Shaughnessy Number: 114402

Date Out of EFGWB: JAN 29 1990

TO: T. Luminello
Product Manager 50
Registration Division (H7505C)

FROM: Michael Barrett, Acting Chief
Ground-Water Section
Environmental Fate & Ground-Water Branch/EFED (H7507C)

THRU: Henry Jacoby, Chief
Environmental Fate & Ground-Water Branch/EFED (H7507C)

Attached, please find the EFGWB review of:

Reg./File #: _____

Chemical Name: Acifluorfen

Type Product: Herbicide

Company Name: Rhone-Poulenc Ag Company and BASF Corporation

Purpose: Review Additional Data for Progress Report and Product Usage Data for Blazer.

Date Received: 10-17-89 ACTION CODE: 660

Date Completed: 1-24-90 EFGWB #(s): 90-0118

Monitoring study requested: X Total Review Time: 5 days

Monitoring study voluntarily: __

Deferrals To: _____ Biological Effects Branch

_____ Science Integration & Policy Staff, EFED

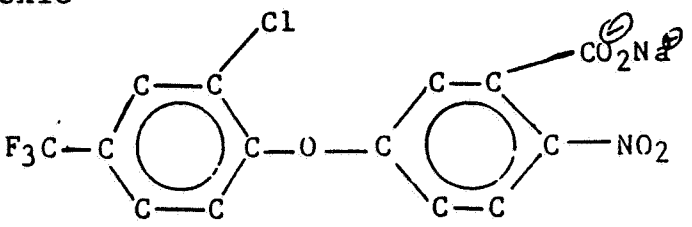
_____ Non-Dietary Exposure Branch, HED

_____ Dietary Exposure Branch, HED

_____ Toxicology Branch, HED

1. CHEMICAL:

Chemical name: Sodium-5-(2-chloro-4-(trifluoromethyl)-phenoxy)-2-nitrobenzoate
Common name: acifluorfen-sodium salt
Trade name: Blazer/Tackle
Structure:



2. TEST MATERIAL:

Not Applicable.

3. STUDY/ACTION TYPE:

Review additional data for progress report of small-scale retrospective and limited prospective ground-water monitoring study and Product usage data for BLAZER.

4. STUDY IDENTIFICATIONS :

1: Title: Addendum to Progress Report of a Small Scale Retrospective Groundwater Monitoring Study and Limited Prospective Field Dissipation Study with acifluorfen-Sodium, The Active Ingredient of TACKLE brand Herbicide and BLAZER brand Herbicide.

Author: F.A. Norris

Completed On: June 22, 1989 (MRID Number: 41160001)

Submitted by: Rhone-Poulenc Ag Company
Environmental Chemistry Department
P.O. Box 12014, 2T.W. Alexander Drive
Research Triangle Park, NC 27709

2: Title: BLAZER (acifluorfen) Product Usage

Author: Jack R. Graham

Completed On: May 1988

Submitted by: BASF Corporation Chemicals Division
Agricultural Chemicals
100 Cherry Hill Road
Parsippany, New Jersey 07054

Identifying No.: 114401-03
Action Code: 660
Accession Number: 411600-01
Record Number: 253523
Date Sent to EFED: 10-13-89

5. REVIEWED BY:

Elizabeth Behl
Hydrogeologist
OPP/EFED/EFGWB/Ground-Water Section

Signature: Eliz Behl

Date: 1/24/90

6. APPROVED BY:

Michael R. Barrett
Acting Chief
OPP/EFED/EFGWB/Ground-Water Section

Signature: Michael R Barrett

Date: 1/25/90

7. CONCLUSIONS:

After careful review of the soil sampling data, the Ground Water Section believes that these results do not provide evidence that pesticides residues will not be detected in ground water at the monitoring sites, if the studies are carried out for the full 1-year period. This conclusion is based largely on a comparison of results of the retrospective studies with results of the prospective ground water monitoring study, which was designed to assess the leaching potential of this pesticide in a worst case environment.

The relative concentration of pesticide residues in soils (in the upper interval) at all retrospective study sites is the same as at the prospective study site. Because of the lower application rates, absolute concentrations of pesticide residues are expected to be much lower at the retrospective study sites.

This review also points out that even in the worst case leaching environment represented by the prospective study site, trends were only observed after the study was conducted for a one-year period.

Product usage data for BLAZER has been previously reviewed.

