Shaughnessy No.: 125601

Date out EAB: 15 MAR 1984

To: Robert Taylor
Product Manager 25
Registration Division (TS-767)

From: Samuel M. Creeger, Chief
Environmental Chemistry Review Section 1
Exposure Assessment Branch
Hazard Evaluation Division (TS-769c)

Attached, please find the EAB review of:

Reg./File No.: 10182 - IE

Chemical: (2RS,3RS)-1-(4-chlorophenyl)-4,dimethyl-2-(1H-1,2,4,-triazol-1-yl-)pentan-3-ol; paclobutrazol

Type Product: Plant growth regulator

Product Name: BONZI

Company Name: ICI Americas, Inc.

Submission Purpose: new chemical, use on potted greenhouse [redacted] ornamentals

ZBB Code: 3(c)(5)

Action Code: 115

Date In: 11/30/83

EFB No.: 4094

Date Completed: 3/13/84

TAIS (Level II) Days

Deferrals To: 61 5

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

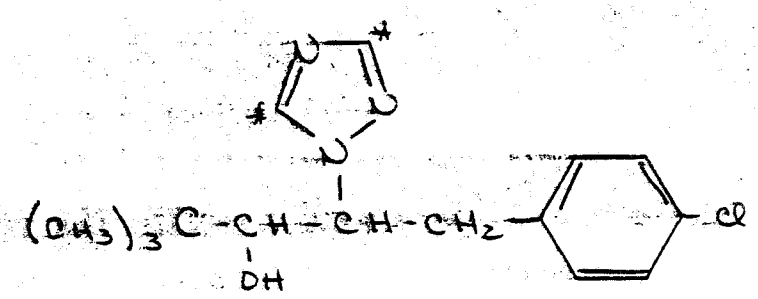
_____ Toxicology Branch

1.0 INTRODUCTION

ICI Americas Inc has submitted environmental fate data in support of its application for registration of Bonzi 50WP Plant Growth Regulator for use on greenhouse ornamental plants. The active ingredient in Bonzi is paclobutrazol. Acc. No. 251748.

2.0 Bonzi: PP333: paclobutrazol

(2RS,3RS)-1-(4-chlorophenyl)-4,4-dimethyl-2-(1H-1,2,4-triazol-1-yl)pentan-3-ol



*position of radiolabel in these studies

3.0 DISCUSSION

Bonzi is a 50% wettable powder formulation of paclobutrazol intended for use as a plant growth regulator on container grown greenhouse ornamentals. Up to two applications of the foliar spray, one to four weeks apart, are recommended. Treatment rates range from 1.18 mg/ft^2 - 4.72 mg/ft^2 (0.11 lb/acre - 0.45 lb/acre or 0.12 kg/ha - 0.5 kg/ha) of the active ingredient.

3.1 Hydrolysis. Report No. RJ0316B. T.M. Woods and J.P. Leahey, 1983.

Hydrolysis of PP333 was carried out using 10 ug/ml sterile solutions in sterile glassware in the dark at 25°C. Samples of the pH 4, 7, and 9 solutions were analyzed at 0, 7, 14 and 30 days.

Analysis proceeded by first extracting with dichloromethane and then air drying. After radioassay using LSC, the samples were analyzed by TLC. Results indicate no hydrolysis of PP333 occurred at any pH value. Table 1 gives the summary of the 30 day samples.

Conclusion

PP333 does not hydrolyze at 25°C at pH 4, 7 and 9 and is expected to be stable to hydrolysis under environmental conditions.

Table 1 Summary of the "Work-up" of the 30 day incubations

pH of solution	% of applied radioactivity in solution after 30 days incubation	% of recovered radioactivity in aqueous phase after dichloromethane extraction	% of recovered radioactivity in dichloromethane extract
pH 4	102	0.02	94.9
pH 4	100	0.01	95.0%
pH 7	98	0.05	94.2
pH 7	102	0.01	95.5
pH 9	108	0.22	96.6
pH 9	97	0.04	98.9

The dichloromethane extracts

3.2 Aqueous Photolysis. Report No. RJ0317B. T.M. Woods and J.P. Leahy, 1983.

A radiolabeled solution containing 10.4 ug/ml PP333 in sterile aqueous pH buffer was irradiated continuously for 10 days. An irradiation apparatus was used in which a xenon arc lamp was filtered through borosilicate glass. The spectral distribution is given in Figure 1. A dark control was used.

