	JS11-1075	0	429	Dicofol	FRV C
98-0244	JS11-1076	0	318	Dicofol	FRV D
98-0245	JS11-1077	0	191	Dicofol	HRV A
98-0246	JS11-1078	0	227	Dicofol	HRV B
98-0247	JS11-1079	0	137	Dicofol	HRV C
98-0248	JS11-1080	0	221	Dicofol	HRV D

Table 1. Dislodgeable Foliar Residue Results, cont.

Lab No.	Sample No.	Study Day	Results (µg/sample)	Pesticide	Treatment/ Sample
98-0249	JS12-1069	0	497	Dicofol	CONV A
98-0250	JS12-1070	0	661	Dicofol	CONV B
98-0251	JS12-1071	0	649	Dicofol	CONV C
98-0252	JS12-1072	0	798	Dicofol	CONV D
98-0253	JS12-1073	0	342	Dicofol	FRV A
98-0254	JS12-1074	0	284	Dicofol	FRV B
98-0255	JS12-1075	0	184	Dicofol	FRV C
98-0256	JS12-1076	0	152	Dicofol	FRV D
98-0257	JS12-1077	0	146	Dicofol	HRV A
98-0325	JS11-1081	1	777	Dicofol	CONV A
98-0326	JS11-1082	1	643	Dicofol	CONV B
98-0327	JS11-1083	1	824	Dicofol	CONV C
98-0328	JS11-1084	1	968	Dicofol	CONV D
98-0329	JS11-1085	1	322	Dicofol	FRV A
98-0330	JS11-1086	1	234	Dicofol	FRV B
98-0331	JS11-1087	1	375	Dicofol	FRV C
98-0332	JS11-1088	1	352	Dicofol	FRV D
98-0333	JS11-1089	1	220	Dicofol	HRV A
98-0334	JS11-1090	1	163	Dicofol	HRV B
98-0335	JS11-1091	1	211	Dicofol	HRV C
98-0337	JS12-1081	1	294	Dicofol	CONV A
98-0338	JS12-1082	1	405	Dicofol	CONV B
98-0339	JS12-1083	1	566	Dicofol	CONV C
98-0340	JS12-1084	1	616	Dicofol	CONV D
98-0341	JS12-1085	1	227	Dicofol	FRV A
98-0342	JS12-1086	1	197	Dicofol	FRV B
98-0343	JS12-1087	1	189	Dicofol	FRV C
98-0344	JS12-1088	1	157	Dicofol	FRV D
98-0345	JS12-1089	1	281	Dicofol	HRV A
98-0346	JS12-1090	1	273	Dicofol	HRV B
98-0347	JS12-1091	1	201	Dicofol	HRV C
98-0348	JS12-1092	1	203	Dicofol	HRV D
98-0336	JS11-1092	1	187	Dicofol	HRV D
98-0349	JS11-1093	2	726	Dicofol	CONV A
98-0350	JS11-1094	2	855	Dicofol	CONV B
98-0351	JS11-1095	2	1067	Dicofol	CONV C
98-0352	JS11-1096	2	653	Dicofol	CONV D
98-0353	JS11-1097	2	693	Dicofol	FRV A
98-0354	JS11-1098	2	764	Dicofol	FRV B
98-0355	JS11-1099	2	867	Dicofol	FRV C
98-0356	JS11-1100	2	384	Dicofol	FRV D

Table 1. Dislodgeable Foliar Residue Results, cont.

Lab No.	Sample No.	Study Day	Results (µg/sample)	Pesticide	Treatment/ Sample
98-0357	JS11-1101	2	229	Dicofol	HRV A
98-0358	JS11-1102	2	265	Dicofol	HRV B
98-0369	JS11-1103	2	286	Dicofol	HRV C
98-0360	JS11-1104	2	199	Dicofol	HRV D
98-0361	JS12-1093	2	283	Dicofol	CONV A
98-0362	JS12-1094	2	260	Dicofol	CONV B
98-0363	JS12-1095	2	475	Dicofol	CONV C
98-0364	JS12-1096	2	517	Dicofol	CONV D
98-0365	JS12-1097	2	172	Dicofol	FRV A
98-0366	JS12-1098	2	187	Dicofol	FRV B
98-0367	JS12-1099	2	192	Dicofol	FRV C
98-0368	JS12-1100	2	127	Dicofol	FRV D
98-0369	JS12-1101	2	162	Dicofol	HRV A
98-0370	JS12-1102	2	203	Dicofol	HRV B
98-0371	JS12-1103	2	134	Dicofol	HRV C
98-0372	JS12-1104	2	134	Dicofol	HRV D
98-0373	JS11-1105	3	425	Dicofol	CONV A
98-0374	JS11-1106	3	448	Dicofol	CONV B
98-0375	JS11-1107	3	546	Dicofol	CONV C
98-0376	JS11-1108	3	645	Dicofol	CONV D
98-0377	JS11-1109	3	150	Dicofol	FRV A
98-0378	JS11-1110	3	138	Dicofol	FRV B
98-0379	JS11-1111	3	183	Dicofol	FRV C
98-0380	JS11-1112	3	213	Dicofol	FRV D
98-0381	JS11-1113	3	98.9	Dicofol	HRV A
98-0382	JS11-1114	3	121	Dicofol	HRV B
98-0383	JS11-1115	3	133	Dicofol	HRV C
98-0384	JS11-1116	3	88.6	Dicofol	HRV D
98-0385	JS12-1105	3	244	Dicofol	CONV A
98-0386	JS12-1106	3	198	Dicofol	CONV B
98-0387	JS12-1107	3	339	Dicofol	CONV C
98-0388	JS12-1108	3	294	Dicofol	CONV D
98-0389	JS12-1109	3	191	Dicofol	FRV A
98-0390	JS12-1110	3	164	Dicofol	FRV B
98-0391	JS12-1111	3	116	Dicofol	FRV C
98-0392	JS12-1112	3	114	Dicofol	FRV D
98-0393	JS12-1113	3	114	Dicofol	HRV A
98-0394	JS12-1114	3	163	Dicofol	HRV B
98-0395	JS12-1115	3	110	Dicofol	HRV C
98-0396	JS12-1116	3	98.7	Dicofol	HRV D
98-0403	JS11-1117	7	86.1	Dicofol	CONV A

