

US EPA ARCHIVE DOCUMENT

ECOLOGICAL EFFECTS BRANCHREVIEWDATE: IN 6/1/79 OUT 12/28/79FILE OR REG. NO. 3125-236, 3125-237, 3125-283

PETITION OR (EXP. PERMIT NO.) \_\_\_\_\_

DATE DIV. RECEIVED 3/28/79, 5/16/79

DATE OF SUBMISSION \_\_\_\_\_

DATE SUBMISSION ACCEPTED \_\_\_\_\_

TYPE PRODUCT(S): I, D, H, F, (N), R, S NematocideDATA ACCESSION NO(S). 237905PRODUCT MGR. NO. (21) H. M. JacobyPRODUCT NAME(S) Nemacur 3, Nemacur 10%G, Nemacur 15%GCOMPANY NAME Mobay Chemical Corp.SUBMISSION PURPOSE Amended Registration--New use on tobacco and  
non-bearing fruit trees; Data EvaluationCHEMICAL & FORMULATION Ethyl 3-methyl-4-(methylthio)phenyl(1-methylethyl)  
phosphoramidate

Pesticide Name    Nema-cur

100        Pesticide Label Information

100.1     Pesticide Use

Nema-cur 3, 10G, and 15G are currently registered for control of nematodes in cotton, peanuts, and other crops. The purpose of this submission is to add the use of Nema-cur for nematode control on flue-cured tobacco and on non-bearing fruit trees.

100.2     Formulation Information

Nema-cur 10% Granular and Nema-cur 15% Granular

Size: The granules used in both formulations average in size between 24 mesh and 48 mesh. The range of sizes is 20 mesh to 60 mesh with at least 96 to 97% of granules (by weight) in this size range.

Weight: The average bulk weight of Nema-cur 10% granular is 40 pounds/cubic foot with a range of 38 to 42 pounds/cubic foot. The average bulk weight for Nema-cur 15% granular is 43 pounds/cubic foot with a range of 41 to 45 pounds/cubic foot.

Nema-cur 3 - Emulsifiable Compound (liquid)

35% Active Ingredient

100.3

Application Methods Directions, Rates

## NEMACUR 3

## RECOMMENDED APPLICATIONS

CROP	DOSAGE NEMACUR 3		REMARKS
	BAND: FLUID OUNCES/ 1,000 Ft. of Row	BROADCAST: Gallons/ ACRE	
FIELD CROPS			
Tobacco (Not for use on shade grown tobacco)	(Use Only Broadcast Application on Tobacco)	1-1/3 to 2  4-6 pounds Active ingredient/Acre	BROADCAST: Apply as a water emulsion spray over the entire area to be treated using a minimum of 20 gallons of water per acre to insure uniform distribution. Incorporate to a depth of 2 to 6 inches by disking or tilling. Where a range in rates is recommended use the high rate in fields with high populations of nema- todes or in fields having a history of serious nematode damage. Plant crop in the usual manner.

RECOMMENDED APPLICATIONS

CROP	PEST	GALLONS NEMACUR 3	REMARKS
<u>NON-BEARING FRUIT*</u>			<u>BROADCAST APPLICATION:</u> Apply specified dosage in 20 to 40 gallons of water per acre as a water emulsion spray to the soil surface.
Deciduous Fruit Trees (apple, peach and cherry trees)	Lesion	3-1/3 to 6-2/3	
	nematodes	10-20 lbs.ai/acre	<u>BAND APPLICATION:</u> Apply specified dosage in 20 to 40 gallons of water per <u>treated</u> acre as a water emulsion spray to the soil surface in a 4 to 6 foot band.

\*Non-bearing fruit trees are those that will not bear fruit for one year after application, including newly planted and established trees. Any fruit that may form on treated trees during this one year period must be destroyed and not used for human or animal consumption.

Do not apply more than once per year per planting site. The recommended time of application is between April 1 and June 30.

NEMACUR 10% GRANULAR

RECOMMENDED APPLICATIONS

CROP	DOSAGE NEMACUR 10% Granular		REMARKS
	BAND: OZS/1,000 FT. OR ROW	BROADCAST: LBS/ ACRE	
Tobacco (Not for use on shade grown tobacco)	(Use only broadcast application on tobacco)	40 to 60 Pounds/acre  4-6 Pounds Active ingredient/Acre	BROADCAST: Distribute the granules uniformly over the entire area to be treated and immediately incorporate to a depth of 2 to 6 inches by disking or tilling to insure uniform distribution. Where a range in rates is recommend- ed, use the high rate in field with high populations of nematodes or in fields having a history of serious nematode damage.

