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Date Out EFB: APR 27 1982

To: Product Manager 25 Taylor  
TS-767

From: Dr. Willa Garner III  
Chief, Review Section No. 1  
Environmental Fate Branch

Attached please find the environmental fate review of:

Reg./File No.: 524-308

Chemical: Glyphosate

Type Product: Herbicide

Product Name: Roundup

Company Name: Monsanto

Submission Purpose: Forest ecosystem study

ZBB Code: 3(c)(7)

ACTION CODE: 400

Date in: 2/2/82

EFB # 166

Date Completed: APR 27 1982

TAIS (level II) Days

Deferrals To:

67

2

Ecological Effects Branch

Residue Chemistry Branch

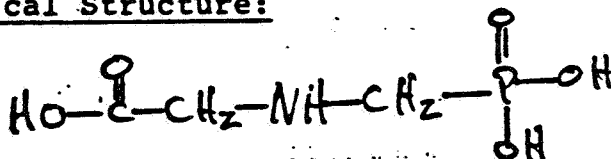
Toxicology Branch

## 1.0 Introduction

Chemical Name and Type Pesticide: glyphosate, N-(phosphonomethyl)glycine, herbicide

Trade Name: Roundup

Chemical Structure:



Monsanto is providing additional data, as Part II of a forest ecosystem study, to satisfy the requirement for the use of glyphosate (Roundup) in silvicultural areas under conditional registration. Part I was the subject of a previous review (11 February 1982).

## 2.0 Directions for Use

See previous review (9 October 1979).

## 3.0 Discussion of Data

### 3.1 FOREST ECOSYSTEM STUDY

- 3.1.1 Roundup Forest Ecosystem; Part II: Residues of Glyphosate, Aminomethylphosphoric Acid and N-nitroglyphosate in Forest Foliage and Litter and on Mylar Spray Interceptors, Following Aerial Application of Roundup Herbicide, R.G. Danhaus and C.M. Lottman, 1 February 1982, R.D. #379, Special Report MSL-1820, Acc. # 246658.

### Experimental Procedure

Roundup® herbicide was applied in an aerial spray to a Pacific Northwest watershed to begin a forest ecosystem study. Mylar spray interceptors were collected immediately after the application, and samples of soil, water, foliage, litter, fish and small mammals were collected at intervals out to 62 days for residue analysis. Residue results for soil and water, reported earlier in Monsanto Report MSL-1578, indicated that glyphosate quickly became bound to soil and that in natural water, glyphosate dissipated by dilution and degradation while bound to bottom sediments.

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### 1979 Bridging Experiment

The mylar sheet data from the 1978 protocol were highly variable, did not correlate well with foliage residues, and did not provide a reliable measurement of treatment rate. In 1979, a bridging experiment was performed which was designed to improve the exposure of the mylar sheets to the aerial spray and to provide more samples for correlation of mylar sheet data with foliage data. Clearings were cut for eight sample stations along the fall-line of a hillside and numbered 1 through 8 from top to bottom of the hill. Mylar sheets attached to helium-filled balloons were suspended at canopy level and at two intermediate heights above ground level. Mylar sheets at ground level were placed on or near sword ferns, the dominant ground cover plants. The helicopter flew along the hillside crossing perpendicular to the line of stations and passing directly over the sample stations on successive passes. After the spraying, trees were felled to permit easy and thorough collecting of foliage at the various levels. Mylar sheets were collected immediately after treatment and foliage samples were collected on Day zero and Day one. For this bridging study, the treatment rate was 3 lb glyphosate per acre, the same as in the original study, and the site was similar to that of the original study in terrain and vegetation.

### Results

Results for foliage and leaf litter (detailed in the report in hand) show that rain falling on Day One washed significant amounts of glyphosate off the taller foliage down to the forest floor where it accumulated temporarily in leaf litter and then dissipated rapidly at a rate comparable to the rates observed in the foliages. Calculated field half-lives for glyphosate are 9.5 days for overstory foliage, 11.6 days for shrubs, 14.3 days for herbs and 9.6 days for leaf litter. These short half-lives are influenced by migration, translocation, and sample dilution effects in this complex, stratified, forest environment, but when the soil, water and foliage sample systems are examined together it is evident that glyphosate is not accumulating in the forest environment. See figures 1-5.

