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HUDSON L. BOYD

DICROTOPHOS

Task 2: Topical Discussions

Contract No. 68-01-5830

Final Report

October 7, 1981

SUBMITTED TO:

**Environmental Protection Agency
Arlington, Virginia 22202**

SUBMITTED BY:

**Enviro Control, Inc.
The Dynamac Building
11140 Rockville Pike
Rockville, MD 20852**

A Subsidiary of the Dynamac Corporation



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DICROTOPHOS

Task 2

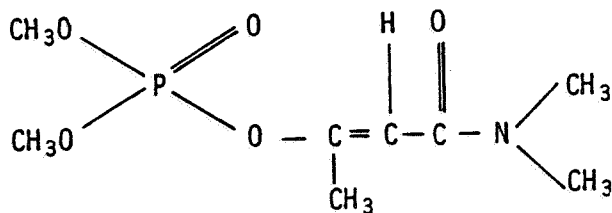
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DICROTOPHOS

Task 2

DICROTOPHOS, BIDRIN, C 709, CARBICRON,
EKTAPOS, SD 3562



Dimethyl phosphate ester of 3-hydroxy-
N,N-dimethyl-cis-crotonamide

Data requirements are cited from EPA's Guidelines for Registering Pesticides (1981).

(1) DEGRADATION 163.161

(A) Hydrolysis 163.161-1

Hydrolysis data are required to support the registration of each end-use product intended for outdoor use or aquatic impact use, and each manufacturing-use product that may legally be used to formulate such an end-use product.

One study on the hydrolysis of dicrotophos was reviewed and was found to be invalid. Therefore, no data on the hydrolysis of dicrotophos are available.

Data Gaps

All data specified in Section 163.161-1 are needed to assess the hydrolysis properties of dicrotophos.

(B) Photodegradation in Water 163.161-2

A photodegradation study in water is required to support the registration of each end-use product intended for terrestrial (except greenhouse and

domestic outdoor), aquatic, and forestry use and for any aquatic impact use which results in direct discharges into the aquatic environment. Such a study is also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product.

One study on the photodegradation of dicotophos in water was reviewed and was found to be invalid. Therefore, no data on the photodegradation of dicotophos in water are available.

Data Gaps

All data specified in Section 163.161-2 are required to assess the photodegradation of dicotophos in water.

(C) Photodegradation on Soil 163.161-3

Photodegradation studies on soil surfaces are required to support the registration of each end-use product intended for orchard crop use, field and vegetable crop use, or forestry use. Such studies are also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product. However, uses involving injection of the product into the soil or incorporation of the product into the soil upon application are not subject to the requirements of this section.

No data on the photodegradation of dicotophos on soil are available.

Data Gaps

All data specified in Section 163.161-3 are needed to assess the photodegradation of dicotophos on soil.

(D) Photodegradation in Air 163.161-4

A laboratory photodegradation study in the vapor phase will be required on a case-by-case basis to support the registration of an end-use product

with orchard or field and vegetable crop uses that involve potentially significant exposure to workers. Data from such a study will also be required to support the registration of a manufacturing-use product which legally could be used to make such an end-use product. The Agency will make an assessment of what constitutes a significant inhalation exposure to workers based on the information required by Section 163.163-2(b)(2).

No data on the photodegradation of dicrotophos in air are available.

Data Gaps

All data specified in Section 163.161-4 are needed to assess the photodegradation of dicrotophos in air.

(2) METABOLISM 163.162

Data on metabolism are required to determine the nature and availability of pesticide residues to rotational crops and to help in the assessment of potential disposal and reentry hazards.

(A) Aerobic Soil 163.162-1

An aerobic laboratory soil metabolism study is required to support the registration of each end-use product intended for terrestrial or forestry use. Such a study is also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product.

Four aerobic soil metabolism studies were reviewed. Two were found to be valid, were combined into a single review, and are discussed below.

Osgerby and Clarke (00013470) and Osgerby and Woodburn (00028571) found that dicotophos degradation in soil (clay, sandy loam, and sandy clay loam) follows first-order kinetics and is microbially mediated. The enzymes responsible for metabolism are apparently synthesized continuously. The half-life is 3-15 days. Metabolism of technical dicotophos (90% ai) occurs at approximately twice the rate of granular (5% ai) formulations.

Data Gaps

All data specified in Section 163.162-1 are needed to assess the aerobic soil metabolism of dicotophos.