8. RECOMMENDATIONS:

The Registrants should continue monitoring at all retrospective study sites agreed upon with EPA and detailed in EFGWB # 90-002 (1-9-90).

9. BACKGROUND:

Tackle, manufactured by Rhone-Poulenc, is a selective post-emergence herbicide registered for use on soybeans and rice at application rates of 0.125 to 0.75 # ai/acre since 4/86. Blazer, manufactured by BASF, is a selective pre- and post-emergence herbicide for a wide spectrum of annual broadleaf weeds and grasses in soybeans, peanuts, and other large-seeded legumes.

Data submitted as part of the Ground-Water-Data-Call-In (GWDCI) indicate that acifluorfen is both persistent and mobile. The Environmental Fate One-liner (8/27/86) states that the free acid readily leaches in soil column experiments, but the degradation products are considered not to leach. Samples are usually analyzed for the acifluorfen-sodium (the salt), acifluorfen (free acid), the amino metabolite, sodium-5-(2-chloro-4-(trifluoromethyl)-phenoxy)-2-aminobenzoate (LS-82-5281), and the desnitro product, sodium-2-(2-chloro-4-(trifluoromethyl)-phenoxy)benzoate (LS-82-5283). Acifluorfen has been classified as a (B2, probable human) carcinogen, with a one-in-a-million risk level of 1 ppb.

Data reviewed for the Pesticides in Ground Water Database: Interim Report (1988) indicate that wells in 2 states have been analyzed for acifluorfen as a result of normal agricultural use. Acifluorfen has not been detected in these samples. EPA determined that the registrant should conduct a small-scale prospective monitoring study based on results of the GWDCI (9/15/87). Findings of pesticide residues in ground water during the prospective study, prompted the registrant to agree to conduct small-scale retrospective monitoring studies at different locations. Based on the results of the prospective monitoring study, the Registrant has indicated that they intend to restrict the sale of acifluorfen products in 8 counties in Wisconsin and 2 counties in New York.

10. DISCUSSION:

This report contains the results of soil sampling at the five small-scale retrospective study sites and product usage data for BLAZER. The product usage data has been reviewed previously and retrospective site selection was based upon that information (EFGWB# 90-002). It is the understanding of the Ground Water Section that Rhone-Poulenc has designed the studies to answer questions that are required to be addressed in a small-scale retrospective study[1]. The protocol for this study type ("A Small-scale Retrospective and Limited Prospective Study") has not been received by the Ground Water Section for review.

The results of soil sampling were presented to the Ground Water Section in a meeting with the Registrants on October 11, 1989. In that meeting the Registrants requested permission to stop ground water sampling at all locations except North Dakota based on the soil sampling data reviewed herein. Representatives of the Ground Water Section indicated that they required time to analyze the data and subsequently scheduled a meeting with the registrants on November 21, 1989. In the November meeting, the Ground Water Section indicated that continued monitoring was required, and pointed out several reasons for this decision including the short

[1]Eiden et al., in draft, Guidance for Ground-Water Monitoring Studies, Office of Pesticide Programs, U.S. Environmental Protection Agency, 115 p.

history of pesticide use at several of the retrospective monitoring sites and that only 2 well clusters were installed at all sites. These elements are discussed in detail in EFGWB# 90-002 (1-9-90).

After careful review of the soil sampling data, the Ground Water Section believes that these results do not provide evidence that pesticides residues will not be detected in ground water at the monitoring sites, if the studies are carried out for the full 1-year period. This conclusion is based largely on a comparison of results of the retrospective studies with results of the prospective ground water monitoring study, which was designed to assess the leaching potential of this pesticide in a worst case environment. By contrast, the retrospective studies are designed to give an indication of the leaching characteristics of the pesticide in more typical agricultural conditions.

Residues are present in soil.

Acifluorfen was applied at the rate of 0.75 lb ai/A in the prospective study, and at about 0.25 lb ai/A in retrospective studies. The application rate was based on information from the registrants that acifluorfen is typically used at this rate. The Ground Water Section has recommended in the past that the pesticide label should be amended to reflect that change (EFGWB# 90-002, 1-9-90).

Figure 1 is a plot of relative concentrations[2] in soils at prospective and retrospective study sites with time (see data in Table 1). This figure indicates that relative concentrations of pesticides at the retrospective sites are decreasing at the same rate as at the prospective sites, in the surface layer. Correspondingly, pesticide residues are persisting at the retrospective sites at the same relative concentration as at the prospective study site where residues were subsequently detected in ground water.