### Conclusions

Degradation of glyphosate in the field after aerial application to a Pacific Northwest watershed was fairly rapid, with no observed persistence or build-up.

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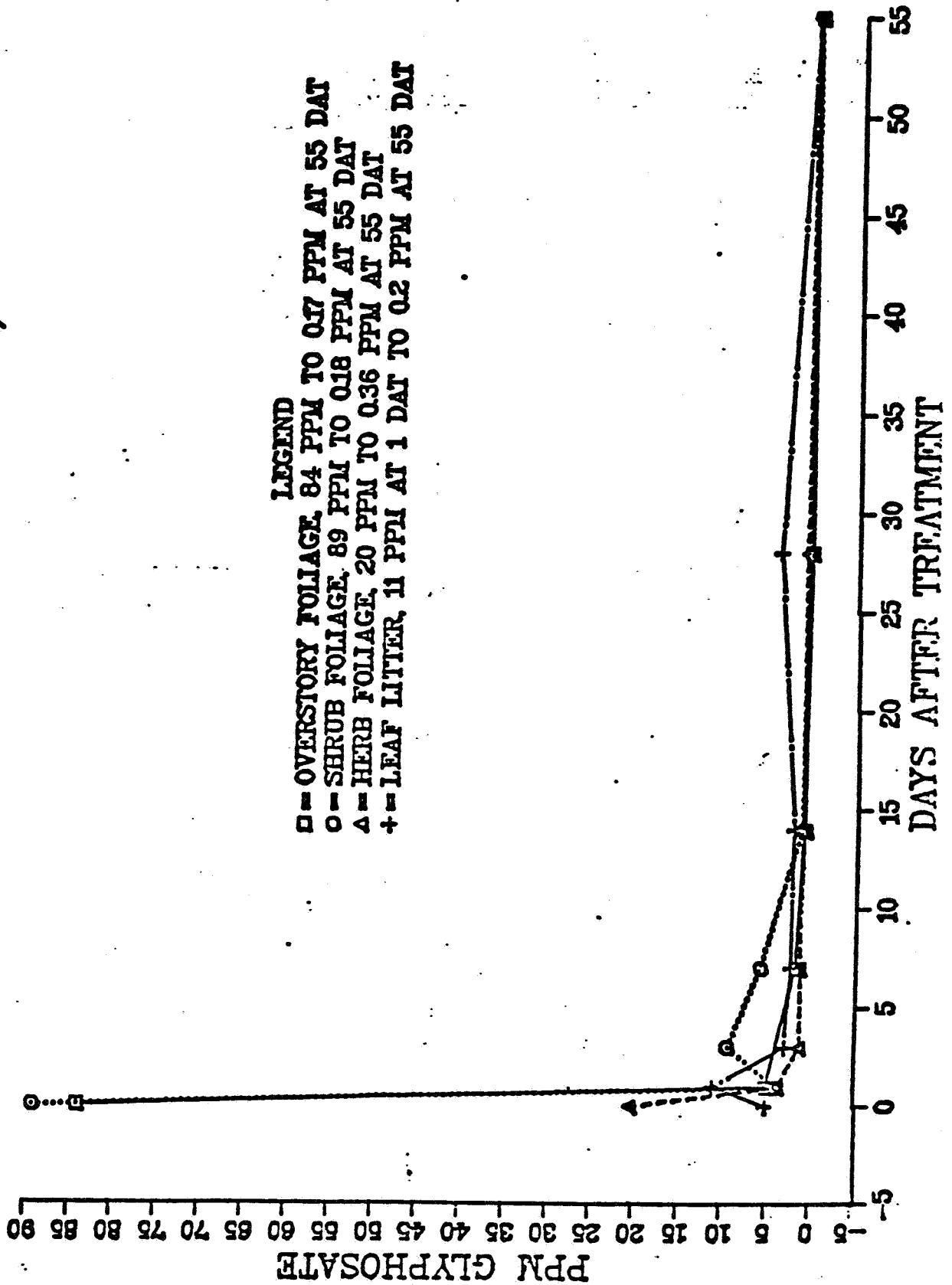
4.0 Recommendations

EFB finds the forest ecosystem study satisfactory and concurs with the use of glyphosate for forest use in the Pacific Northwest.

*Herbert L. Manning*  
Herbert L. Manning, Ph.D.  
Review Section #1  
EFB/HED

Figure 1.