Table 1. Dislodgeable Foliar Residue Results, cont.

Lab No.	Sample No.	Study Day	Results (µg/sample)	Pesticide	Treatment/ Sample
98-0404	JS11-1118	7	109	Dicofol	CONV B
98-0405	JS11-1119	7	111	Dicofol	CONV C
98-0406	JS11-1120	7	59.5	Dicofol	CONV D
98-0407	JS11-1121	7	64.5	Dicofol	FRV A
98-0408	JS11-1122	7	21.8	Dicofol	FRV B
98-0409	JS11-1123	7	30	Dicofol	FRV C
98-0410	JS11-1124	7	21.1	Dicofol	FRV D
98-0411	JS11-1125	7	6.37	Dicofol	HRV A
98-0412	JS11-1126	7	9.2	Dicofol	HRV B
98-0413	JS11-1127	7	5	Dicofol	HRV C
98-0414	JS11-1128	7	8.17	Dicofol	HRV D
98-0415	JS12-1117	7	69.5	Dicofol	CONV A
98-0416	JS12-1118	7	52.9	Dicofol	CONV B
98-0417	JS12-1119	7	49.4	Dicofol	CONV C
98-0418	JS12-1120	7	63.1	Dicofol	CONV D
98-0419	JS12-1121	7	17.1	Dicofol	FRV A
98-0420	JS12-1122	7	17	Dicofol	FRV B
98-0421	JS12-1123	7	8.33	Dicofol	FRV C
98-0422	JS12-1124	7	11.1	Dicofol	FRV D
98-0423	JS12-1125	7	21	Dicofol	HRV A
98-0424	JS12-1126	7	20.4	Dicofol	HRV B
98-0425	JS12-1127	7	9.63	Dicofol	HRV C
98-0426	JS12-1128	7	16.8	Dicofol	HRV D
98-0443	JS11-1129	14	63.1	Dicofol	CONV A
98-0444	JS11-1130	14	76.5	Dicofol	CONV B
98-0445	JS11-1131	14	70.4	Dicofol	CONV C
98-0446	JS11-1132	14	120	Dicofol	CONV D
98-0447	JS11-1133	14	31.4	Dicofol	FRV A
98-0448	JS11-1134	14	21.2	Dicofol	FRV B
98-0449	JS11-1135	14	18.7	Dicofol	FRV C
98-0450	JS11-1136	14	34.9	Dicofol	FRV D
98-0451	JS11-1137	14	10.4	Dicofol	HRV A
98-0452	JS11-1138	14	22	Dicofol	HRV B
98-0453	JS11-1139	14	14.5	Dicofol	HRV C
98-0454	JS11-1140	14	16.7	Dicofol	HRV D
98-0455	JS12-1129	14	9.7	Dicofol	CONV A
98-0456	JS12-1130	14	ND	Dicofol	CONV B
98-0457	JS12-1131	14	19.2	Dicofol	CONV C
98-0458	JS12-1132	14	15.8	Dicofol	CONV D
98-0459	JS12-1133	14	ND	Dicofol	FRV A
98-0460	JS12-1134	14	5.23	Dicofol	FRV B

Table 1. Dislodgeable Foliar Residue Results, cont.