RECOMMENDED APPLICATIONS

CROP	PEST	POUNDS NEMACUR 10% G	REMARKS
<u>NON-BEARING FRUIT*</u>		100 to 200 10 to 20 lbs.	<u>BROADCAST APPLICATION:</u> Apply specified dosage per acre with equipment that will insure uniform distribution. Thoroughly incorporate granules into the soil to a depth of 4 to 6 inches.
Deciduous Fruit Trees (apple, peach and cherry trees)	Lesion nematodes	Active ingredient/ Acre	<u>BAND APPLICATION:</u> Apply specified dosage per treated acre in a 4 to 6 foot band in the orchard row. Thoroughly incorporate granules into the soil to a depth of 4 to 6 inches.

\*Non-bearing fruit trees are those that will not bear fruit for one year after application, including newly planted and established trees. Any fruit that may form on treated trees during this one year period must be destroyed and not used for human or animal consumption.

Do not apply more than once per year per planting site. The recommended time of application is between April 1 and June 30.

NEMACUR 15% GRANULAR

RECOMMENDED APPLICATIONS

CROP	DOSAGE NEMACUR 15% Granular		REMARKS
	BAND: OZS/1,000 FT. OR ROW	BROADCAST: LBS/ ACRE	
Tobacco (Not for use on shade grown tobacco)	(Use only broadcast application on tobacco)	26-2/3 to 40 Pounds/acre  4-6 pounds Active ingredient/Acre	BROADCAST: Distribute the granules uniformly over the entire area to be treated and immediately incorporate to a depth of 2 to 6 inches by disking or tilling to insure uniform distribution. Where a range in rates is recommend- ed, use the high rate in field with high population of nematodes or in fields having history of serious nematode damage

RECOMMENDED APPLICATIONS

CROP	PEST	POUNDS NEMACUR 15% G	REMARKS
<u>NON-BEARING FRUIT*</u>		66.7 to 133.3 10 to 20 lbs.	<u>BROADCAST APPLICATION:</u> Apply specified dosage per acre with equipment that will insure uniform distribution. Thoroughly incorporate granules into the soil to a depth of 4 to 6 inches.
Deciduous Fruit Trees (apple, peach and cherry trees)	Lesion nematodes	Active ingredient/ Acre	<u>BAND APPLICATION:</u> Apply specified dosage per treated acre in a 4 to 6 foot band in the orchard row. Thoroughly incorporate granules into the soil to a depth of 4 to inches.

\*Non-bearing fruit trees are those that will not bear fruit for one year after application, including newly planted and established trees. Any fruit that may form on treated trees during this one year period must be destroyed and not used for human or animal consumption.

Do not apply more than once per year per planting site. The recommended time of application is between April 1 and June 30.



103.2.3 Fish Acute LC<sub>50</sub>

See T.F.

O'Brien

11/25/77	Rainbow Trout	Technical (88%)	72.1 ppb	Core
"	Bluegill Sunfish	Technical (88%)	17.7 ppb	Core
54150	Bluegill Sunfish	Technical (88%)	9.5 (6.8-15)ppb	Core
54150	"	" Sulfoxide	2653 (1000-4600)ppb	Core
54150	"	" Sulfone	1173 (1000-1500)ppb	Core

103.2.4 Aquatic Invertebrate LC<sub>50</sub>

54047	<u>Daphnia magna</u>	Technical (88%)	1.6 (1.3-1.9)ppb	Supplemental
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103.5 Field Tests

103.5.2 Simulated Field Tests

<u>Report No.</u>	<u>Type</u>	<u>Species</u>	<u>Concentration</u>	<u>Result</u>	<u>Category</u>
43811	Small Pen	1) Bobwhite Quail	40 lb 15%G/Acre	Little Hazard	Invalid
		2) Ringnecked Pheasant	27 oz 15%G/1000 ft (Row)		

103.5.4 Terrestrial Field Test

<u>Report No.</u>	<u>Type</u>	<u>Species</u>	<u>Concentration</u>	<u>Result</u>	<u>Category</u>
42063	Avian Field Study	1) Bobwhite Quail	133 lbs 15% G/Acre	Little or no Hazard	Invalid
		2) Natural Bird Population			

104 Hazard Assessment

104.1 Discussion

For additional information see Namacur review for citrus by T.F. O'Brien, amended by L. Turner, 11/25/77.