After 10 days no photolysis was observed. Each sample was extracted with dichloromethane. After radioassay using LSC, the aliquots of these samples were analyzed using three solvent systems by TLC. The solvent systems and results are given in Table 1.

Conclusion

PP333 is stable to [redacted] photolysis, and is not expected to photodegrade in the environment.

Figure 1

Spectral Distribution of Xenon Arc Lamps

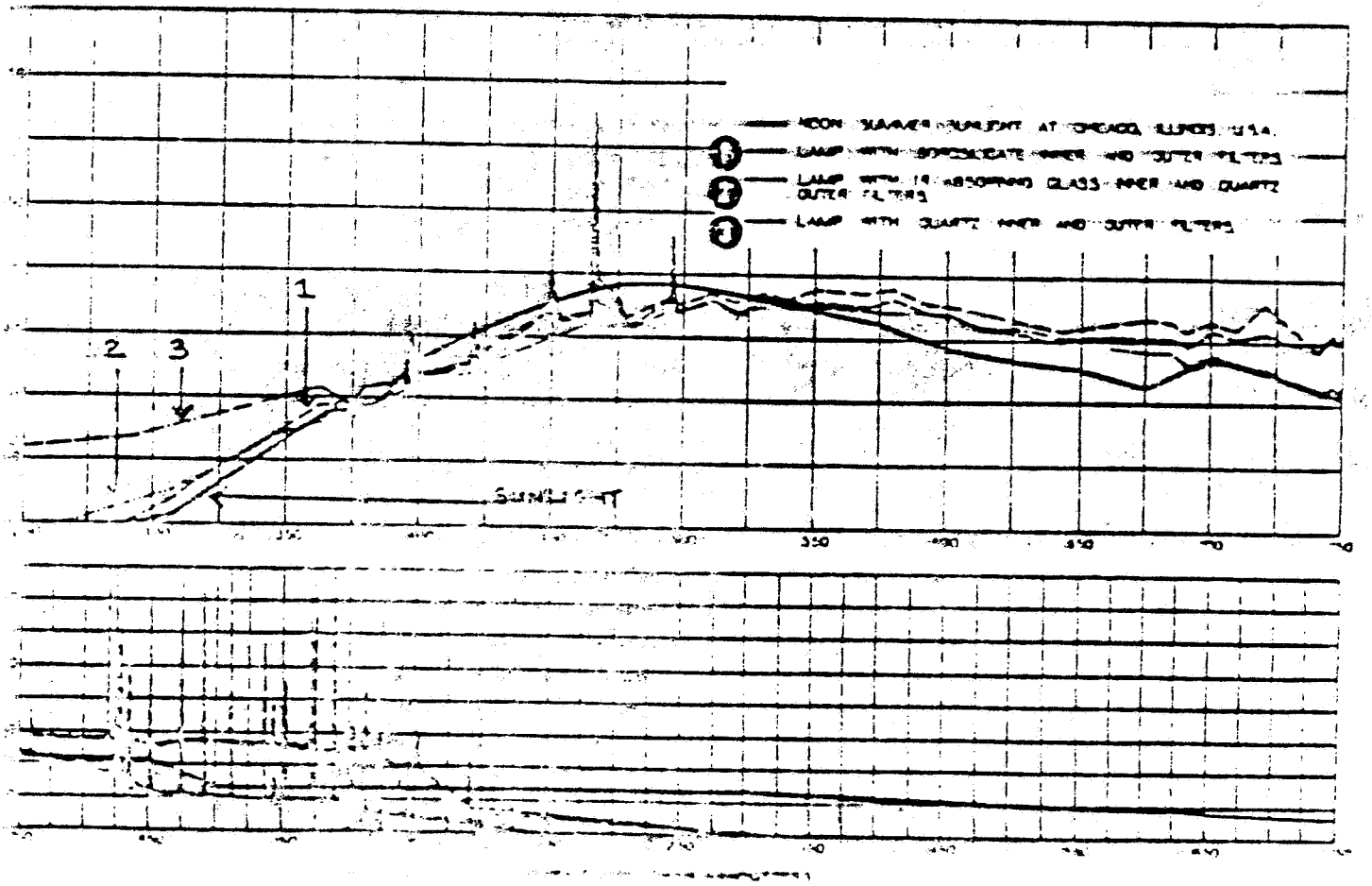


Table 1 Radioactive Recoveries for 10 day Photolysed Samples and the Extraction of these samples with Dichloromethane