Lab No.	Sample No.	Study Day	Results (µg/sample)	Pesticide	Treatment/ Sample
98-0461	JS12-1135	14	ND	Dicofol	FRV C
98-0462	JS12-1136	14	ND	Dicofol	FRV D
98-0463	JS12-1137	14	ND	Dicofol	HRV A
98-0464	JS12-1138	14	ND	Dicofol	HRV B
98-0465	JS12-1139	14	ND	Dicofol	HRV C
98-0466	JS12-1140	14	ND	Dicofol	HRV D
98-0489	JS11-1141	21	79.1	Dicofol	CONV A
98-0490	JS11-1142	21	54.2	Dicofol	CONV B
98-0491	JS11-1143	21	77.2	Dicofol	CONV C
98-0492	JS11-1144	21	70.2	Dicofol	CONV D
98-0493	JS11-1145	21	15.6	Dicofol	FRV A
98-0494	JS11-1146	21	18.2	Dicofol	FRV B
98-0495	JS11-1147	21	17.5	Dicofol	FRV C
98-0496	JS11-1148	21	22.9	Dicofol	FRV D
98-0497	JS11-1149	21	ND	Dicofol	HRV A
98-0498	JS11-1150	21	5.94	Dicofol	HRV B
98-0499	JS11-1151	21	16.1	Dicofol	HRV C
98-0500	JS11-1152	21	14.8	Dicofol	HRV C
98-0501	JS12-1141	21	ND	Dicofol	CONV A
98-0502	JS12-1142	21	ND	Dicofol	CONV B
98-0503	JS12-1143	21	ND	Dicofol	CONV C
98-0504	JS12-1144	21	17.6	Dicofol	CONV D
98-0505	JS12-1145	21	ND	Dicofol	FRV A
98-0506	JS12-1146	21	ND	Dicofol	FRV B
98-0507	JS12-1147	21	ND	Dicofol	FRV C
98-0508	JS12-1148	21	6.61	Dicofol	FRV D
98-0509	JS12-1149	21	ND	Dicofol	HRV A
98-0510	JS12-1150	21	ND	Dicofol	HRV B
98-0511	JS12-1151	21	ND	Dicofol	HRV C
98-0512	JS12-1152	21	ND	Dicofol	HRV D
98-0157	JS11-1057	Pre-App	ND	Dimethoate	CONV A
98-0158	JS11-1058	Pre-App	ND	Dimethoate	CONV B
98-0159	JS11-1059	Pre-App	ND	Dimethoate	CONV C
98-0160	JS11-1060	Pre-App	ND	Dimethoate	CONV D
98-0161	JS11-1061	Pre-App	ND	Dimethoate	FRV A
98-0162	JS11-1062	Pre-App	ND	Dimethoate	FRV B
98-0163	JS11-1063	Pre-App	ND	Dimethoate	FRV C
98-0164	JS11-1064	Pre-App	ND	Dimethoate	FRV D
98-0165	JS11-1065	Pre-App	ND	Dimethoate	HRV A
98-0166	JS11-1066	Pre-App	ND	Dimethoate	HRV B
98-0167	JS11-1067	Pre-App	ND	Dimethoate	HRV C

Table 1. Dislodgeable Foliar Residue Results, cont.

Lab No.	Sample No.	Study Day	Results (µg/sample)	Pesticide	Treatment/ Sample
98-0168	JS11-1068	Pre-App	ND	Dimethoate	HRV D
98-0169	JS12-1057	Pre-App	ND	Dimethoate	CONV A
98-0170	JS12-1058	Pre-App	ND	Dimethoate	CONV B
98-0171	JS12-1059	Pre-App	ND	Dimethoate	CONV C
98-0172	JS12-1060	Pre-App	ND	Dimethoate	CONV D
98-0173	JS12-1061	Pre-App	ND	Dimethoate	FRV A
98-0174	JS12-1062	Pre-App	ND	Dimethoate	FRV B
98-0175	JS12-1063	Pre-App	ND	Dimethoate	FRV C
98-0176	JS12-1064	Pre-App	ND	Dimethoate	HRV D
98-0177	JS12-1065	Pre-App	ND	Dimethoate	HRV A
98-0178	JS12-1066	Pre-App	ND	Dimethoate	HRV B
98-0179	JS12-1067	Pre-App	ND	Dimethoate	HRV C
98-0180	JS12-1068	Pre-App	ND	Dimethoate	HRV D
98-0237	JS11-1069	0	240	Dimethoate	CONV A
98-0238	JS11-1070	0	255	Dimethoate	CONV B
98-0239	JS11-1071	0	181	Dimethoate	CONV C
98-0240	JS11-1072	0	254	Dimethoate	CONV D
98-0241	JS11-1073	0	195	Dimethoate	FRV A
98-0242	JS11-1074	0	144	Dimethoate	FRV B
98-0243	JS11-1075	0	227	Dimethoate	FRV C
98-0244	JS11-1076	0	193	Dimethoate	FRV D
98-0245	JS11-1077	0	98.3	Dimethoate	HRV A
98-0246	JS11-1078	0	135	Dimethoate	HRV B
98-0247	JS11-1079	0	89.5	Dimethoate	HRV C
98-0248	JS11-1080	0	117	Dimethoate	HRV D
98-0249	JS12-1069	0	202	Dimethoate	CONV A
98-0250	JS12-1070	0	333	Dimethoate	CONV B
98-0251	JS12-1071	0	366	Dimethoate	CONV C
98-0252	JS12-1072	0	308	Dimethoate	CONV D
98-0253	JS12-1073	0	170	Dimethoate	FRV A
98-0254	JS12-1074	0	231	Dimethoate	FRV B
98-0255	JS12-1075	0	173	Dimethoate	FRV C
98-0256	JS12-1076	0	122	Dimethoate	FRV D
98-0257	JS12-1077	0	114	Dimethoate	HRV A
98-0258	JS12-1078	0	92.3	Dimethoate	HRV B
98-0259	JS12-1079	0	114	Dimethoate	HRV C
98-0260	JS12-1080	0	96.2	Dimethoate	HRV D
98-0325	JS11-1081	1	376	Dimethoate	CONV A
98-0326	JS11-1082	1	241	Dimethoate	CONV B
98-0327	JS11-1083	1	388	Dimethoate	CONV C
98-0328	JS11-1084	1	351	Dimethoate	CONV D

Table 1. Dislodgeable Foliar Residue Results, cont.