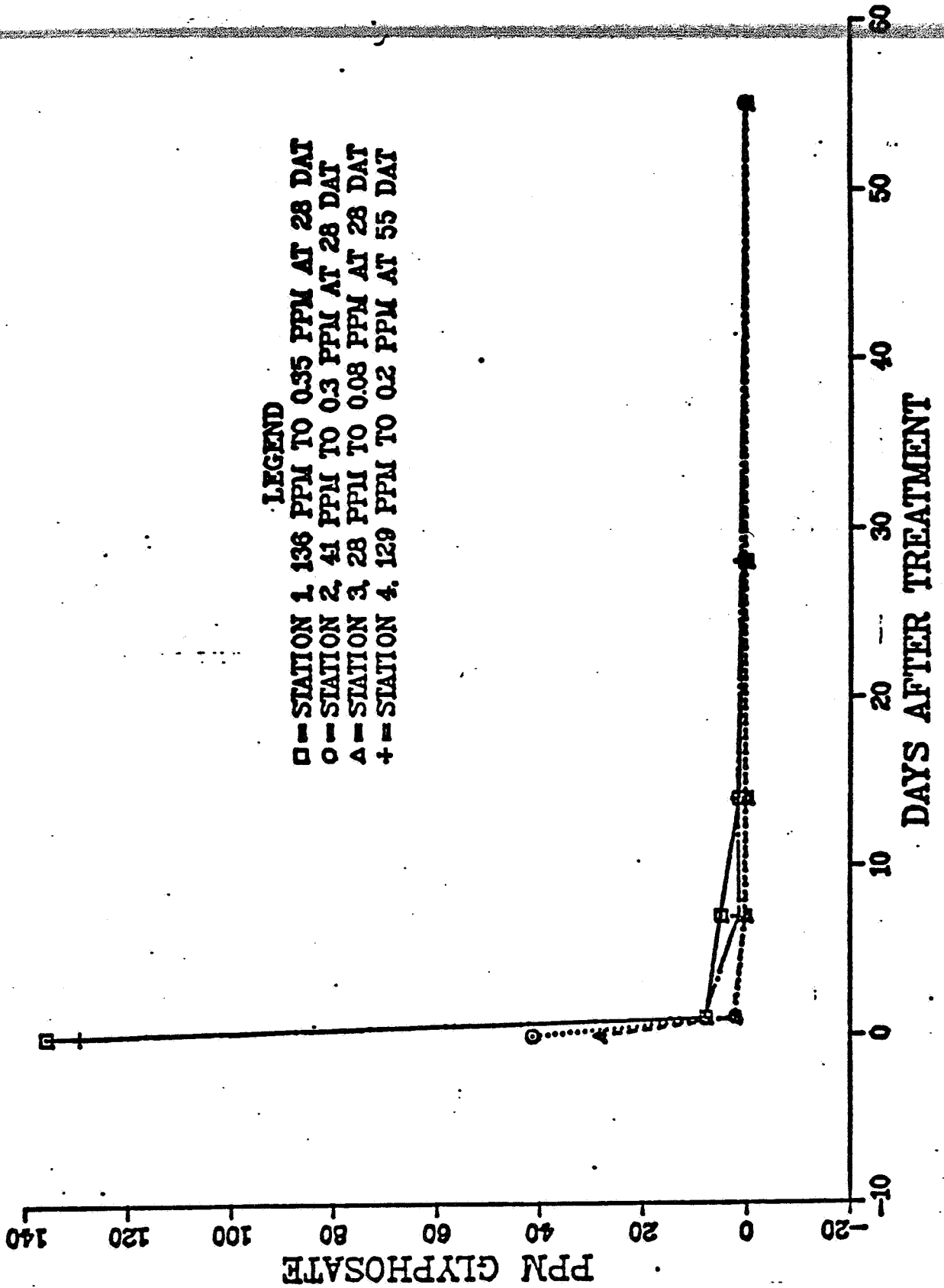
# DISSIPATION OF GLYPHOSATE IN FOREST FOLIAGE AND LITTER FOLLOWING AERIAL APPLICATION OF ROUNDUP HERBICIDE (DATA AVERAGED FOR 4 STATIONS)



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Figure 2.