Ground-water monitoring continued for a full year at the prospective study site, despite pesticide residues in the top interval of soil that decreased from 0.094 ppm to 0.004 ppm in two months. It is of note that although the magnitude of pesticide concentrations is in some cases lower at the retrospective sites (and residues more difficult to detect) this is not an indication of whether or not residues are leaching. These lower concentrations are expected given the reduced application rates.

Time required for detection of residues.

The prospective study was done in very sandy soils with a large quantity of water applied for irrigation. If acifluorfen leaches in more typical agricultural environments (that should be

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[2]Relative concentrations are calculated as the percentage of pesticide present at time zero that remains in the soil.

represented by retrospective study sites) the leaching process is expected to take longer than at the prospective study site.

Pesticide detections in soil, soil-water and ground-water samples at the prospective study site are shown in Tables 1 to 3. Given the difference in pesticide application rate, soils, the volume of water applied to the field, and the more intensive sampling done for prospective studies, is it quite possible that residues will require a longer time to be detected in the retrospective study.

The rate of reduction of pesticide residues in the uppermost soil interval at all monitoring sites is shown in Figure 1. Pesticide residues in soils at all sites decline at approximately the same rate. Values decreased to about 10 % of pesticide applied after about one and a half months. The concentration of acifluorfen in the soil at all retrospective sites at that time ranged from less than quantification to 28 ppb.

Soil-water samples taken from the prospective study site indicate that despite a reduction of pesticide residues in the soil, residues continued to be detected in soil-water samples. Figure 2 is a plot of the percentage of detections of pesticide residues in lysimeter samples. After a lag of about one month, residues began to show up in lysimeter samples and peaked between 2 and 2.5 months after application of the pesticide.

Figure 3 is a plot of the percentage of detections of pesticide residues in ground-water samples taken from wells. Once again, despite a reduction of pesticide residues in the soil, residues were not detected in ground-water samples until about 3 months after application of the pesticide.

Lag times in both these cases are for the prospective study, which was conducted in an environment conducive to leaching. Residues would not be expected to move as rapidly at the retrospective monitoring sites, and would be more difficult to detect because of the lower application rates.

<u>Soil sampling design critiqued.</u>

Intensive soil sampling is not required in a small-scale retrospective study. However, because the registrants insist on drawing conclusions from the results of soil sampling it is appropriate to critique the design of their soil sampling scheme. The Ground Water Section has made these points before in a review of the prospective study (EFGWB # 90701, 11-16-89).

- Sampling intervals (0-1, 1-2, 2-4, 4-6 feet) are larger than recommended in the draft guidance for performing these studies. Increasing the size of the sample taken with depth may mask the concentration of residues in the lower end of the profile by in effect "diluting" the sample. The same sampling intervals were used in the prospective study.

- Sampling depth was based on the expected mobility of the pesticide. In some instances this depth may have been underestimated and residues may have moved further than expected into the soil profile. For example, at 3 of the 5 retrospective monitoring sites residues were detected in the lowest interval sampled in the initial round of sampling. Usually two intervals were sampled: 0.00-0.3 and 0.3-0.6 m. In addition, despite pesticide residues detected in the lower interval, lower intervals were not sampled at subsequent rounds of sampling at the North Dakota site.

Discussion Summary.

In a recent letter to EPA (Shearer to Luminello, 1/5/90) the Registrants summarized the results of a November 21, 1989 meeting with EPA and stated that:

> "We believe that the data is sufficient to address the persistence and leaching characteristics of acifluorfen-sodium. Continued well water sampling will not enlighten further the understanding of the potential movement of acifluorfen under normal agricultural conditions.
>
> EPA reviewer rejected our proposal without any consideration and scientific evaluation of the data and insisted that further work would be necessary. We strongly objected to the need for this additional work."

Although the concerns of EPA reviewers expressed at the November 21, 1989 meeting were based primarily on the criteria used in selection of the monitoring sites, the analysis of soil monitoring data in this review clearly indicates that for the prospective monitoring study, where residues were detected in ground water, soils data alone were not sufficient to characterize the mobility and leaching characteristics of this chemical. This analysis also pointed out that even in the worst case leaching environment represented by the prospective study site, trends could only be observed after the study had been conducted for a minimum of a year.

