

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

I. Study Type: Soil Microbial Effects

II. Citation:

Mason G., A. Prevett, A.R. Tarry. 1994 ICIA5504: Study on Microbiological Activities in Soil. Performed by Zeneca Agrochemicals (Zeneca Limited), Berkshire, U.K. Submitted by Zeneca Agricultural Products (Zeneca Inc.), Wilmington, Delaware. MRID 43678176.

III. Reviewer:

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James A. Hetrick

30 JUL 1996

IV. Approved by:

Name: Paul J. Mastradone, Ph.D.
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30 JUL 1996

V. Conclusions:

The study provides ancillary data on the soil microbial effects of methyl (E)-2-{2-[6-(6-2-cyanophenoxy)pyrimidin-4-yloxy]phenoxy}-3-methoxyacrylate (ICIA5504). The data are deemed as ancillary because the study is not a Subdivision N guideline study.

United Kingdom soils amended with ICIA5504, at 0.25 and 2.50 kg ai/ha, had an increase of 6 to 12% in KCl extractable soil nitrate (NO_3^-) over non-treated controls. There were small or no differences in ammonium (NH_4^+) concentration between the ICIA5504 amended and control treatments. Nitrite (NO_2^-) was not detected in the ICIA5504 amended and control treatments. Test soils amended with ICIA5504 did not significantly affect microbial respiration. The registrant claims that ICIA5504 amendment to soils did not affect the microbial activity associated with N mineralization and respiration.

The reported data indicate ICIA5504 should not affect microbial-mediated N mineralization and respiration.

VI. Materials and Methods:

United Kingdom test soils were classified as a Frenshaw sandy loam (Mesic Psammentic Hapludalf) and 18 Acre loam (Typic or Eutric Hapludoll). The test soils were taken at a 5-15 cm depth from a turf site, air-dried, passed through a 2mm sieve, and then stored at 4°C. Physicochemical and microbiological properties of the test soils are shown in Table 1.

Nitrogen Mineralization Study

Subsamples (1 kg) of each soil type were placed into each of 10 open containers. These soils were incubated at a soil moisture content near field capacity (2% below experimental soil moisture levels) and a soil temperature of 20°C for 7 days. After preincubation, nine samples of each soil type were amended with 5.0 g of ground lucerne (3.8% N and C:N ratio of 11:1). The ground lucerne was used as an available organic N source for microbial mineralization. Three of the lucerne-amended samples of each soil type were amended with ICIA5504 (22.8% ai w/w; formulated as suspension concentrate) to yield soil concentration of 0.25 or 2.50 kg/ha. Three of the lucerne-amended samples of each soil type were not amended with ICIA5504 to establish lucerne treatment control. The remaining sample of each soil type was used as treatment controls. The soil samples were incubated at field capacity and 20°C. Duplicate samples of Frenshaw soil were taken immediately posttreatment, 14, and 28 days posttreatment. Duplicate samples of 18 Acre soil were taken at immediately posttreatment, 14, 28, 42, 56, and 60 days posttreatment.

Analytical

Each soil sample was extracted with 2M KCl. Soil extracts were analyzed for nitrite (NO_2^-), total oxidizable N ($\text{T.O.N} = \text{NO}_3^- + \text{NO}_2^-$), and ammonium (NH_4^+).

Nitrite concentration was determined using a colorimetric method with sulphanilamide and N-1-naphthylethylene-diamine azo dye complex. Total oxidizable nitrogen (T.O.N) was determined by nitrate reduction using a Cd coil and measured absorbance of 540 nm. Ammonium ($\text{NH}_4\text{-N}$) was determined using a colorimetric method with alkaline hypochlorite-phenol-indolphenol blue complex. The limit of detection for the analytical methods was 0.5 mg-N/ kg soil.

Short Term Respiration Study

Subsamples (1 kg) of each soil type were placed into each of 10 open containers. These soils were incubated at field capacity (2% below experimental soil moisture levels) and 20°C. Three samples of each soil type were amended with ICIA5504 (22.8% ai w/w; formulated as suspension concentrate) to yield nominal soil concentration of 0.25 or 2.25 kg/ha. Three samples of each soil type were not amended with ICIA5504 to establish treatment controls for the lucerne treatment. The remaining samples were used as treatment controls. The soil samples were incubated at field capacity and 20°C for 28 days. Duplicate subsamples samples of each soil were taken at immediately posttreatment, 14, and 28 days posttreatment.

Each subsample (75g) was amended with glucose to yield a soil concentration of 1333 $\mu\text{g/g}$. Subsamples of the treatment control were not amended with glucose. Each subsample was placed in respirometer connected to a differential gas analyzer. The CO_2 concentration was continuously measured for 12 hours.

Statistical Analysis

All data were statistically analyzed using one way ANOVA. A Student's T-test was used to compare treatments and controls.

VII. Study Author's Conclusions

A. United Kingdom soils amended with ICIA5504, at 0.25 and 2.50 kg ai/ha, had an increase of 6 to 12% in KCl extractable soil nitrate (NO_3^-) over non-treated controls (Figure 3). There were small or no differences in ammonium (NH_4^+) concentration between the ICIA5504 amended and controls treatments. Nitrite (NO_2^-) was not detected in the ICIA5504 amended or control soil samples.

B. Test soils amended with ICIA5504 did not significantly affect microbial respiration (Figure 4).

C. The registrant claims that ICIA5504 amendment to soils did not affect the microbial activity associated with N mineralization and respiration.

VIII. Reviewer's Comments

A. The soil microbial effects study is not a guideline study. Therefore, EFWGB reviewed the study for scientific content and interpretation of ICIA5504 effects in soil environments. The study provides ancillary information on the ICIA5504 effects on soil microorganisms.

B. The registrant did not explicitly explain the procedure used for determination of $\text{NO}_3\text{-N}$ concentration in soil extracts. It is assumed the total oxidizable nitrogen (T.O.N) in soil extracts refers to the cumulative inorganic N as $\text{NO}_3\text{-N}$ and $\text{NO}_2\text{-N}$ concentration. Therefore, the nitrate concentration would be calculated by the T.O.N concentration minus the $\text{NO}_2\text{-N}$ concentration.

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