# DISSIPATION OF GLYPHOSATE IN FOREST OVERSTORY FOLIAGE ROUNDUP FOREST ECOSYSTEM STUDY (1978)

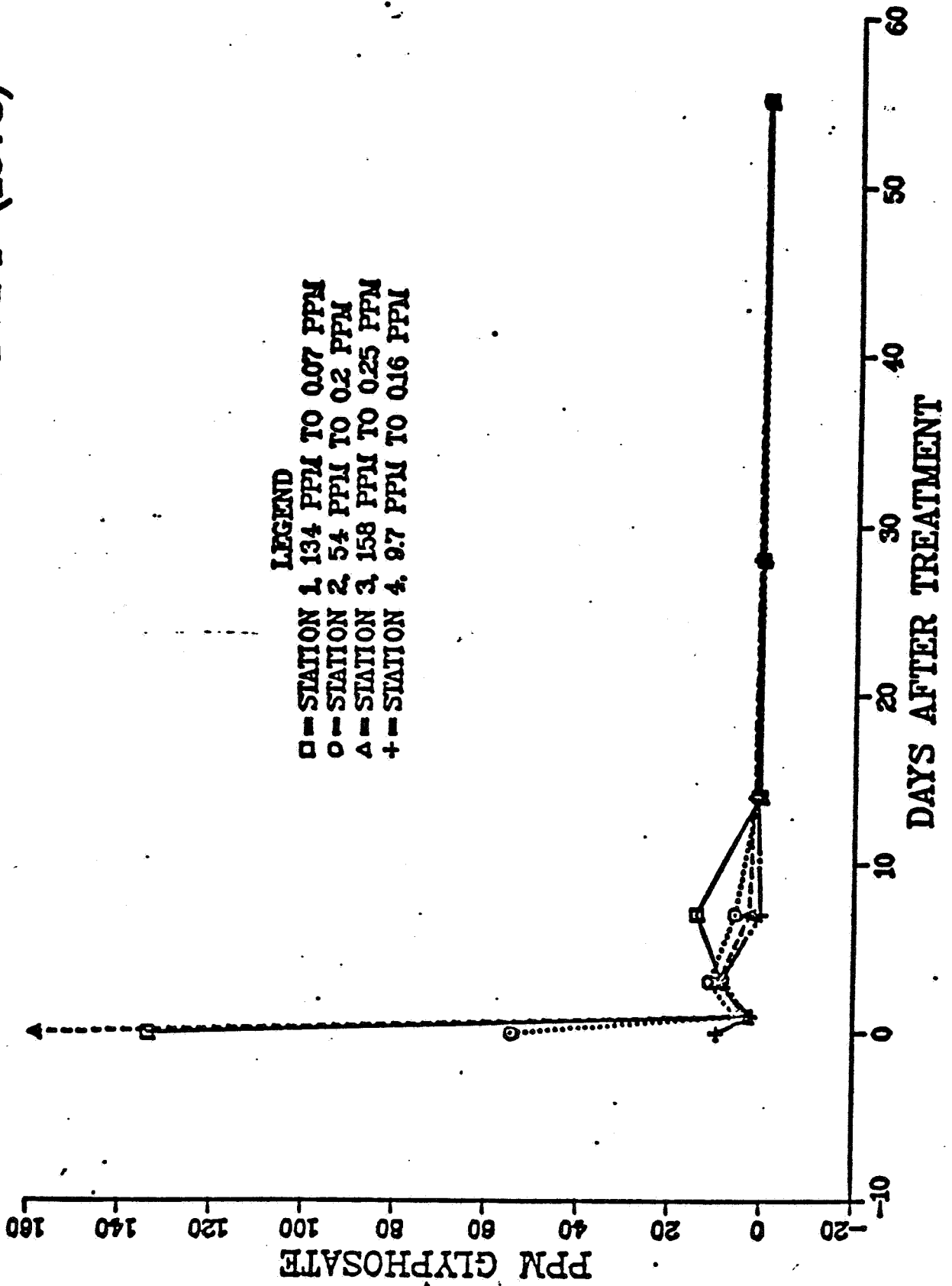


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Figure 3.

