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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

2 MAY 1989

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: HANDLER EXPOSURE ASSESSMENT FOR AZINPHOS-METHYL (GUTHION)
USE ON POMEGRANATES

TO: Don Stubbs/Gene Asbury
Registration Support and Emergency Response Branch
Registration Division (H-7505C)

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Attached, please find the NDEB review of....

HED Project #: 9-1166
Reg File/Rec #: 242,447
Registration #: _____
Caswell #: 374
Company Name: California Department of Food and Agriculture
Date Received: 1/29/89 Action Code: 510
Monitoring Study Requested: _____ Reviewing Time: 1 week

Deferal to: TB-IRS X

1.0 CONCLUSIONS AND RECOMMENDATIONS

The following table summarizes the exposure estimates for guthion use on pomegranates. Surrogate studies were used for the exposure calculations given, as explained in the text of this review.

SUMMARY OF SINGLE DAY DERMAL EXPOSURE FOR USE OF GUTHION ON POMEGRANATES-CLOSED LOADING AND AIRBLAST APPLICATION

	(MG/KG)
MIXER-LOADER:	0.0024 or 2.4×10^{-3}
APPLICATOR:	0.088 or 8.8×10^{-2}
MIXER-LOADER-APPLICATOR:	0.090 or 9.0×10^{-2}

The estimated single day exposure for an individual doing mixing, loading and airblast application of guthion on pomegranates at 12 oz ai/A using Guthion 2S EC is 0.090 mg/kg. Guthion may be used up to twice per year.

NDEB recommends that the Toxicology Branch-Insecticide Rodenticide Support (TB-IRS) be advised of this exposure estimation for the use of guthion on pomegranates.

Note to RD: We reiterate our prior request that the registrant should provide glove permeability data (See C. Lunchick memo of 6/13/86). The label should include the restriction that closed loading is required.

This review does not address the question of worker reentry into treated fields. At a minimum, the label should retain the warning statements submitted on the previous pomegranate label regarding reentry into treated fields. For permanent registration, a study addressing harvester exposure should be required.

2.0 INTRODUCTION

The Registration Support and Emergency Response Branch has requested that the Non-Dietary Exposure Branch (NDEB) conduct an exposure assessment for handlers (mixers, loaders, and applicators) using guthion on pomegranates. This assessment is needed to support the Section 18 Emergency Exemption Request by the California Department of Food and Agriculture (CDFA) (See letter from CDFA to D. Stubbs dated March 17, 1989).

TB-IRS, has determined that guthion is an acute toxicant with an acute dermal LD₅₀ of 150-250 mg/kg.

Labeling included with the 2/26/88 Dietary Exposure Branch (DEB) IR-4 request for use of guthion on pomegranates in California (See DEB file, 8E3618) requires use of the following protective clothing and statements:

HANDLE THE CONCENTRATE ONLY WHEN WEARING THE FOLLOWING CLOTHING AND EQUIPMENT (I.E., FOR MIXER-LOADERS):

*Protective suit which covers all parts of the body except the head, hands, and feet.

*Chemical resistant gloves, chemical resistant apron and chemical resistant shoes, shoe coverings, or boots.

*Goggles or face shield.

*Pesticide respirator approved by the National Institute of Safety and Health/Mining Safety and Health Administration (NISH/MSHA) (previously called the National Institute of Occupational Safety and Health/Mining Enforcement and Safety Administration).

*If handling the concentrate with a closed system, long sleeved shirt and long legged pants may be substituted for the protective suit and the respirator requirement is waived.

*A closed loading system is required in California.

DURING APPLICATION OR REENTRY TO TREATED AREAS:

*Protective suit.

*Chemical resistant gloves and shoes.

*Chemical resistant hat during airblast application.

The following should be included as part of the label restriction for the use of guthion on pomegranates in California, to be consistent with other fruit tree uses in California (See the State of California Department of Food and Agriculture "Changes in the Regulations of the Department of Food and Agriculture Pertaining to Field Worker Reentry" dated July 2, 1986, signed by George Deukmejian, Governor).

*Do not reenter into treated orchards without appropriate protective clothing, until 14 days after application.

3.0 METHODOLOGY AND ASSUMPTIONS

Guthion exposure to mixers, loaders, and applicators was estimated based on analysis of surrogate exposure data.

Assumptions made in exposure calculations are as follows:

- *Mixer-loaders wear long pants and long-sleeved shirts, chemical resistant gloves, and a protective mask.
- *Mixing and loading is done using a closed loading system only.
- *The submission included both aerial and ground application. Only ground application was considered in this review at the request of Emergency Response Section, RD, G. Asbury, 4/10/89.
- *Chemical resistant gloves provide 90% protection from dermal contact.
- *Calculations of exposure are not adjusted for dermal absorption.
- *Respiratory exposure is assumed to be negligible compared to exposure by the dermal route for both mixer/loader and applicator (mixer-loaders are required to wear a protective mask).
- *The mixing, loading and application is performed by the same individual.

4.0 PESTICIDE USE INFORMATION

The proposed use is for 2 applications/season via airblast application of 12 oz ai/A (0.75 lb ai/A) to a 15 A orchard. This is equivalent to 22.5 lb ai/season. The formulation to be used is an emulsifiable concentrate.

