430800-49

Versar INC.

MEMORANDUM

TO: Al Nielsen - U.S. EPA/OPP/OREB

FROM: Hank Appleton

DATE: July 13, 1995

SUBJECT: Summary Review of Metalaxyl Worker Exposure

Introduction

A study was completed in support of the registration requirements for metalaxyl (but not in response to a data call-in). This study was submitted to satisfy the requirements specified by the U.S. Environmental Protection Agency (i.e. the Agency) under Subdivision U (Applicator Exposure Monitoring Requirements) of the Pesticide Assessment Guidelines (U.S. EPA, 1986/U.S. EPA, 1988). This study's identifying information is presented below:

Title:	Worker Exposure to Apron® Flowable While Treating Seed Commercially
Sponsor Facility:	Ciba-Geigy Corporation 410 Swing Road Greensboro, NC 27419-8300
Performing Facility:	Pan-Agricultural Laboratories, Inc. 32380 Avenue 10 Madera, California 93638
Authors:	Leah Rosenheck (PAN-AG), Aaron Rotondaro (PAN-AG), Frank B. Selman (Ciba)
MRID No:	430800-49

To summarize, metalaxyl fungicide formulated as Apron® Flowable and Apron® 25 Wettable Powder were used to commercially treat soybean seed. A total of 15 mixer/operator, bagger, and bag sewer replicates were monitored during the study for the flowable formulation, and five replicates of each for the wettable powder.

The purpose of this study was to determine the amount of metalaxyl residues that mixer/operators, baggers, and bag sewers are exposed to during commercial seed treatment. A total of nine experienced volunteers were monitored in this study, which included 4 trials (minimum 3.5 hours) of 5 replicates each.

MEMORANDUM

TO: Al Nielsen - U.S. EPA/OPP/OREB

FROM: Hank Appleton

DATE: July 13, 1995

SUBJECT: Summary Review of Metalaxyl Worker Exposure

Introduction

A study was completed in support of the registration requirements for metalaxyl (but not in response to a data call-in). This study was submitted to satisfy the requirements specified by the U.S. Environmental Protection Agency (i.e. the Agency) under Subdivision U (Applicator Exposure Monitoring Requirements) of the Pesticide Assessment Guidelines (U.S. EPA, 1986/U.S. EPA, 1988). This study's identifying information is presented below:

Title:	Worker Exposure to Apron® Flowable While Treating Seed Commercially
Sponsor Facility:	Ciba-Geigy Corporation 410 Swing Road Greensboro, NC 27419-8300
Performing Facility:	Pan-Agricultural Laboratories, Inc. 32380 Avenue 10 Madera, California 93638
Authors:	Leah Rosenheck (PAN-AG), Aaron Rotondaro (PAN-AG), Frank B. Selman (Ciba)
MRID No:	430800-49

To summarize, metalaxyl fungicide formulated as Apron® Flowable and Apron® 25 Wettable Powder were used to commercially treat soybean seed. A total of 15 mixer/operator, bagger, and bag sewer replicates were monitored during the study for the flowable formulation, and five replicates of each for the wettable powder.

The purpose of this study was to determine the amount of metalaxyl residues that mixer/operators, baggers, and bag sewers are exposed to during commercial seed treatment. A total of nine experienced volunteers were monitored in this study, which included 4 trials (minimum 3.5 hours) of 5 replicates each.

Study Design

The following table outlines the breakdown by job category of exposure replicates collected during this study. Site 1 represents Bunker Hill, Indiana (Jenkin Seed, Inc.); Site 2 is Belle Plaine, Iowa (Ciba Seeds).