Lab No.	Sample No.	Study Day	Results (µg/sample)	Pesticide	Treatment/ Sample
98-0329	JS11-1085	1	121	Dimethoate	FRV A
98-0330	JS11-1086	1	95	Dimethoate	FRV B
98-0331	JS11-1087	1	138	Dimethoate	FRV C
98-0332	JS11-1088	1	129	Dimethoate	FRV D
98-0333	JS11-1089	1	61.4	Dimethoate	HRV A
98-0334	JS11-1090	1	51.2	Dimethoate	HRV B
98-0335	JS11-1091	1	57.2	Dimethoate	HRV C
98-0336	JS11-1092	1	53.1	Dimethoate	HRV D
98-0337	JS12-1081	1	129	Dimethoate	CONV A
98-0338	JS12-1082	1	199	Dimethoate	CONV B
98-0339	JS12-1083	1	283	Dimethoate	CONV C
98-0340	JS12-1084	1	276	Dimethoate	CONV D
98-0341	JS12-1085	1	104	Dimethoate	FRV A
98-0342	JS12-1086	1	108	Dimethoate	FRV B
98-0343	JS12-1087	1	92.9	Dimethoate	FRV C
98-0344	JS12-1088	1	80.9	Dimethoate	FRV D
98-0345	JS12-1089	1	108	Dimethoate	HRV A
98-0346	JS12-1090	1	98.7	Dimethoate	HRV B
98-0347	JS12-1091	1	74.5	Dimethoate	HRV C
98-0348	JS12-1092	1	68.1	Dimethoate	HRV D
98-0349	JS11-1093	2	149	Dimethoate	CONV A
98-0350	JS11-1094	2	152	Dimethoate	CONV B
98-0351	JS11-1095	2	167	Dimethoate	CONV C
98-0352	JS11-1096	2	184	Dimethoate	CONV D
98-0353	JS11-1097	2	66.7	Dimethoate	FRV A
98-0354	JS11-1098	2	52.7	Dimethoate	FRV B
98-0355	JS11-1099	2	64.2	Dimethoate	FRV C
98-0356	JS11-1100	2	67.4	Dimethoate	FRV D
98-0357	JS11-1101	2	25.4	Dimethoate	HRV A
98-0358	JS11-1102	2	27.9	Dimethoate	HRV B
98-0359	JS11-1103	2	21.8	Dimethoate	HRV C
98-0360	JS11-1104	2	37.5	Dimethoate	HRV D
98-0361	JS12-1093	2	66.7	Dimethoate	CONV A
98-0362	JS12-1094	2	61.1	Dimethoate	CONV B
98-0363	JS12-1095	2	116	Dimethoate	CONV C
98-0364	JS12-1096	2	150	Dimethoate	CONV D
98-0365	JS12-1097	2	44	Dimethoate	FRV A
98-0366	JS12-1098	2	55.3	Dimethoate	FRV B
98-0367	JS12-1099	2	56	Dimethoate	FRV C
98-0368	JS12-1100	2	31.2	Dimethoate	FRV D
98-0369	JS12-1101	2	37	Dimethoate	HRV A

Table 1. Dislodgeable Foliar Residue Results, cont.