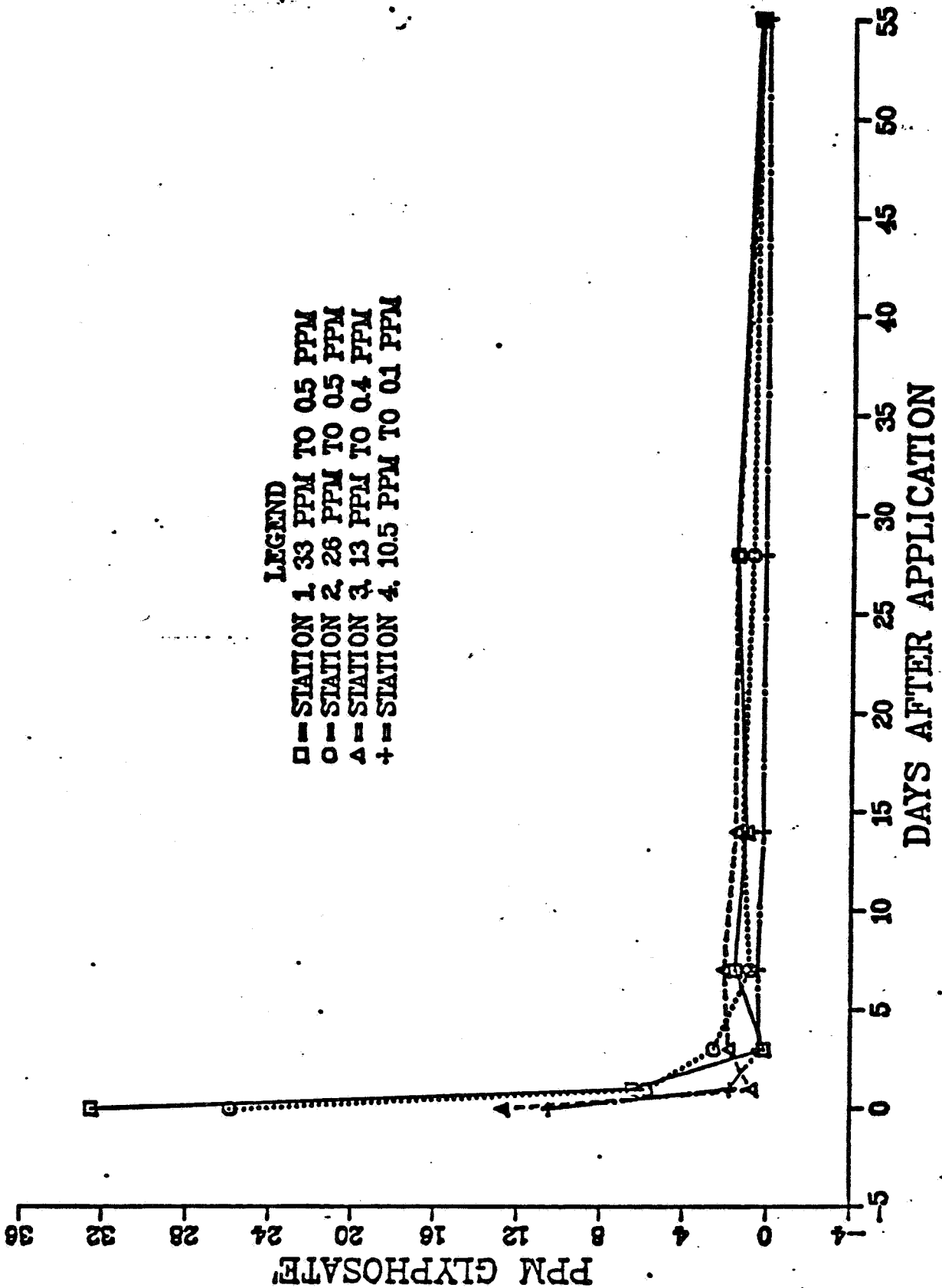
# DISSIPATION OF GLYPHOSATE IN FOREST SHRUB FOLIAGE ROUNDUP FOREST ECOSYSTEM STUDY (1978)



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Figure 4.