Table 1. Relative concentration of acifluorfen in soil.

PROSPECTIVE STUDY IN "WORST CASE" LEACHING ENVIRONMENT

	INTERVAL [meters]		
TIME [days]	0.0-0.3	0.3-0.6	0.6-1.2
0	100	---	---
7	37.2	4.3	---
14	24.5	7.4	LQ[3]
28	13.8	6.4	LQ
63	4.3	LQ	LQ

RETROSPECTIVE STUDY IN NORTH CAROLINA

	INTERVAL [meters]		
TIME [days]	0.0-0.3	0.3-0.6	0.6-1.2
0	100	---	---
14	24	1.5	---
30	LQ	0.75	---
62	LQ	LQ	LQ

RETROSPECTIVE STUDY IN VIRGINIA

	INTERVAL [meters]		
TIME [days]	0.0-0.3	0.3-0.6	0.6-1.2
0	100	---	---
14	26.25	LQ	---
27	15.25	LQ	LQ

RETROSPECTIVE STUDY IN NORTH DAKOTA

	INTERVAL [meters]		
TIME [days]	0.0-0.3	0.3-0.6	0.6-1.2
0	100	---	---
13	25.5	9.75	---
32	14.5	1	---
62	12	0.25	2.25

RETROSPECTIVE STUDY IN INDIANA

	INTERVAL [meters]		
TIME [days]	0.0-0.3	0.3-0.6	0.6-1.2
0	100	---	---
12	23	8.25	---
25	5.25	LQ	LQ

RETROSPECTIVE STUDY IN ARKANSAS

	INTERVAL [meters]			
TIME [days]	0.0-0.3	0.3-0.6	0.6-0.9	0.9-1.2
0	100	---	---	
20	44.75	9	LQ	LQ
36	7.25	7.25	LQ	LQ