Summary of Dermal and Inhalation Exposure Replicates by Job Category

	Mixer/ Operator	Bagger	Bag Sewer
Trial 1 Site 1	5	5	5
Trials 2-4 Site 2	15	15	15
Totals	20	20	20

Mixing Tank. At the Indiana site, a Gustafson open mixing system was used (model PM 30, 30 gallon capacity). Three gallons of Apron FL (2.65 pound ai/gallon), 1 quart of Gustafson Pro-ized Seed Colorant) were added to 18.5 gallons of water per slurry mixture. The tank was half filled with water prior to pouring the entire contents of the Apron FL and colorant jugs into the tank (the jugs were repeatedly rinsed, and rinsate also poured into the tank). The mixer/operator wore a chemical-resistant apron, nitrile gloves, and protective goggles. At the Iowa site, a 60 gallon Gustafson or Gustafson-type open mixing system was used. For Trial 2, 10 gallons of water was mixed with 1 gallon of Apron at a time, with a final total of 21.5 gallons of mix, including colorant and 5 gallons of Apron FL. For Trial 3, 5 gallons of Apron FL were added to 15.4 gallons of water, plus 2.6 pounds of colorant, giving a total volume of 20.9 gallons. For Trial 4, 54 pounds of Apron 25W were mixed with 21.1 gallons of water and 2.6 pounds of colorant. The mixer/operator also would place his gloved hands into the seed treater box to check for coverage and to check the slurry volume. The treater could treat 250 bags per hour.

Bagging/Sewing Procedures. At both sites, baggers would clamp an empty seed bag to the bagging machine, which automatically dispensed 50 pounds of treated seed . The bags dropped onto a

conveyer belt, and the bagger guided it through sewing and stamping machines. The baggers and sewers wore dust masks and thick gloves for warmth. In Trial 1, the bagger collected a sample of seeds with a soup spoon after every 54 bags (for quality control purposes). Some workers bounced the bags up and down once to settle the seed. In the remaining trials, quality control samples were automatically taken from every other bag. The baggers and sewers handled 250 bags per hour as limited by the speed of the treating process.

The workers ranged in age from 29 to 63 years old and varied in experience handling pesticides from 3 to 15 years. The following table outlines the worker's age and experience.

Worker Data

Worker ID	Site/Trial	Age	Weight kg	Years Experience	Male or Female
A	1/1	63	84	10	Male
B	1/1	34	95	3	Male
C	1/1	44	100	15	Male
A	2/2	29	123	4	Male
B	2/2	39	47.6	7	Female
C	2/2	35	49.9	10	Female
A	2/3	36	81.2	10	Male
B	2/3	31	96.2	3.5	Female
C	2/3	33	138	3.5	Female
A	2/4	29	123	4	Male
B	2/4	39	47.6	7	Female
C	2/4	35	49.9	10	Female
MEAN	-	37	86.3	7	- -

Exposure Monitoring

At the beginning of each exposure replicate, each test subject was outfitted with dermal and inhalation monitoring equipment. Whole-body dosimeters were used to measure potential dermal exposure, excluding hands and face. The whole-body dosimeters consisted of was a 100 percent cotton, long underwear (Sears Union Suit) which was prewashed (except Trial 1). The long underwear was worn over regular underwear and under normal work clothing which was changed at the end of each replicate. After each replicate,

Suit) which was prewashed (except Trial 1). The long underwear was worn over regular underwear and under normal work clothing which was changed at the end of each replicate. After each replicate, the dosimeters were carefully removed by the investigator using clean latex examination gloves to avoid contamination. The investigator, using scissors cleaned with ethanol, sectioned the garment into four pieces; lower portion (just below the second button), arms (at the shoulder seam), chest, and back. Sections were sealed in Kapak bags.

The test subjects washed each hand twice in a soap solution to assess exposure to the hands. Each wash consisted of 300 ml of 0.01 Aerosol OT (sodium dioctyl sulfosuccinate) solution prepared in distilled water. Face and neck exposure of the workers were monitored with gauze pad swipes (12-ply cotton, 4 by 4 inches) wetted with 4 to 7 ml of 0.01% Aerosol OT solution.

Inhalation exposure was assessed using an MSA personal air-sampling pump, attached to cassettes containing two glass fiber filters and an XAD-2 vapor collection tube. The calibrated pumps, were attached to the workers belts, drew in air at approximately 1.5 L of air per minute from the worker's breathing zone.

Climatological Data

Indoor environmental conditions were monitored, and results were appended to the submission (page 183). At Site 1, temperature averaged from 54 to 68° F, and relative humidity from 39.5 to 44%. At Site 2, temperature averaged from 41 to 52° F, and relative humidity from 44 to 46%.