Sample	% of Applied radioactivity recovered after 10 days irradiation	% of recovered radioactivity in Aqueous Phase after partition	% of recovered radioactivity in Dichloromethane Phase
Sample A	93	1.8	96.6
Sample B	94	1.2	100.0
Control	98	0.0	97.6

Solvent system 1 chloroform/ethyl acetate 3:2

Solvent system 2 chloroform/diethylamine 9.5:1.5

Solvent system 3 diethylether/hexane/methanol 7:2:1

3.3 Aerobic Soil Degradation. Report No. RJ0256B. B.R Harvey, M.S. Weissler, C.K.J. Zinner, and I.R. Hill, 1982.

PP333 was applied at a rate of 0.5 lb ai/acre to two soils — "18 Acres", a sandy loam soil, and "Gore", a clay loam soil. The soil profiles are given in Table 1. Treated soils, incubated at 25°C and maintained at 40% of moisture holding capacity at zero suction, were sampled at zerotime and after 6, 12, and 20 weeks incubation. $^{14}CO_2$ evolution was monitored throughout the study. Figure 2 shows the schematic of the incubation units.

Soil samples were extracted with methanol (18 hr soxhlet) followed by n-hexane:acetone (1:1, 18 hr reflux). Radioactivity was quantified using LSC. Samples were then applied to TLC plates and analyzed.

The recoveries of radioactivity from treated soil ranged from 96-101%. More $^{14}CO_2$ evolved from Gore (11%) than from 18 Acres (<1%) over 20 weeks. The amount of unextractable residues increased in both soil types with up to 17% bound in 18 Acres and 36% bound in Gore. PP333 degraded more rapidly in Gore than in 18 Acres. The t 1/2 in Gore is estimated to be <6 weeks while in 18 Acres >20 weeks. These results are shown in Table 4.

One degradation product was identified as the keto analogue of PP333 (Figure 1) in amounts ranging from 9-12% in both soils. Other radioactivity near the origin is thought to be 1,2,4-triazole. Figure 3 gives chromatograms of soil extracts.

Conclusion

PP333 appears to degrade faster in soil with high organic content (Gore, 14%) than in soil with lower organic content (18 Acres, 4%).

Residue decline curves were run by EAB and indicate t 1/2 in Gore to be 9.1 weeks and in 18 Acres to be 30.5 weeks (Table 5). This is in reasonable agreement with t 1/2 estimates given in study.

Paclobutrazol scientific review

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___ Identity of product impurities

___ Description of the product manufacturing process

___ Description of product quality control procedures

___ Identity of the source of product ingredients

___ Sales or other commercial/financial information

___ A draft product label

___ The product confidential statement of formula

___ Information about a pending registration action

X FIFRA registration data

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3.4 Leaching. Report No. RJ0244B. I.R. Hill and S. Prashad, 1982.

For this soil 'thick' layer chromatography leaching study, four soils were used. Soil properties are found in Table 2. The reference pesticide was [ethyl-1-^{14}C] atrazine (Figure 2). Figure 3 shows the experimental set-up. The amounts of pesticide added to the soil ranged from 0.125 lb ai/acre to 1.25 lb ai/acre (>2X maximum label rate). Atrazine rate was about 1.6 lb/acre (Table 3). The plates were developed with 80 ml 0.01 M $CaCl_2$ solution. The total amount of solution was taken up in 4-6 days. Radioactivity in leachate was determined using LSC.

The distribution of radioactivity was determined by radiochromatogram scanning and the results are shown in Figures 4-6. Table 4 shows radioactivity amounts in the leachates.

No residues were found in any leachate except Lilyfield (a coarse sandy soil with OM = 0.7%) where up to 10% of the applied radioactivity was found. Peak leaching distances are shown in Table 5 and except for Lilyfield none went beyond 6 cm on the plates.

Conclusion

PP333 is placed on the Helling mobility scale at 2, where 1 is immobile and 5 is very mobile. PP333 could leach in sandy soils with low organic content. No aged leaching study was reported.

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4.0 SUMMARY

- PP333 is not expected to hydrolyze in the environment.

- PP333 does not photodegrade when exposed to simulated sunlight continuously for 10 days.

- PP333 does degrade aerobically in soil. T 1/2 depends on soil type and ranges from about 1 month to 7 months in the two soils tested.

- Except for sandy soils of low organic content, PP333 does not have a high propensity to leach.

5.0 CONCLUSION & RECOMMENDATION

The studies presented are acceptable and partially satisfy the requirements for registration of PP333 for greenhouse use. An aged leaching study is necessary to complete the environmental fate requirements for this use.

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