[3]LQ = less than quantification

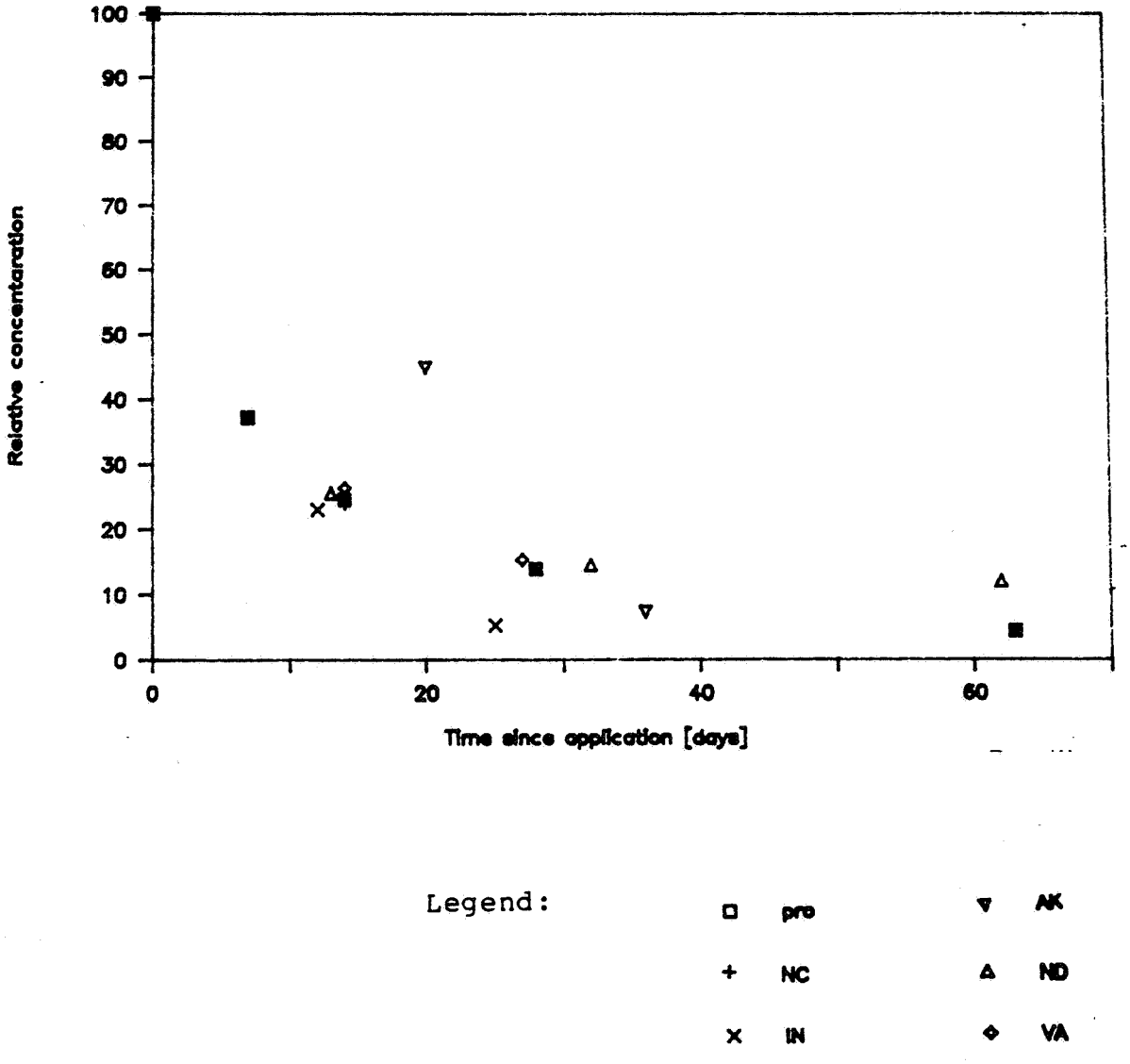

Figure 1. Relative concentration of acifluorfen in the top interval of soil versus time at retrospective ad prospective study sites.

Table 2. Detection of pesticides in soil water in prospective field studies.

DAYS AFTER APPLICATION	% DETECTS
14	0
28	0
36	0
42	25
47	16.6
51	6.25
55	25
58	18.75
63	50
65	18.75
69	43.75
72	43.75
76	50
79	62.5
83	50
98	37.5
132	18.75