Quality Assurance/Quality Control (QA/QC) Data

Method Validation

Method validation was performed prior to the analytical phase of the study. The method validation data are presented below.

Method Validation (Laboratory Based)

Matrix	Fortification Level (ug)	Number of Samples	Average Recovery Percent (± Std)
Whole-body dosimeters	1.00 10.0 100 **Mean**	2 2 2 **6**	103.6 103.6 83.4 **96.9 (± 11.6)**
Facial swipes	0.200 0.50 5.00 **Mean**	2 2 2 **6**	93.2 81.6 79.1 **84.7 (± 7.9)**
Handwash solution	0.020 0.20 2.00 **Mean**	2 2 2 **6**	107 95.2 102 **102 (± 12.1)**
Vapor Collection Tubes	0.200 0.500 2.0 20.0 **Mean**	4 2 2 2 **10**	132.2 97.1 109 88.0 **112 (± 19.8)**
Glass fiber filter	0.05 0.50 5.00 **Mean**	2 2 2 **6**	113 91.4 100.4 **102 (± 9.9)**

Laboratory controls were either nondetects or below the minimum quantifiable limit (MLQ) (1.00 ug for whole-body dosimeter, 0.02 ug/ml for handwash, 0.200 ug for facial swipes, 0.0500 for glass fiber filters, and 0.200 ug for XAD-2 tubes). Non-detect results were reported as 1/2 the MLQ.

Laboratory fortifications analyzed concurrently with field samples (2 per sample set) gave the following percent recoveries: glass fiber filters 92.5%; vapor collection tubes 96.8%; handwash solution 91.8%; facial wipes 79.1%; whole-body dosimeters 81.1%.

Field Recovery

Field fortified samples were prepared during Trial 1 using both the formulated material in deionized water and the analytical grade material diluted in acetone. For the remaining trials, only the technical material (in methanol) was used. During each day of monitoring, two sets of field fortification samples were performed at sites 1 and 3, but only one set of field fortifications were conducted at site 2. Spiking levels were in duplicate as follows: handwash 0.1, 1.0, 10 ug; facial swipe 1, 10, 100 ug; dosimeter 5, 50, 500 ug; glass filter 0.25, 2.5, 25 ug. All fortified samples, except handwash solution, were exposed to the environmental conditions for the duration of a replicate. The handwash solution was exposed for approximately 10 minutes. Vapor collection tubes were not tested for field recoveries. During the study, it was discovered that the acetone spiking solution destroyed the glass fiber cassettes, rendering the data unusable. Also, the results from the dosimeters spiked with analytical metalaxyl were unacceptable. Therefore, the registrant obtained permission from OREB to rerun the field recoveries under the same conditions and sites, using formulated material only (and shown to give acceptable results in a pilot study). Field recoveries are summarized in the following table.

Field Recovery Data

Trial	Handwash	Facial Swipe	Dosimeter	Glass Filters
1	86.3%	72.1%	68.4%*	75%**
2 & 3***	85.9%	78.9%	73.9%*	67.7%
4	84.8%	99.3%	73.9%*	81.6%

* Results are from a subsequent recovery study using formulated material.
** Samples were destroyed by the spiking solution, the mean value from the other trials was used.
*** These trials were conducted simultaneously, and field recoveries applied to both trials.

The registrant set all recovery values >100 percent to 100 percent when calculating averages.

Storage Stability

A storage stability study was stated to be ongoing: interim results were not included in the submission.

Good Laboratory Practice Compliance Statements were provided in the report. The overall compliance statement was signed on March 9, 1993, and indicated that the study was in compliance with the GLP standards set forth in 40 CFR 160, August 1989, with a minor exception.

Study Results

Exposure data were corrected using site-specific average field recoveries. The geometric mean exposure estimates as reported by the investigator are presented below. This reviewer verified the algorithms used in calculating total dermal exposure.