References

Osgerby, J.M., and D. Clarke. 1965. Project Progress Report PPR FD/5/65: The stability of Bidrin in soil:Project F 18. (Unpublished study received Jan. 28, 1966; prepared by Shell Research, Ltd., submitted by Shell Chemical Co., Washington, D.C.; CDL:000834-AM). (00013470)

Osgerby, J.M., and A.T. Woodburn. 1965. Project Progress Report PPR FD 48/65: The adsorption and decomposition of Bidrin and Azodrin in soil: Project F 18. (Unpublished report prepared by Shell Research, Ltd.). (00028571)

(B) Anaerobic Soil 163.162-2

An anaerobic soil metabolism study is required to support the registration of each end-use product intended for field or vegetable crop use. Such a study is also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product. However, an anaerobic soil metabolism study shall not be required if an anaerobic aquatic metabolism study has been conducted in accordance with the requirements of Section 163.162-3.

No data on the anaerobic soil metabolism of dicotophos are available.

Data Gaps

All data specified in Section 163.162-2 are needed to assess the anaerobic soil metabolism of dicotophos.

(C) Anaerobic Aquatic 163.162-3

An anaerobic aquatic metabolism study is required to support the registration of each end-use product intended for aquatic use, forestry use, or for any aquatic impact use which results in direct discharges into the aquatic environment. Such a study is also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product. The anaerobic soil metabolism study in Section 163.162-2 may not be substituted for this study.

No data on the anaerobic aquatic metabolism of dicotophos are available.

No data on the anaerobic aquatic metabolism of dicotophos are required because the use pattern indicates that introduction of dicotophos into an aquatic environment or a forest ecosystem would not occur.

(D) Aerobic Aquatic 163.162-4

An aerobic aquatic metabolism study is required to support the registration of each end-use product intended for aquatic use or for any aquatic impact use which results in direct discharges into the aquatic environment. Such a study is also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product.

No data on the aerobic aquatic metabolism of dicrotophos are available.

No data on the aerobic aquatic metabolism of dicrotophos are required because the use pattern indicates that introduction of dicrotophos into an aquatic environment would not occur.

(3) MICROBIOLOGICAL

The requirement for the submission of microbiological data is currently being reserved.

(A) Effects of Microbes on Pesticides

One study on the effects of microbes on dicotophos was reviewed and was found to be valid.

Osgerby and Woodburn (00028571) found that 95% of the initial amount of dicotophos (unspecified formulation) was lost after 12 days in a soil-inoculated nutrient medium. The loss was largely attributed to microbial metabolism since only 25% of the dicotophos was lost from a sodium azide-sterilized nutrient solution over the same period.

Reference

Osgerby, J.M., and A.T. Woodburn. 1965. Project Progress Report PPR FD 48/65: The adsorption and decomposition of Bidrin and Azodrin in soil: Project F 18. (Unpublished report prepared by Shell Research, Ltd.). (00028571)

(B) Effects of Pesticides on Microbes

No data on the effects of dicotophos on microbes are available.

(C) Activated Sludge

No data on the activated sludge metabolism of dicotophos are available.

(4) MOBILITY 163.163

The movement of pesticide residues by means of leaching through the soil may cause contamination of food, result in a loss of usable land and water resources to man due to contamination of groundwater supplies, or cause habitat loss to wildlife. Therefore, studies are required to ascertain the extent of pesticide leaching through soil, which, in turn, provides a basis for assessing the mobility potential of a pesticide.

(A) Leaching 163.163-1

Data are required to support the registration of each end-use product intended for domestic outdoor use, greenhouse use, terrestrial noncrop use, orchard crop use, field or vegetable crop use, forestry use, aquatic use, and aquatic impact use involving direct discharge only. Such data are also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product.

For terrestrial noncrop uses, orchard crop uses, field or vegetable crop uses, and forestry uses, the mobility of the test substance and its degradates in soil shall be assessed either by soil thin-layer chromatography, soil column, or batch equilibrium (adsorption/desorption). For domestic outdoor uses, greenhouse uses, aquatic uses, and aquatic impact uses, the mobility of the test substance and its degradates in soil shall be assessed only by batch equilibrium (adsorption/desorption).

Two studies on the leaching potential of dicotophos were reviewed and were found to be invalid. Therefore, no data on the leaching potential of dicotophos are available.

Data Gaps

All data specified in Section 163.163-1 are needed to assess the potential of dicotophos to leach.

