

Pesticide Exposure Study For A Hand-Operated, Metered, Closed-System Applicator For Di-Syston® (Disulfoton) In Fraser Fir Production In Western North Carolina

(Or the Red Long John Study)

By Jerry Moody, Dr. Ross Leidy

This past spring you might have thought you seen some fellows running around in red union suits in a tree patch. Well, if you did you were not dreaming! Those people were Jerry Moody-Extension Agent, Avery County; Jim Hamilton-Extension Agent, Watauga County; David Isner-Extension Agent, Alleghany County; Colby Lambert-Extension Agent, Ashe County; Bryan Davis-BMP Coordinator; Jeff Vance-County Extension Director, Mitchell County; and Jill Sidebottom-Extension Specialist. Also, you would have seen Dr. Ross Leidy-Professor Emeritus of Toxicology; Doug Hundley-IPM Technician, Avery County; Jeff Owen-Extension Specialist; and Tres Magner-Extension Agent, Avery County. This group completed the Worker Exposure Study for the Di-Syston Study. The data is being analyzed at a lab in Colorado. Bayer Corporation awarded the Avery County Cooperative Extension Center a grant for approximately \$65,000.00 to pay for the analysis of this information. This is the last step in the re-registration process. Once the data is analyzed it will be delivered to the US EPA in Washington. Below is a description of the work that was completed. These are excerpts from a report written by Dr. Ross Leidy to satisfy the requirements for the final EPA grant concerning Di-Syston.

Objective: The objective of the study was to determine potential worker exposure to disulfoton when using the new applicator to deposit the insecticide at the base of Fraser fir trees by collecting air and body dosimeter samples from six applicators, and to field test the new applicators for both efficacy and durability.

Experimental Design: All treatments were arranged in randomized, complete block designs with three replications. Four-row plots were designated with plastic strips of various colors placed on the first and fourth row at the beginning and end of the plot (Figs. 1, 2 and 3). During each 4-hour replication (a normal treatment period), each individual randomly selected a granular applicator that was marked with one of the colored tapes to designate the rows that he/she

would treat. Thus, the application devices were also randomized to eliminate bias. The six individuals performing the applications were North Carolina Cooperative Extension personnel who were experienced with Fraser fir management practices. Prior to the start of the application, each pesticide applicator put on a one-piece 'Union Suit' that served as the body dosimeter to determine the potential dermal adsorption. A tee shirt and shorts were put on over this and a disposable Tyvek® coverall completed the clothing required by the label (Appendix 3). In addition, each applicator wore rubber boots and gloves, a hat and a dust/mist respirator.

Applications: The replications of 4-h duration were conducted on 21, 28 and 29 April 2003. Weather conditions were monitored every 30 min as prescribed by USEPA protocols. A "Compact" Whirling Hygrometer (VWR, Charlotte, NC) was used to measure temperature and humidity; a combination compass/digital wind speed meter was used to measure wind speed and direction. Each applicator randomly selected a granular dispenser and the container (Di-Syston® 15G, Lot 2030149) was attached. They were directed to the first plot and proceeded to "point and shoot" the 8 g of granules at the base of each tree. Each worker got into a routine pace immediately, and the amount of disulfoton applied by each was recorded during replacement of the empty container (Table 1). A pick-up truck traversed the fields on established roads in order to facilitate refilling operations. The pesticide applicators took one or two breaks over the four hours but did not leave the treatment area. There were no problems with the application equipment, and each worker applied the granules to approximately 2 ac (0.81 ha). A total of 804 lb (365 kg) were applied to about 30 ac (12 ha) (60,500 trees) over the three replications.

Sampling: Samples obtained followed the guidelines set forth in the AHETF Field M/L/A Protocol. At the completion of the 4-h treatment period, each individual reported to the sampling station that was set up in the vicinity of the final plots (Appendix 8).

Air: The pump was shut off, time recorded, and the adsorbent tube was capped and placed in an individually labeled ZipLok® bag. The amount of air collected from each applicator is shown in Table 3. Bags were placed in a cooler containing Blue Ice®. The individual proceeded to station 2 where the respirator was removed and the hands and face were sampled.

Hands: The gloves were removed and ca. 400 ml of 0.01% Aerosol OT in distilled water were slowly poured over the hands for 30 sec while the applicator scrubbed them. This was followed with an additional 100 mL rinse with the Aerosol OT. The 500 ml of solution were poured into a 500-ml pre-cleaned, labeled glass jar until approximately two-thirds full, sealed with a Teflon®-lined screw cap and placed in a cooler containing Blue Ice®.

Face and Neck: The face and neck were wiped with two, 4 by 4-in. (10.2 by 10.2 cm) sterile gauze pads wetted with 0.01% Aerosol OT. The combined pads were placed in a labeled, pre-cleaned 4 oz jar and sealed with a Teflon®-lined screw cap and placed in a cooler containing Blue Ice®.

Body Dosimeter: With assistance, the Tyvek® suit was removed followed by the tee shirt and shorts. Then the "Union suit" was removed and sectioned as follows:

1. upper arms
2. lower arms
3. chest
4. back
5. upper legs
6. lower legs


the upper left and right arms, lower left and right arms, upper left and right legs and lower left and right legs were combined and wrapped in labeled aluminum foil, placed in a labeled ZipLok® bag and placed in the cooler. Thus, there were a total of six samples including the chest and back portions of the "Union Suit". The gloves, Tyvek® suit and respirator were discarded and replaced for each replication.

Residue Analysis: Pyxant Laboratories, Inc., Colorado Springs, CO, was selected to perform the residue analysis based upon discussions with Dr. Joe Hudson, Bayer AgriScience. Samples currently are undergoing residue analysis, and these data will be supplied upon their completion.

Final Step:

There is one final test that must be completed. In June 2003, we traveled to Raleigh to meet with Bayer representatives. Much of the discussion was regarding the concerns about the new packaging and how it will work. Bayer had concerns about the logistics behind the new packaging. It was determined that even though the new packaging won't be necessary until after June 2004, it is necessary to test the system prior to putting 450,000 pounds of material into jugs. This test concerns the logistics of changing a chemical from a bag to a jug. Bayer is going to try to put approximately 40,000 pounds of material into jugs. Each jug will contain about fourteen pounds and there will be two jugs per case. They will be working with NCCES, NCDA & CS, UAP/Carolinas, and North Carolina growers to find the weak links in the production, packaging, distribution, usage and recycling process. The cost of putting this small amount of material into jugs for testing will make this particular production of Di-Syston very costly.

A meeting will be held in late August to seek growers willing to purchase the new material at the higher price; to ensure this product will remain in the market, and that this product will not have problems with the production, packaging, distribution, usage, and recycling of the new packaging of Di-Syston. Growers will also need to have an applicator to apply this material. If you are interested in being a part of this project, please contact your County Cooperative Extension Center and speak with the County Agent.

Disclaimer: Use of product names does not imply endorsement by the North Carolina Agricultural Research Service of the products named nor criticism of similar ones not mentioned. 



Winter Meeting
Boone, NC
February 27-28
2004