The study results show that overall average dermal exposure was greater for the mixer/loaders than for baggers and bag sewers. However, the opposite is true for overall average inhalation exposure. Higher inhalation exposures for mixer/loaders handling the wettable powder was attributed to the dust present during the operations.

Exposure Summary

	Mean Dermal Exposure mg/kg ai handled	Mean Inhalation Exposure mg/kg ai handled
Apron FL (15 reps.)		
Mixer/Operator	0.0610	0.000775
Bag Sewer	0.0346	0.00560
Bagger	0.0182	0.000518
Apron 25W (5 reps.)		
Mixer Operator	0.0427	0.00696
Bag Sewer	0.0101	0.000889
Bagger	0.0340	0.000763

A comparison was also made of relative exposure in Trials 2 and 4, where the same workers were used, and the only difference was in the formulation of Apron (Trial 2 was the flowable, and Trial 4 was the wettable powder). Only the mixer/operator experienced a real difference in exposure, where dermal exposure was higher for the flowable (0.147 mg/kg ai vs. 0.0427 mg/kg ai), and inhalation exposure was higher for the wettable powder (0.00696 mg/kg ai vs. 0.00168 mg/kg ai).

Summary

Compliance with sections 230-236 of Subdivision U of the Pesticide Assessment Guidelines (U.S. EPA, 1986) is critical if a study is to be considered acceptable. The list below describes on an item-by-item basis, compliance with major points of Subdivision U. Other issues not included on the checklist that compromise the scientific integrity of the study are also discussed.

- Typical end use product of active ingredient tested. This criterion was met.

- End use product handled and applied using recommended equipment, application rates, and typical work practices. This criterion was met.

- For outdoor exposure monitoring at least five replicates at each of at least three sites for each job function with the exception of pilots. Pilots should have at least three replications at each of at least three sites. This criterion is not applicable to this indoor study.

- For indoor exposure, monitoring at least five replicates at each of at least three sites for each job function. This criterion was not fully met, although four trials were conducted at the two sites utilized.

- Monitoring period is sufficient to collect measurable residues but not excessive so that residue loss occurs. This criterion was met.

- Dermal and/or inhalation exposure monitored by validated methodologies. Biological monitoring is consistent with and supported by pharmacokenetic data accepted by the Agency. This criterion was met. The dermal and inhalation sampling techniques used in this study were typical (i.e., whole-body dosimeter, facial swipes with gauze, hand rinses, and glass fiber filters/vapor collection tubes). Biological monitoring was not measured in this study.

- Quantity of active ingredient handled and duration of monitoring period for each replicate. This criterion was met. The required information was provided for each test replicate.

- Clothing worn by each study participant and location of dosimeters reported. This criterion was met. Whole-body dosimeters were worn under normal work clothing.

- Quantitative level of detection (LOD) is at least 1 ug/cm^2. This criterion was met.

- Storage of samples consistent with storage stability data. This criterion was not met. A storage stability study was stated to be in progress, and to be submitted when complete.

- Efficiency of extraction in laboratory provides as mean plus or minus one standard deviation. Lower 95 percent confidence limit is not less than 70 percent based on a minimum of seven replications per fortification level or prior Agency approval of extraction methodology provided. This criterion was not fully met, as only two samples per matrix fortification level were utilized in the method validation study. Recovery values were all well within acceptable levels, however.

- At least one field fortification sample per worker per monitoring period per fortification level for each matrix. This criterion was met.

Summary

Before the metalaxyl seed treatment mixer/operator/bagger/sewer exposure study fully meets the QA/QC specifications outlined in Subdivision U of the Pesticide Assessment Guidelines (U.S. EPA 1986/U.S. EPA 1988), the storage stability study stated to be on-going will have to be reviewed and found acceptable. Other variances from the guideline requirements appear, on the weight of all the data, to be of less concern.

13544

R132750

Chemical: Metalaxyl

PC Code:
113501

HED File Code: 19050 Versar DER Warning: May not have been QAed by EPA--CONTRACTOR DRAFT DOCUMENT

Memo Date: 7/13/1995

File ID: 00000000

Accession #: 412-07-0024

HED Records Reference Center
11/14/2006