(B) Laboratory Volatility 163.163-2

A laboratory volatility study will be required on a case-by-case basis to support the registration of each end-use product intended for commercial greenhouse, orchard, or field and vegetable crop uses that involve significant inhalation exposure to workers. Data from such a study will also be required to support the registration of each manufacturing-use product which legally could be used to make any end-use product for which laboratory volatility data are required.

No data on the volatility of dicotophos under laboratory conditions are available.

Data Gaps

All data specified in Section 163.163-2 are needed to assess the volatility of dicotophos under laboratory conditions.

(C) Field Volatility 163.163-3

A volatility study conducted on-site in a commercial greenhouse and/or in the field will be required on a case-by-case basis only for those pesticides that the Agency considers pose a potentially significant inhalation exposure to workers (see Section 163.163-2(b)) and, based on the results of the laboratory study described in Section 163.163-2, that also demonstrate, in the Agency's opinion, a significant rate of volatilization from soil.

No data on the field volatility of dicotophos are available.

Data Gaps

All data specified in Section 163.163-3 are needed to assess the volatility of dicotophos under greenhouse and/or field conditions.

(5) DISSIPATION 163.164

(A) Field Dissipation - Terrestrial 163.164-1

A terrestrial field dissipation study is required to support the registration of each end-use product intended for any terrestrial use (except greenhouse use). Such data are also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product.

One study on the terrestrial field dissipation of dicrotophos was reviewed, was found to be valid, and is discussed below.

Elgar and MacDonald (00013512) found that dicrotophos (5% ai granular), applied at 2, 4, or 8 lb/A, dissipates rapidly from a clay loam soil. The half-life was <1 week and no dicrotophos was detected 8 weeks after application.

Data Gaps

All data specified in Section 163.164-1 are needed to assess the terrestrial field dissipation of dicrotophos.

Reference

Elgar, K.E., and I.A. MacDonald. 1966. Analysis of crops for residues of Bidrin and its metabolites. J. Sci. Food Agric. 17:500-505. (00013512)

(B) Field Dissipation - Aquatic and Aquatic Impact 163.164-2

An aquatic field dissipation study is required to support the registration of each end-use product intended for aquatic food crop uses, aquatic non-crop uses, and for any aquatic impact use which results in direct discharges into the aquatic environment. Such a study is also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product.

No data on the aquatic field dissipation of dicotophos are available.

No data on the aquatic field dissipation of dicotophos are required because the use pattern indicates that introduction of dicotophos into an aquatic environment would not occur.

(C) Dissipation - Forestry 163.164-3

Field dissipation studies for forestry uses are required to support the registration of each end-use product intended for forestry use and of each manufacturing-use product which legally could be used to make such an end-use product.

No data on the dissipation of dicotophos in forests are available.

No data on the dissipation of dicotophos in forests are required because the use pattern indicates that introduction of dicotophos into a forest environment would not occur.

(D) Dissipation - Combinations and Tank Mixes 163.164-4

A laboratory or field soil dissipation study may be required on a case-by-case basis to support the registration of an end-use product containing more than one active ingredient, intended for use as a component in tank mixtures, or customarily applied serially with another pesticide product.

No data on the dissipation of multiple active ingredient formulations of dicotophos are available.

Data requirements for combinations and tank mixes containing dicotophos are not cited here because this standard deals only with the single active ingredient.

(E) Dissipation - Long Term 163.164-5

A long-term soil dissipation study will be required to support the registration of the end-use products of any pesticide that has been shown not to readily dissipate in a soil environment. Such a study may also be required to support the registration of any manufacturing-use product that legally could be used to make such an end-use product.

No data on long-term dissipation of dicotophos in soil are available.

Data Gaps

All data specified in Section 163.164-5 are needed to assess the long-term soil dissipation of dicotophos.

(6) ACCUMULATION 163.165

(A) Confined Accumulation - Rotational Crops 163.165-1

Confined accumulation studies on rotational crops are required to support the registration of each end-use product intended for field or vegetable crop use, aquatic crop use, or use on any other site on which it is reasonably foreseeable that any food or feed crop may be produced after application of a pesticide. Such studies are also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product.

No data on the confined accumulation of dicotophos in rotational crops are available.

Data Gaps

All data specified in Section 163.165-1 are needed to assess the confined accumulation of dicotophos in rotational crops.