Lab No.	Sample No.	Study Day	Results (µg/sample)	Pesticide	Treatment/ Sample
98-0370	JS12-1102	2	36.4	Dimethoate	HRV B
98-0371	JS12-1103	2	23.6	Dimethoate	HRV C
98-0372	JS12-1104	2	27.2	Dimethoate	HRV D
98-0373	JS11-1105	3	90.9	Dimethoate	CONV A
98-0374	JS11-1106	3	84.6	Dimethoate	CONV B
98-0375	JS11-1107	3	90.3	Dimethoate	CONV C
98-0376	JS11-1108	3	105	Dimethoate	CONV D
98-0377	JS11-1109	3	29	Dimethoate	FRV A
98-0378	JS11-1110	3	31.3	Dimethoate	FRV B
98-0379	JS11-1111	3	34.2	Dimethoate	FRV C
98-0380	JS11-1112	3	33.6	Dimethoate	FRV D
98-0381	JS11-1113	3	12.9	Dimethoate	HRV A
98-0382	JS11-1114	3	15.2	Dimethoate	HRV B
98-0383	JS11-1115	3	21.3	Dimethoate	HRV C
98-0384	JS11-1116	3	14	Dimethoate	HRV D
98-0385	JS12-1105	3	32.9	Dimethoate	CONV A
98-0386	JS12-1106	3	49.3	Dimethoate	CONV B
98-0387	JS12-1107	3	84.9	Dimethoate	CONV C
98-0388	JS12-1108	3	71.2	Dimethoate	CONV D
98-0389	JS12-1109	3	34.2	Dimethoate	FRV A
98-0390	JS12-1110	3	35.8	Dimethoate	FRV B
98-0391	JS12-1111	3	32.4	Dimethoate	FRV C
98-0392	JS12-1112	3	30.9	Dimethoate	FRV D
98-0393	JS12-1113	3	20.3	Dimethoate	HRV A
98-0394	JS12-1114	3	18.8	Dimethoate	HRV B
98-0395	JS12-1115	3	13.8	Dimethoate	HRV C
98-0396	JS12-1116	3	10.5	Dimethoate	HRV D
98-0403	JS11-1117	7	ND	Dimethoate	CONV A
98-0404	JS11-1118	7	ND	Dimethoate	CONV B
98-0405	JS11-1119	7	ND	Dimethoate	CONV C
98-0406	JS11-1120	7	ND	Dimethoate	CONV D
98-0407	JS11-1121	7	ND	Dimethoate	FRV A
98-0408	JS11-1122	7	ND	Dimethoate	FRV B
98-0409	JS11-1123	7	ND	Dimethoate	FRV C
98-0410	JS11-1124	7	ND	Dimethoate	FRV D
98-0411	JS11-1125	7	ND	Dimethoate	HRV A
98-0412	JS11-1126	7	ND	Dimethoate	HRV B
98-0413	JS11-1127	7	ND	Dimethoate	HRV C
98-0414	JS11-1128	7	ND	Dimethoate	HRV D
98-0415	JS12-1117	7	ND	Dimethoate	CONV A
98-0416	JS12-1118	7	ND	Dimethoate	CONV B

Table 1. Dislodgeable Foliar Residue Results, cont.

Lab No.	Sample No.	Study Day	Results (µg/sample)	Pesticide	Treatment/ Sample
98-0417	JS12-1119	7	ND	Dimethoate	CONV C
98-0418	JS12-1120	7	ND	Dimethoate	CONV D
98-0419	JS12-1121	7	ND	Dimethoate	FRV A
98-0420	JS12-1122	7	ND	Dimethoate	FRV B
98-0421	JS12-1123	7	ND	Dimethoate	FRV C
98-0422	JS12-1124	7	ND	Dimethoate	FRV D
98-0423	JS12-1125	7	ND	Dimethoate	HRV A
98-0424	JS12-1126	7	ND	Dimethoate	HRV B
98-0425	JS12-1127	7	ND	Dimethoate	HRV C
98-0426	JS12-1128	7	ND	Dimethoate	HRV D
98-0443	JS11-1129	14	16.6	Dimethoate	CONV A
98-0444	JS11-1130	14	ND	Dimethoate	CONV B
98-0445	JS11-1131	14	5.74	Dimethoate	CONV C
98-0446	JS11-1132	14	13.4	Dimethoate	CONV D
98-0447	JS11-1133	14	ND	Dimethoate	FRV A
98-0448	JS11-1134	14	9.87	Dimethoate	FRV B
98-0449	JS11-1135	14	ND	Dimethoate	FRV C
98-0450	JS11-1136	14	ND	Dimethoate	FRV D
98-0451	JS11-1137	14	ND	Dimethoate	HRV A
98-0452	JS11-1138	14	6.03	Dimethoate	HRV B
98-0453	JS11-1139	14	ND	Dimethoate	HRV C
98-0454	JS11-1140	14	ND	Dimethoate	HRV D
98-0455	JS12-1129	14	ND	Dimethoate	CONV A
98-0456	JS12-1130	14	ND	Dimethoate	CONV B
98-0457	JS12-1131	14	ND	Dimethoate	CONV C
98-0458	JS12-1132	14	ND	Dimethoate	CONV D
98-0459	JS12-1133	14	ND	Dimethoate	FRV A
98-0460	JS12-1134	14	ND	Dimethoate	FRV B
98-0461	JS12-1135	14	ND	Dimethoate	FRV C
98-0462	JS12-1136	14	ND	Dimethoate	FRV D
98-0463	JS12-1137	14	ND	Dimethoate	HRV A
98-0464	JS12-1138	14	ND	Dimethoate	HRV B
98-0465	JS12-1139	14	ND	Dimethoate	HRV C
98-0466	JS12-1140	14	ND	Dimethoate	HRV D
98-0489	JS11-1141	21	ND	Dimethoate	CONV A
98-0490	JS11-1142	21	ND	Dimethoate	CONV B
98-0491	JS11-1143	21	ND	Dimethoate	CONV C
98-0492	JS11-1144	21	ND	Dimethoate	CONV D
98-0493	JS11-1145	21	ND	Dimethoate	FRV A
98-0494	JS11-1146	21	ND	Dimethoate	FRV B
98-0495	JS11-1147	21	ND	Dimethoate	FRV C

Table 1. Dislodgeable Foliar Residue Results, cont.

