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DATA EVALUATION RECORD

STUDY 8

CHEM 128974 Quinclorac §162-4

FORMULATION--00--ACTIVE INGREDIENT

STUDY MRID 41919601
Tibbles, P. 1988. The microbial degradation of 3-chloroquinoline-8-carboxylic acid and 5-chloro-2-hydroxynicotinic acid. BASF Registration Document No. 88/0647. Unpublished Ph.D. dissertion performed at the Institute of Microbiology of Hohenheim University, Germany. Submitted by BASF Corporation, Research Triangle Park, NC.

DIRECT REVIEW TIME = 5

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This document was submitted by the registrant to supplement "BAS 514-H-^{14}C laboratory soil metabolism study: aerobic aquatic metabolism" (MRID 40320817), a study previously reviewed by EFGWB in a report dated December 3, 1990 and to provide supplemental information on degradation pathways for quinclorac.

CONCLUSIONS:

Metabolism - Aerobic Aquatic

1. EFGWB concludes that this study is scientifically valid and provides supplemental information that shows BH 514-1 and 5-chloro-2-hydroxynicotinic acid, respectively, are capable of being degraded by isolated strains of Psuedomonas spp. and Mycobacterium spp.

2 However, EFGWB concludes the registrant has not conclusively shown that this study presents evidence that quinclorac can be expected to degrade in soil to CO_2 as suggested in BASF Registration Document No. 91/5134 (Nelsen,

T. R. January 1991. An overview of the environmental fate of quinclorac, page 14). The data as presented show that a bacterial strain, Psuedomonas spp., not from any of the soils studied, but from a starter culture for effluent treatment plants, was able to utilize 3-chloroquinoline-8-carboxylic acid (BH 514-1) as the sole source of C and transform it to 5-chloro-2-hydroxynicotinic acid. Although another bacterial strain, Mycobacterium spp., was isolated from one soil (Greenville, MS) that was able to use 5-chloro-2-hydroxynicotinic acid as the sole source of C, no bacterial strain was isolated from any of the soils studied that was capable of degrading quinclorac or BH 514-1.

3. Although the study author mentions that the disappearance of the chemicals were monitored, no data was presented that illustrate the degradation of quinclorac, BH 514-1 or the other chemicals tested in the various substrates (soil, water, etc.). However, although EFGWB concludes that while this information was not the objective of the study, it may have provided some useful data demonstrating the degradation of quinclorac and BH 514-1 in various substrates.

METHODOLOGY:

Enrichment and Isolation of Bacteria

Soil Samples: (a). In order to obtain enriched strains of bacteria, 200 gm samples of soil (not characterized) collected from various locations [Benin, Africa; Java, Indonesia; Germany (Ohringen, Castrop-Rauxel, Stuttgart-Hohenheim and Berlin) and Greenville, MS] were treated and incubated with different concentrations (not specified) of 3,7, dichloroquinoline-8-carboxylic acid (quinclorac), 3-chloroquinoline-8-carboxylic acid (BAS 514-1, a metabolite of quinclorac found in the aerobic aquatic metabolism study, Study 8, MRID 40320817, the confined field dissipation study, Study 11, MRID 41432101 and the confined crop rotation study, Study 21, MRID 410635566), 5-chloro-2-hydroxynicotinic acid, quinoline-8-carboxylic acid, 7-chloroquinoline-8-carboxylic acid, and 2-chlorobenzoic acid in flower pots at 30°C and kept constantly moist (moisture % not stated).

Every four weeks, about 5 g of the treated soil samples were added to 50 ml of bacterial growth medium that contained the appropriate concentration of test substance and shaken (time not specified) at 30°C.

(b). Five gm. of each untreated soil from the various location was also added to 250-ml Erlenmeyer flasks which contained 50 ml of the bacterial growth medium and 5 g of the above 6 chemicals plus 3-methyl-7-chloroquinoline-8-carboxylic acid and shaken (time not specified) at 30°C.
(c). Degradation of the chemicals was monitored by thin-layer chromatography and/or UV spectrometry. Isolation of the various strains of bacteria was accomplished by several liquid transfer dilutions and plating them out on bacterial growth medium. This was followed by cleansing the various colonies by brushing them alternately on solid bacterial growth medium and liquid medium.

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Water Samples: One-liter of water samples (not characterized) collected from various locations in Germany (Rhine River near Bonn; Wupper River near Wuppertal; Korsch River near Plieningen; Lake Teufel in Berlin and from a brook near a railway line in Nordhalben, Frankenwald) were centrifuged and the solid matter was added to and shaken (time not specified) at 30°C with 50 ml of bacterial growth medium and 5 mg of the previously mentioned chemicals including 3-methyl-7-chloroquinoline-8-carboxylic acid. Degradation of chemicals and isolation of bacterial strains was performed as indicated above under (c).

Sludges: Ten grams of various sludge samples (not characterized) collected from locations in Germany (Busnau, Stuttgart-Mohringen and Stuttgart) were susspended in and shaken (time not specified) at 30°C with 50 ml of the bacterial growth medium which contained 5 mg of the above mention chemicals. Degradation of chemicals and isolation of bacterial strains was performed as indicated above under (c).

"Thermobac": Five g of "Thermobac" (a mixture of bacteria in sawdust that can be used as a starter culture or inoculation culture for effluent treatment plants) were suspended in and shaken at 30°C with 5 mg of each of the above mentioned chemicals in 50 ml of bacterial growth medium. Degradation of chemicals and isolation of bacterial strains was performed as indicated above under (c).

Cultivation of the Bacterial Strains: All the strains of isolated bacteria were incubated at 30°C on solid growth medium until there was visible growth and then at room temperature and inoculated every 4 to 6 weeks.

DATA SUMMARY:

No degradation of any of the seven chemicals tested, including quinclorac, occurred in the sludges. One bacterial strain from the Korsch River water sample was isolated that was capable of degrading 2-chlorobenzoic acid. One strain of bacteria was isolated from the "Thermobac" that slowly transformed 3-chloroquinoline-8-carboxylic acid (BAS 514-1) to a substance with an R_f = 0.45 in chloroform:methanol:acetic acid (85:5:5/v:v:v).

It was possible to isolate 3 different mixed cultures from the soil samples from Africa and Indonesia that were capable of degrading quinoline-8-carboxylic acid; however, it was not possible to isolate a single strain that was able to metabolize or transform quinoline-8-carboxylic acid.

A bacterial strain was isolated from the soil from Greenville, MS that was capable of utilizing 5-chloro-2-hydroynicotinic acid. However, the author of the study noted that only after multiple attempts were made did growth occur and that, at best, development was very weak.

The proposed pathway for the degradation of BH 514-1 and 5-chloro-2-hydroynicotinic acid is shown in Figure 27 and 28.

REVIEWERS COMMENTS:

This study is a translation from German into English of a Ph.D. thesis related to, according to the title, the microbial degradation of 3-chloro-quinoline-8-carboxylic acid (BH 514-1) and 5-chloro-2-hydroxynicotinic acid. However, the degradation of quinclorac (3,7-dicloroquinoline-8-carboxylic acid) plus four other chemicals were also studied.