(B) Field Accumulation - Rotational Crops 163.165-2

A field accumulation study to determine the uptake of soil residues by rotational crops is required when (1) the confined accumulation study (Section 163.165-1) identifies the ¹⁴C residues in the crop as either parent compound, closely-related degradates, metabolites, and/or their conjugates or (2) a subsequent crop is treated with the same active ingredient as the initial crop.

No data on the field accumulation of dicotophos in rotational crops are available.

Data Gaps

All data specified in Section 163.165-2 are needed to assess the accumulation of dicotophos in rotational crops under field conditions.

(C) Accumulation - Irrigated Crops 163.165-3

A study of residue accumulation in irrigated crops under actual field use conditions is required to support the registration of each end-use product intended for aquatic food crop or aquatic non-crop uses, for uses in and around holding ponds used for irrigation purposes, or for uses that involve effluents and other discharges which in turn are used to irrigate crops. Such a study is also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product.

No data on the accumulation of dicotophos in irrigated crops are available.

No data on the accumulation of dicotophos in irrigated crops are required because the use pattern indicates that crops are not irrigated with dicotophos-treated water and that introduction of dicotophos into the aquatic environment would not occur.

(D) Laboratory Studies - Fish 163.165-4

A fish accumulation study is required to support the registration of each end-use product intended for outdoor use (except domestic outdoor and greenhouse uses), or aquatic impact use resulting in direct discharge into aquatic environments, and for each manufacturing-use product that legally could be used to produce such a product, except when the criteria below are satisfied.

Fish accumulation data will not normally be required in situations where the registrant can offer acceptable evidence showing that the active ingredient and/or its principal degradation product(s):

- Will not reach water, or
- Will not persist in water (i.e., a half-life of approximately 4 days or less) and has properties suggesting:

- A relatively low potential for accumulation in fish (i.e., an octanol/water partition coefficient less than ~1,000) or
- A lack of accumulation in the organs and tissues of mammals or birds.

No data on the accumulation of dicrotophos in fish under laboratory conditions are available.

Data Gaps

All data specified in Section 163.165-4 are needed to determine whether dicrotophos will accumulate in fish.

(E) Field Accumulation - Aquatic Non-Target 163.165-5

Field accumulation studies in aquatic non-target organisms are required to support the registration of each end-use product:

- Which is intended for forestry use, aquatic non-crop use, or aquatic impact use that results in direct discharges;
- For which data from a laboratory fish accumulation study are required by Section 163.165-4; and
- For which no tolerance or action level for fish has been granted.

Such studies are also required to support the registration of each manufacturing-use product which legally could be used to make such an end-use product.

No data on the accumulation of dicrotophos in aquatic non-target organisms are available.

Data Gaps

All data specified in Section 163.165-5 are needed to determine whether dicrotophos will accumulate in non-target aquatic organisms.

(7) REENTRY (SUBPART K)

Reentry intervals are required to support the registration of all manufacturing-use and end-use products intended for use where exposure of persons reentering treated sites may be expected.

One study pertaining to the dissipation of foliar dicrotophos residues was reviewed and was found to be valid.

Bull and Lindquist (00013471) found that 16-31% of the radioactivity applied to cotton leaves or cotyledons as [³²P]dicrotophos remained as water dislodgeable residues after incubation in a greenhouse for 24 hours. Dislodgeable residues declined at similar rates from treated leaves and cotyledons.

Data Requirements

General

For each crop, the registrant must propose an acceptable reentry interval; this proposed interval may be based on any of the following: (a) the longest (most restrictive) existing reentry intervals; (b) data on dissipation of foliar residues (decline curve), on human exposure to those residues, and on the inherent toxicity of the chemical; (c) determination of that time beyond which there are no detectable foliar residues (under appropriate climatic conditions) in the area where the chemical will be applied.

Specific

Either the longest (most restrictive) reentry interval is acceptable, or the exposure data and a dislodgeable residue curve, together with the inherent toxicity of the chemical, may be used to establish an appropriate interval for activities that result in foliar contact. The longest (most restrictive) reentry intervals will be listed by crop.

Reference

Bull, D.L., and D.A. Lindquist. 19?? Rate of absorption of Bidrin into plant parts. (Unpublished study received Jan. 28, 1966; prepared by U.S. Agricultural Research Service, Entomology Research Div., Cotton Insects Research Branch, submitted by Shell Chemical Co., Washington, D.C.; CDL:000834-AN). (00013471)