US EPA ARCHIVE DOCUMENT

427223-01 5.7.

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

AUG 11 1993

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM:

SUBJECT: Aldicarb: Results of Additional Sweet Potato Residue Trials. MRID No. 427223-01. DP Barcode D190336. CBTS No. 11746

FROM: Joel Garbus, PhD., Chemist
Tolerance Petition Section III
Chemistry Branch Tolerance Support
Health Effects Division (H7509C)

Joel Garbus

THRU: Debra Edwards, PhD., Chief
Chemistry Branch Tolerance Support
Health Effects Division (H7509C)

Debra Edwards 8/11/93

TO: J. Housenger / S. Haddad PM/RM 60
Risk/Benefit Section I
Special Review Branch (H7505C)

Rhone-Poulenc, as the registrant of aldicarb, was required to conduct additional field residue trials on sweet potatoes as a condition for the continuing registration of aldicarb on this rac. The trials were requested to answer questions regarding present tolerances and acute toxicity concerns, that arose from the results of past field trials and monitoring studies.

The current tolerance for the combined toxic residues of aldicarb on sweet potatoes is 0.1 ppm (40 CFR 180.269). The numeric value of the tolerance has been questioned because of the limited number of trials that led to the value; the disparity between this tolerance and the tolerance of 1.0 ppm for white potatoes; and the finding of a considerable number of over-tolerance individual sweet potatoes in the Aldicarb National Food Survey (ANFS).

The registrant agreed to conduct additional field trials in the 1992 growing season to obtain residue data for dietary risk assessment and data that could be the basis of a new tolerance proposal if that is considered necessary.

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Experimental Protocol

Seven field trials were conducted at sites representative of the major sweet potato growing areas in SC (1), NC (2), LA (2), TX, (1), and MD (1). The trials were conducted at the current maximum allowable label rates (3 lbs ai/A), and harvested at the current minimum PHI (120 days) or, in most instances, sooner. In this regard Rhone-Poulenc's protocol states:

> Planting to Harvest interval for current commercial sweet potato varieties can vary from 90 to 160 days. A growing trend in sweet potato agronomic practices is to shorten this interval. Most of the commercial varieties can be harvested 90 to 110 days after planting. The previously required PHI of 120 days did not reflect current commercial practices.
>
> Decreasing the required PHI by 10 to 30 days may increase the resulting aldicarb residue in the resulting raw agricultural commodity (RAC)but will not effect the integrity of the study. Normal commercial practice dictates this change be made and Rhone-Poulenc is prepared to adjust the TEMIK sweet potato registration accordingly.

At harvest, samples of sweet potato roots were taken from the center and from the row-ends of treated plots together with samples from untreated plots.

The samples were shipped to CYAL, Inc's laboratories in Morrisville, NC, for the determination of total toxic aldicarb residues. Initially the samples were analyzed as composites, each composite consisting of the halves of six tubers. If the composite value equaled or exceeded 0.015 ppm, the remaining halves of the tubers making up the composite were individually analyzed.

The method of analysis was a modification of Rhone-Poulenc's method RPAC SOP 90015: "Aldicarb: Determination of Aldicarb Residues in Potatoes by HPLC." The method individually quantifies the parent and metabolites in the residue by separating the extracted aldicarb, sulfoxide, and sulfone, and subsequently converting the analytes to fluorescent derivatives. Recoveries for all three compounds ranged from 64.5 to 120.4%, with average percent recovery for aldicarb of 86.8 ± 9.16%; for aldicarb sulfoxide 80.8 ± 11.41%; and for aldicarb sulfone 93.9 ± 11.25%. The level of residues in samples were not corrected for recoveries. The limit of detection was determined to be 0.005 ppm; the limit of quantification 0.01 ppm.

Results

Sixty-three composite and 144 individual samples were analyzed. For each site, 4 composites were made of row-end samples; 5 were composites of center-row samples. Twenty-four composites from four of the trial sites had residues greater than 0.015 ppm. Ten of these

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samples (36%) were row-end samples; 14 were center-row samples. The 144 tubers of the 24 samples exceeding 0.015 ppm were individually analyzed.

Site	PHI Days	Sample Type ER = End-Row CR = Center-Row	Total Toxic Residues Range in ppm's
Golden TX	119	ER	0.012 - 0.054
		CR	0.025 - 0.049
Cheneyville LA	103	ER	0.002 - 0.014
		CR	0.001 - 0.021
Washington LA	108	ER	0.000 - 0.000
		CR	0.004 - 0.012
Elko SC	118	ER	0.004 - 0.008
		CR	0.006 - 0.008
Jamesville NC	92	ER	0.005 - 0.049
		CR	0.009 - 0.030
Indian Springs NC	98	ER	ND - 0.012
		CR	0.004 - 0.013
Salisbury MD (1)	109	ER	0.152 - 0.613
		CR	0.020 - 0.034
Salisbury MD (2)*	109	ER	0.178 - 0.631

* Duplicate analyses of end-row samples

All residues are uncorrected for recoveries and for untreated control blanks.