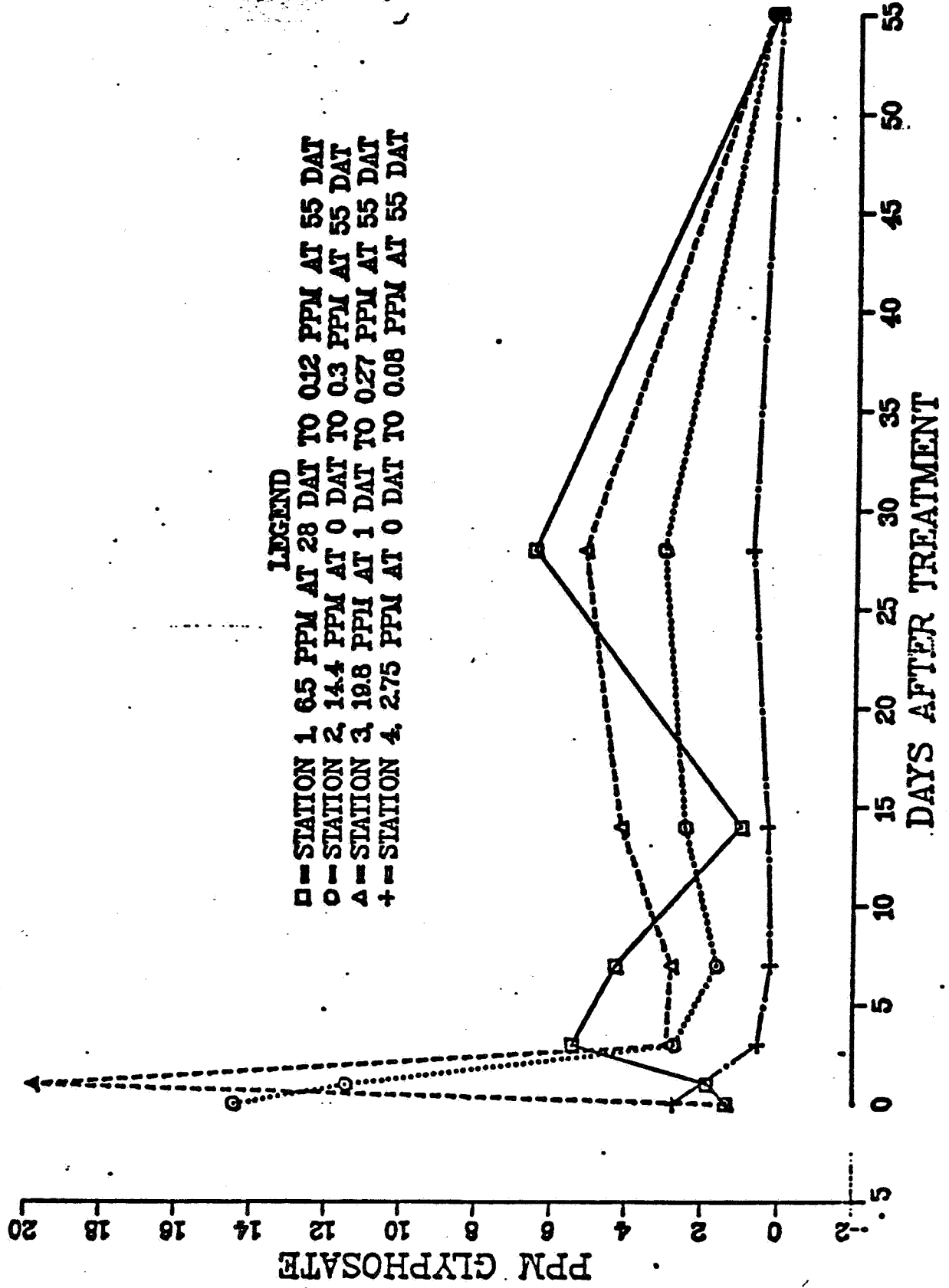
# DISSIPATION OF GLYPHOSATE IN HERB FOLIAGE ROUNDUP FOREST ECOSYSTEM STUDY AERIAL APPLICATION OF ROUNDUP HERBICIDE



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Figure 2.

# DISSIPATION OF GLYPHOSATE IN LEAF LITTER AERIAL APPLICATION OF ROUNDUP HERBICIDE ROUNDUP FOREST ECOSYSTEM STUDY



**LEGEND**  
□ - STATION 1, 6.5 PPM AT 28 DAT TO 0.12 PPM AT 55 DAT  
○ - STATION 2, 14.4 PPM AT 1 DAT TO 0.3 PPM AT 55 DAT  
△ - STATION 3, 19.8 PPM AT 1 DAT TO 0.27 PPM AT 55 DAT  
+ - STATION 4, 2.75 PPM AT 0 DAT TO 0.08 PPM AT 55 DAT

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