Lab No.	Sample No.	Study Day	Results (µg/sample)	Pesticide	Treatment/ Sample
98-0496	JS11-1148	21	ND	Dimethoate	FRV D
98-0497	JS11-1149	21	ND	Dimethoate	HRV A
98-0498	JS11-1150	21	ND	Dimethoate	HRV B
98-0499	JS11-1151	21	ND	Dimethoate	HRV C
98-0500	JS11-1152	21	ND	Dimethoate	HRV D
98-0501	JS12-1141	21	ND	Dimethoate	CONV A
98-0502	JS12-1142	21	ND	Dimethoate	CONV B
98-0503	JS12-1143	21	ND	Dimethoate	CONV C
98-0504	JS12-1144	21	ND	Dimethoate	CONV D
98-0505	JS12-1145	21	ND	Dimethoate	FRV A
98-0506	JS12-1146	21	ND	Dimethoate	FRV B
98-0507	JS12-1147	21	ND	Dimethoate	FRV C
98-0508	JS12-1148	21	ND	Dimethoate	FRV D
98-0509	JS12-1149	21	ND	Dimethoate	HRV A
98-0510	JS12-1150	21	ND	Dimethoate	HRV B
98-0511	JS12-1151	21	ND	Dimethoate	HRV C
98-0512	JS12-1152	21	ND	Dimethoate	HRV D

Table 2. Fallout Card Results

Lab No.	Sample No.	Results (mg/sample)	Pesticide	Treatment/ Sample
98-0261	JS11-1153	13.45	Dicofol	CONV A
98-0262	JS11-1154	9.68	Dicofol	CONV B
98-0263	JS11-1155	10.93	Dicofol	CONV C
98-0264	JS11-1156	13.35	Dicofol	CONV D
98-0265	JS11-1157	3.29	Dicofol	FRV A
98-0266	JS11-1158	2.61	Dicofol	FRV B
98-0267	JS11-1159	2.4	Dicofol	FRV C
98-0268	JS11-1160	1.87	Dicofol	FRV D
98-0269	JS11-1161	2.11	Dicofol	HRV A
98-0270	JS11-1162	2.91	Dicofol	HRV B
98-0271	JS11-1163	1.92	Dicofol	HRV C
98-0272	JS11-1164	2.81	Dicofol	HRV D
98-0297	JS12-1153	11.11	Dicofol	CONV A
98-0298	JS12-1154	12.7	Dicofol	CONV B
98-0299	JS12-1155	22.17	Dicofol	CONV C
98-0300	JS12-1156	16.15	Dicofol	CONV D
98-0301	JS12-1157	3.7	Dicofol	FRV A
98-0302	JS12-1158	4	Dicofol	FRV B

Table 2. Fallout Card Results, cont.

Lab No.	Sample No.	Results (mg/sample)	Pesticide	Treatment/ Sample
98-0303	JS12-1159	2.34	Dicofol	FRV C
98-0304	JS12-1160	3.25	Dicofol	FRV D
98-0305	JS12-1161	3.33	Dicofol	HRV A
98-0306	JS12-1162	2.79	Dicofol	HRV B
98-0307	JS12-1163	2.35	Dicofol	HRV C
98-0308	JS12-1164	2.54	Dicofol	HRV D
98-0261	JS11-1153	0.94	Dimethoate	CONV A
98-0262	JS11-1154	0.66	Dimethoate	CONV B
98-0263	JS11-1155	0.83	Dimethoate	CONV C
98-0264	JS11-1156	0.77	Dimethoate	CONV D
98-0265	JS11-1157	0.17	Dimethoate	FRV A
98-0266	JS11-1158	0.13	Dimethoate	FRV B
98-0267	JS11-1159	0.16	Dimethoate	FRV C
98-0268	JS11-1160	0.17	Dimethoate	FRV D
98-0269	JS11-1161	0.05	Dimethoate	HRV A
98-0270	JS11-1162	0.07	Dimethoate	HRV B
98-0271	JS11-1163	0.05	Dimethoate	HRV C
98-0272	JS11-1164	0.08	Dimethoate	HRV D
98-0297	JS12-1153	0.59	Dimethoate	CONV A
98-0298	JS12-1154	0.76	Dimethoate	CONV B
98-0299	JS12-1155	1.63	Dimethoate	CONV C
98-0300	JS12-1156	0.98	Dimethoate	CONV D
98-0301	JS12-1157	0.15	Dimethoate	FRV A
98-0302	JS12-1158	0.22	Dimethoate	FRV B
98-0303	JS12-1159	0.09	Dimethoate	FRV C
98-0304	JS12-1160	0.15	Dimethoate	FRV D
98-0305	JS12-1161	0.18	Dimethoate	HRV A
98-0306	JS12-1162	0.15	Dimethoate	HRV B
98-0307	JS12-1163	0.14	Dimethoate	HRV C
98-0308	JS12-1164	0.15	Dimethoate	HRV D