As to the individual metabolites, in only 1 of the 63 samples was aldicarb detected above the LOQ (at 0.0102 ppm); in general aldicarb sulfoxide and aldicarb sulfone were found in approximately equal amounts.

As was noted above, the 144 tubers comprising the composite samples with residues greater than 0.015 ppm were individually analyzed with the following results:

Site	Composite Residue Total Toxic Res. (ppm)	Individual Tubers Total Toxic Res. (range in ppm's)	Ave. of Individual Tuber Levels** (ppm)
TX	ER 0.054	0.021*- 0.104	0.033
TX	ER 0.031	0.021 - 0.031	0.025
TX	ER 0.018	0.021 - 0.028	0.024
TX	CR 0.039	0.021 - 0.123	0.041
TX	CR 0.049	0.021 - 0.108	0.049
TX	CR 0.037	0.021 - 0.078	0.036
TX	CR 0.025	0.021 - 0.069	0.031
TX	CR 0.029	0.021 - 0.066	0.032
LA	CR 0.021	0.021 - 0.103	0.040
LA	CR 0.016	ND - 0.130	0.037
NC	ER 0.049	0.021 - 0.106	0.032
NC	ER 0.033	0.021 - 0.086	0.038
NC	ER 0.036	0.021 - 0.098	0.046
NC	CR 0.016	0.021 - 0.052	0.029
NC	CR 0.030	0.021 - 0.050	0.028
MD	ER 0.160	0.034 - 0.815	0.293
MD	ER 0.613	0.081 - 1.266	0.510
MD	ER 0.152	0.021 - 0.462	0.135
MD	ER 0.467	0.021 - 2.387	0.808
MD	CR 0.021	0.021 - 0.027	0.023
MD	CR 0.034	0.021 - 0.054	0.030
MD	CR 0.020	0.021 - 0.027	0.022
MD	CR 0.030	0.021 - 0.048	0.026
MD	CR 0.026	0.021 - 0.051	0.026

* 0.021 is the sum of the limits of detection and quantification
** not weight averages

Seventy-five of the 144 individual tubers had residues greater than the sum of the limits of detection and quantification. Nineteen of the individual tubers had residues exceeding the tolerance of 0.10 ppm; 13 of these were end-row samples from the MD trial, 2 were end-row samples from TX and NC, and 4 were center-row samples from TX and LA.

Registrant's Comments

Rhone-Poulenc's interpretation of these results is that the over-tolerance values are the result of excess application to the ends of rows caused by spillage from the gravity-fed applicators as the machinery turns corners. To support this supposition, Rhone-Poulenc cites the QA procedures of before and after weighing to determine the actual amounts of aldicarb applied to the test sites. These ranged from 3 lbs/A in the SC trial to 4.17 lbs/A in MD. Evidence of the higher rate application at row ends was seen in the MD trial, where 81% of the first plants in the row showed signs of necrosis compared with 24% of the second plants and with no signs of phytotoxicity in plants in the center of rows.

CBTS's Comments

The inference that the registrant wishes to draw from these results is that excessive residues in sweet potatoes (i.e., residues exceeding the tolerance of 0.1 ppm) are due to problems associated with gravity-flow applicators applying excess amounts of pesticide, especially at row ends. While this may be true for the MD results, it does not hold for the other field trial sites. For the six other sites: at 3 sites (TX, SC, and NC-2) the average residue values for end-row samples were the same as center-row samples, in one instance (NC-1) the end-row average residue value was twice that of the center row, in one instance (LA-1) the center row average residue value was twice that of the end-row, and in one instance (LA-2) the center-row average residue values ranged from 0.001 to 0.012 ppm while no residues of any metabolite were found in any end-row sample. In the NC-2 trial 3.62 lbs per A was applied according to the QA check, yet residues averaged 0.009 ppm.
We would conclude that Rhone-Poulenc's explanation regarding excessive residues, while possibly true for the MD trial, is not borne out by the totality of the results.

We note that the results for residue values have not been corrected for recoveries. Considering that the average recovery for aldicarb sulfoxide is reported as about 80%, correction for recoveries would tend to raise the total toxic residue levels and probably increase the number of samples exceeding tolerance. Also, we note that some results are reported as 0.0000 ppm rather than ND and others are given as 0.0001 and 0.0005 ppm. We question the accuracy and precision of such values.

The extremely low and non-existent values cited above were from a trial (LA-2) in which essentially no residues were found of the sulfoxide and sulfone while residues were found of the parent. In all other 198 determinations, aldicarb parent was reported as ND.

cc: Aldicarb Subject File, RF., Circ., Reviewer, CBRS, K. Whitby (CCB,
RDI:PE:7/30/93:RAL:8/2/93
H7509C:CBTS:JG:jg:CM:2:Rm:805b:(703)-305-5405:8/10/93.