The Biological and Economic Analysis Division, BEAD, provided an assessment for the expected use of guthion on pomegranates (See Y. NG memorandum dated 4/10/89).

5.0 EXPOSURE CALCULATIONS:

5.1 MIXER-LOADER DERMAL EXPOSURE

NDEB assumes that mixer-loaders wear long sleeved shirts, long pants, and chemical resistant gloves and use closed loading only (as required in California). Only closed pour loading should be permitted on the label.

The unit exposure used in the exposure calculation for closed mixing-loading is 0.015 mg/lb ai, based on data generated by Dubelman and by Peoples. The 1982 Dubelman report is entitled, "Operator Exposure Measurements during Application of the Herbicide Diallate," JAFIC, 30 (3):528-532. The Dubelman study of closed loading showed exposure to be 0.0041 mg/lb ai when long shirt, long pants and gloves were worn. The

Peoples study reported exposure during closed loading to be 0.025 mg/lb ai, when the same clothing was worn (See Peoples, et al., (1979) "Monitoring of Potential Exposure of Mixer/Loaders, Pilots and Flaggers During Application of Tributyl Phosphorothioate (DEF) and Tributyl Phosphothioate (Folex) to Cotton Fields in the San Joaquin Valley of California in 1979." Report HS-676, California Department of Food and Agriculture). In both the Dubelman and Peoples studies, 9 replicates were reported. The unit exposure value used for the estimation of mixer-loader exposure is taken as a simple average of the two unit exposures, 0.015 mg/lb ai handled.

$$\begin{aligned} & \text{Estimated Single Day Mixer/Loader exposure guthion CLOSED LOADING=} \\ & \text{Application Rate (0.75 lb ai/A) x 15 A treated/application} \\ & \text{x Unit Exposure (0.015 mg/lb ai) x 1/70 kg} \\ & = 0.0024 \text{ mg/kg} \\ & = 2.4 \times 10^{-3} \text{ mg/kg} \end{aligned}$$

5.2 APPLICATOR EXPOSURE TO GUTHION

If we assume that applicators wear long sleeved shirts, long pants, and gloves, then exposure can be estimated based on a study done by C. Franklin, et al., entitled, "The Use of Biological Monitoring in the Estimation of Exposure During the Application of Pesticides," (See "Toxicology Letters" 33(1986) 127-136. This study involved airblast application of Guthion 50 WP by 23 individuals in three Canadian provinces. All individuals wore cotton pants, long sleeved shirts and cotton coveralls, as well as respirators. All but one applicator wore protective gloves. Urine samples were analyzed for presence of dimethylthiophosphate, DMPT, after 24 and 72 hours of exposure to guthion. DMPT has been identified as the primary alkylphosphate urinary metabolite of guthion in the Franklin, et al., study (See memo by C. Lunchick, "Worker Exposure Assessment for Guthion," 6/13/86). Urinary levels of DMPT were shown to correlate well with the amount of guthion mixed and sprayed ($R=0.81$, $P<0.001$).

Franklin, et al., reported that throughout the range of the dermal dose to male rats of 100 to 800 micrograms, the proportion of guthion applied dermally to the amount of DMPT excreted (in the urine) was 10 to 1. A pilot study in human volunteers dosed at levels of 500 to 6000 micrograms showed a similar 10 to 1 ratio of applied guthion dose to DMPT excreted.

Lunchick's 6/13/86 review (referenced previously) used this 10 to 1 ratio to estimate the overall mean dosages of guthion to be 1.2 mg/kg ai handled, based on the Franklin, et al. study.

Using the value of 1.2 mg/kg ai handled, we can estimate the maximum amount of guthion handled per day and the maximum mg/kg/d exposure an individual would receive. According to projected parameters prepared by the Biological Analysis Branch, BEAD (See memo by Y. NG, 4/10/89,

"Request for Comprehensive Software Package Use Assessment for Guthion on Pomegranates."), an average of 15 A will be treated per day at 0.75 lb ai/A. The following calculation is used to arrive at the daily exposure estimate for individuals applying guthion via ground application:

Estimated Single Day Applicator exposure guthion (mg/kg) =

Application Rate (0.75 lb ai/A) x kg/2.2 lb
 x 15 A treated/application x Unit Exposure (1.2 mg/kg ai)
 x 1/70 kg

= 0.088 mg/kg

= 8.8×10^{-2} mg/kg

This value assumes that the dermal absorption is 100%. If TB-IRS finds that this guthion is not 100% absorbed through the skin, the actual dermal dose will be reduced proportionately.

We defer to TB-IRS as to the actual dermal penetration of guthion, and actual risk estimates to mixer-loader-applicators. The estimated values for user exposure are summarized in the conclusion section of this review. Exposure to mixer-loader-applicators is estimated to be almost exclusively due to exposure during application, because closed pour loading is required.

cc: Albin Kocialski, SACB
 Judith Hauswirth, TB-IRS
~~David Ritter, TB-IRS~~
 Guthion File
 Circulation File
 Correspondence File
 Chronological File