Table 3. DFR Laboratory Fortification Results

Pesticide	Sample No.	Fortification (ug/sample)	% Recovery
Dicofol	JS11-1033	5	105.15
Dicofol	JS11-1034	5	107.45
Dicofol	JS11-1035	5	109.2
Dicofol	JS11-1051	5	89.71
Dicofol	JS11-1052	5	91.69
Dicofol	JS11-1053	5	97.51
Dicofol	JS12-1051	5	108.23
Dicofol	JS12-1052	5	104.92
Dicofol	JS12-1053	5	103.54
Dicofol	JS12-1033	10	105.01
Dicofol	JS12-1034	10	104.94
Dicofol	JS12-1035	10	76.31
Dicofol	JS12-1042/a	10	76.76
Dicofol	JS12-1043/a	10	60.44
Dicofol	JS12-1044/a	10	76.90
Dicofol	JS11-1048	10	94.02
Dicofol	JS11-1049	10	97.66
Dicofol	JS11-1050	10	107.44
Dicofol	JS12-1048	10	98.50
Dicofol	JS12-1049	10	101.39
Dicofol	JS12-1050	10	92.02
Dicofol	JS11-1045	40	76.14
Dicofol	JS11-1046	40	70.35
Dicofol	JS11-1047	40	75.51
Dicofol	JS12-1045	40	91.26
Dicofol	JS12-1046	40	95.52
Dicofol	JS12-1047	40	79.34
Dicofol	JS11-1042/a	50	58.78
Dicofol	JS11-1043/a	50	69.20
Dicofol	JS11-1044/a	50	54.04
Dicofol	JS11-1054	50	151.51
Dicofol	JS11-1055	50	108
Dicofol	JS11-1056	50	91.77
Dicofol	JS12-1055	50	133.32
Dicofol	JS12-1056	50	101.77
Dicofol	JS12-1054	50	104.04
Dicofol	JS11-1039	100	90.93
Dicofol	JS11-1040	100	68.17
Dicofol	JS11-1041	100	85.28
Dicofol	JS12-1039	100	92.93
Dicofol	JS12-1040	100	89.18

/a - pipette malfunction

Table 3. DFR Laboratory Fortification Results, cont.

Pesticide	Sample No.	Fortification (ug/sample)	% Recovery
Dicofol	JS12-1041	100	81.17
Dicofol	JS11-1036	500	71.52
Dicofol	JS11-1037	500	82.89
Dicofol	JS11-1038	500	87.69
Dicofol	JS12-1036	500	87.69
Dicofol	JS12-1037/b	500	66.21
Dicofol	JS12-1038	500	95.26
Dimethoate	JS11-1033	5	83.4
Dimethoate	JS11-1034	5	83.4
Dimethoate	JS11-1035	5	91.67
Dimethoate	JS12-1033	5	83.33
Dimethoate	JS12-1034	5	85.39
Dimethoate	JS12-1035	5	95.3
Dimethoate	JS11-1051	5	118
Dimethoate	JS11-1052	5	124.09
Dimethoate	JS11-1053	5	108.98
Dimethoate	JS12-1051	5	103.09
Dimethoate	JS12-1052	5	84.44
Dimethoate	JS12-1053/c	5	0
Dimethoate	JS11-1045/c	10	0
Dimethoate	JS11-1046	10	80.99
Dimethoate	JS11-1047	10	75.54
Dimethoate	JS12-1045	10	80.96
Dimethoate	JS12-1046	10	86.68
Dimethoate	JS12-1047	10	82.45
Dimethoate	JS11-1048	10	66.87
Dimethoate	JS11-1049	10	92.63
Dimethoate	JS11-1050	10	71.1
Dimethoate	JS12-1048	10	74.57
Dimethoate	JS12-1049	10	89.85
Dimethoate	JS12-1050	10	83.78
Dimethoate	JS11-1042/a	50	91.36
Dimethoate	JS11-1043/a	50	81.34
Dimethoate	JS11-1044/a	50	99.04
Dimethoate	JS12-1042/a	50	104.8
Dimethoate	JS12-1043/a	50	102.98
Dimethoate	JS12-1044/a	50	94.02
Dimethoate	JS11-1039	100	120.06
Dimethoate	JS11-1040	100	138.29

/a - pipette malfunction
/b - laboratory spill
/c - matrix effects

Table 3. DFR Laboratory Fortification Results, cont.

Pesticide	Sample No.	Fortification (ug/sample)	% Recovery
Dimethoate	JS11-1041	100	111.04
Dimethoate	JS12-1039	100	115.43
Dimethoate	JS12-1040	100	130.64
Dimethoate	JS12-1041	100	121.09
Dimethoate	JS11-1036	500	105.2
Dimethoate	JS11-1037	500	106
Dimethoate	JS11-1038	500	104.4
Dimethoate	JS12-1036	500	107.44
Dimethoate	JS12-1037/b	500	89.05
Dimethoate	JS12-1038	500	92.61