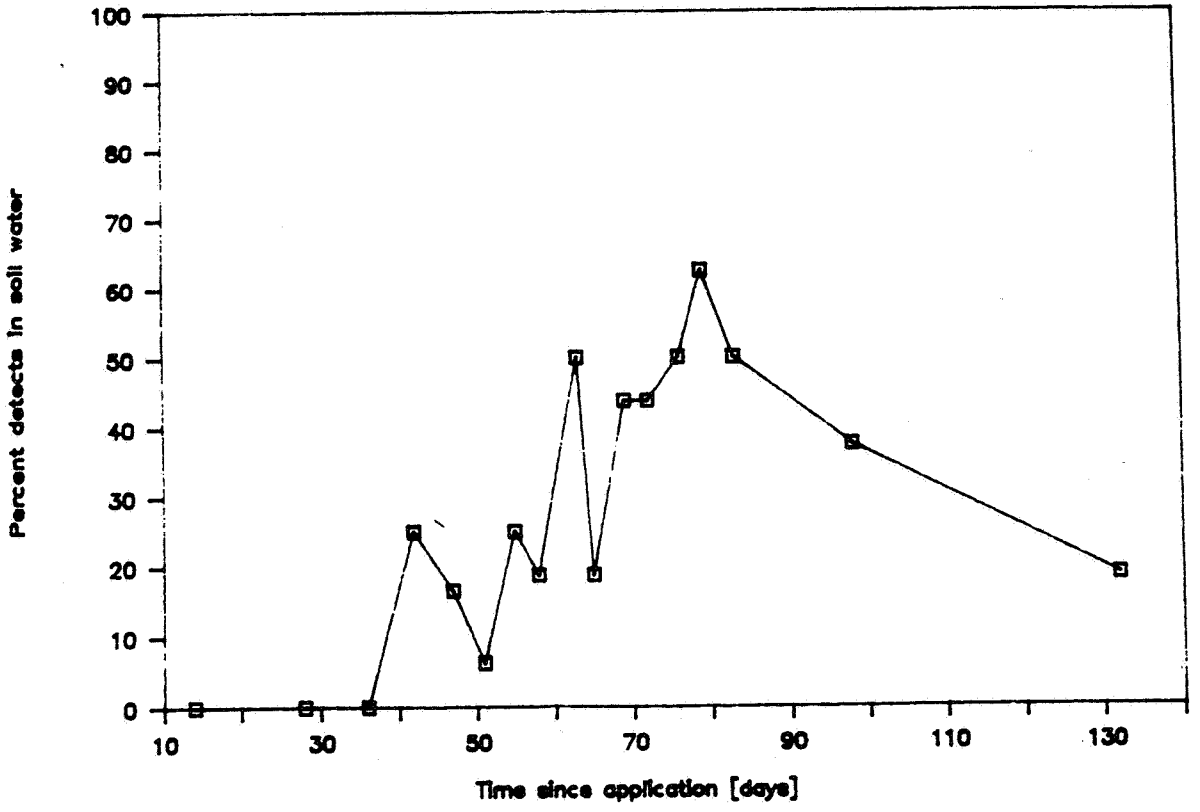

Figure 2. Percent of lysimeter samples with positive detections of pesticide residues versus time.

Table 3. Detection of pesticides in ground water in prospective field study.

DAYS AFTER APPLICATION	% DETECTS
28	0
63	0
98	6.7
126	13.3
141	16.7
154	21.7
185	20.0
305	28.6

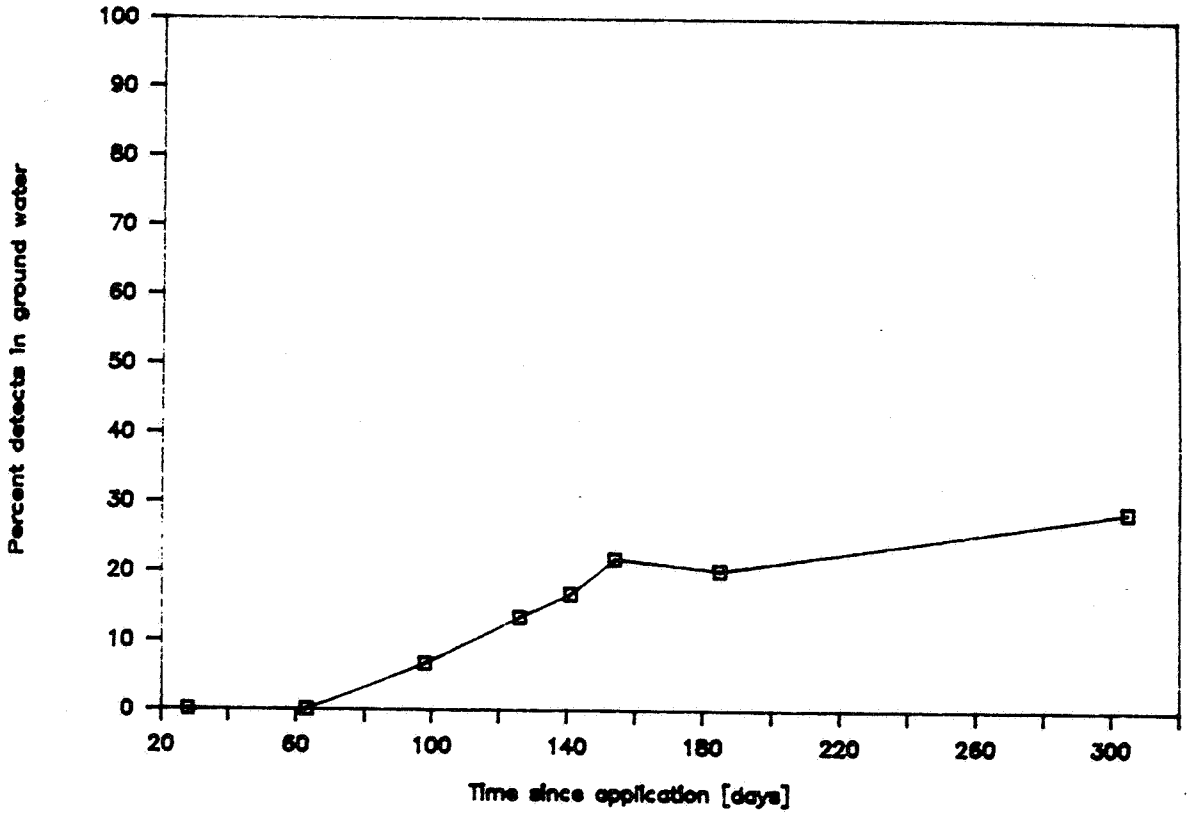

Figure 3. Percent of wells sampled containing positive detections of pesticide residues versus time.