/b - laboratory spill

Table 4. Fallout Cards, Field Fortification Results

Pesticide	Sample No.	Fortification (ug/sample)	Results (ug/sample)
Dicofol	JS11-1173	600	620
Dicofol	JS11-1174	600	677
Dicofol	JS11-1175	600	634
Dicofol	JS11-1176	600	632
Dicofol	JS12-1173	600	642
Dicofol	JS12-1174	600	616
Dicofol	JS12-1175	600	634
Dicofol	JS12-1176	600	630
Dicofol	JS11-1177	6000	6847
Dicofol	JS11-1178	6000	6051
Dicofol	JS11-1179	6000	6067
Dicofol	JS11-1180	6000	6449
Dicofol	JS12-1177	6000	6330
Dicofol	JS12-1178	6000	6347
Dicofol	JS12-1179	6000	5831
Dicofol	JS12-1180	6000	6476
Dimethoate	JS11-1173	400	350
Dimethoate	JS11-1174	400	379
Dimethoate	JS11-1175	400	375
Dimethoate	JS11-1176	400	389
Dimethoate	JS12-1173	400	406
Dimethoate	JS12-1174	400	411
Dimethoate	JS12-1175	400	420
Dimethoate	JS12-1176	400	410
Dimethoate	JS11-1177	2000	1974
Dimethoate	JS11-1178	2000	1960

Table 4. Fallout Cards, Field Fortification Results, cont.

Pesticide	**Sample No.**	**Fortification (ug/sample)**	**Results (ug/sample)**
Dimethoate	JS11-1179	2000	1864
Dimethoate	JS11-1180	2000	1938
Dimethoate	JS12-1177	2000	2047
Dimethoate	JS12-1178	2000	2192
Dimethoate	JS12-1179	2000	2137
Dimethoate	JS12-1180	2000	2058

Table 5. Fallout Cards, Laboratory Fortification Results

Pesticide	Lab No	Fortification (ug/sample)	% Recovery
Dicofol	JS11-1 Blank	0	ND
Dicofol	JS11-2 Blank	0	ND
Dicofol	JS12-1 Blank	0	ND
Dicofol	JS12-2 Blank	0	ND
Dicofol	JS12-1 Low	200	99.16
Dicofol	JS12-2 Low	200	102.4
Dicofol	JS11-1 Low	400	109.21
Dicofol	JS11-2 Low	400	108.9
Dicofol	JS11-1 High	1000	106.2
Dicofol	JS11-2 High	1000	98.59
Dicofol	JS12-1 High	1000	112.24
Dicofol	JS12-2 High	1000	110.79
Dimethoate	JS11-1 Blank	0	ND
Dimethoate	JS11-2 Blank	0	ND
Dimethoate	JS12-1 Blank	0	ND
Dimethoate	JS12-2 Blank	0	ND
Dimethoate	PQL-1	40	94.13
Dimethoate	PQL-2	40	84.65
Dimethoate	PQL-3	40	108.03
Dimethoate	PQL-4	40	107.05
Dimethoate	JS11-1 Low	200	100.96
Dimethoate	JS11-2 Low	200	107.33
Dimethoate	JS12-1 Low	200	101.9
Dimethoate	JS12-2 Low	200	98.03
Dimethoate	PQL-5	40	112.85
Dimethoate	JS12-1 High	700	100.12
Dimethoate	JS12-2 High	700	99.97
Dimethoate	JS11-1 High	1000	106.66
Dimethoate	JS11-2 High	1000	102.65

ND = None Detected

Table 6. Spray Equipment Information

Spray Rig	Make/Model	Tank Specs	No. Booms	Nozzle Configuration	Nozzle Type	Agitation Method
Conventional	Homemade, tractor mounted	420 gal, stainless steel	3, front mounted	26 each side, 13 front	Tee Jet, D2	Hydraulic paddle wheel
Reduced-volume, electrostatic	ESS, tractor mounted	100 gal, polyethylene	3, back mounted	14 each arm, 8 on back	ESS	Pneumatic

Table 7. Application Information, Tank Mix Components*

	Tank Mix Components: Amounts in Tank				
	Kelthane	Dimethoate 267	Dicofol	Dimethoate	
Treatment	Gal. Product		Lb. AI		Total Volume (gal)
CONV	6	3	24	8	420
FRV	5	1.5	20	4	Approx. 50
HRV	5	1.5	20	4	Approx. 100

*Tank mixes also contained Nufilm spreader/sticker and NB Nutritionals 8-8-4 fertilizer

Table 8. Application Information, Spray Rates

	Spray Rates				
	Dicofol		Dimethoate		
Treatment	Pt/Ac	Lb/Ac	Pt/Ac	Lb/Ac	Acres Treated
CONV	3	1.5	1.5	0.5	1.3
FRV	3	1.5	1.5	0.50	2
HRV	1.5	0.75	0.75	0.25	2

Table 9. Ground Speed, Pass Times and Elapsed Time, Mix to Spray

Treatment	Ground Speed (mph)	Pass Times (min:sec)		Mix to Spray (min)
		North Block Trials 2 & 4	South Block Trials 1 & 3	
CONV	4	1:47	1:48	15
FRV	3	3:20	3:20	7
		3:25	3:18	
HRV	3	3:27	3:25	9
		3:27	3:24	