Namacur is an organophosphate compound used as a nematocide. It degrades to sulfoxide and sulfone metabolites which affords additional protection because these products are picked up systemically by plants. Sulfoxide and sulfone are persistent and bind readily to soil particles. This application is for an amended registration for the additional uses on tobacco and

non-bearing fruit trees for Nema-cur 3, Nema-cur 10% granular and Nema-cur 15% granular.

Only broadcast applications are proposed on the label for tobacco use. All formulations call for incorporation to a depth of 2 to 6 inches. The following residues can be expected following application of the different formulations.

1. Nema-cur 3 at 6 pounds A.I./Acre would result in a soil residue of 2.7 ppm throughout the top 6 inches, if evenly mixed.
2. Nema-cur 10G and 15G, both at 6 pounds A.I./Acre would result in a surface residue of 1.25 mg/ft<sup>2</sup> after incorporation.

Both broadcast and band applications are proposed on the label for non-bearing fruit use. Only the 10G and 15G formulations call for information to a depth of 4-6 inches. The following residues can be expected following application of the different formulations.

1. Nema-cur 3 at 20 lbs. A.I./Acre (Broadcast) would result in soil residues in the top 0.1 inch of 435.6 ppm.
2. Nema-cur 10G and 15G, both at 20 lbs. A.I./Acre (Broadcast) would result in a surface residue of 4.16 mg/ft<sup>2</sup> after incorporation.

For band application, the directions call for "specified dosage per treated acre in a 4 to 6 foot band..." This would result in the same residues as for broadcast application. However, the directions are unclear enough that some applicator's might apply the broadcast dosage concentrated into a narrow band.

#### 104.2 Likelihood of Adverse Effects to Non-Target Organisms

See also amended review by L. Turner, 11/25/77.

Nema-cur is an organophosphate compound that is used to control soil nematodes. The proposed uses on tobacco and non-bearing fruit trees would add a significant new use to those currently registered. For example, in 1975 there were 1,086,350 acres of tobacco harvested in the United States. The tobacco industry occurs in 17 states. Figures for non-bearing fruit orchards are equally impressive considering the nationwide scale of this agriculture.

Tobacco as a crop is not considered to have particularly high wildlife utilization, but application of Nema-cur as a soil

nematocide is done pre-plant at a time when the ground is fallow. This fallow ground has potentially high utilization by birds when temporary spring ponds occur or when the ground is broken for pesticide incorporation or crop planting. The major species that may be affected are those birds that feed on such organisms as soil arthropods, annelids, crustaceans, etc.

Orchards have heavy wildlife utilization, although non-bearing orchards would have fewer songbirds, particularly those that use orchards primarily for feeding. Some nesting birds may occur, and depending upon the understory vegetation, utilization by other wildlife would be similar to bearing orchards. This would include possibly heavy utilization by quail, pheasants, deer, mice, porcupines, ground squirrels, wood chucks, and their predators.

Nemacur is highly toxic and the likelihood of exposure to wild species is therefore estimated to be high enough that adverse ecological effects are possible. The following comparisons of application rates versus exposure to certain species indicate that acute toxicity risk criteria are exceeded for the granular formulations even with maximum and immediate soil incorporation:

	<u>Surface residue</u>	<u>Amount granules/animals</u>
Bobwhite Quail	4.16 mg/ft <sup>2</sup>	<del>&gt;3.8 mg/animal (LC<sub>50</sub>)</del> <i>0.2 mg/ANIMAL</i>
White-footed Mouse	4.16 mg/ft <sup>2</sup>	>0.143 mg/animal (LD <sub>50</sub> ) <i>(FROM INVALID DATA)</i>
Meadow Vole	4.16 mg/ft <sup>2</sup>	>0.333 mg/animal (LD <sub>50</sub> )

The toxic hazard for Nemacur 3 is substantially less when incorporated to 6 inches. The label omission for the immediate incorporation in the non-bearing fruit use should be remedied.

It is also possible that Nemacur could adversely affect aquatic organisms. The fish LC<sub>50</sub> values are 17.7 ppb and 72.1 ppb for Bluegill and Rainbow trout, respectively, and Daphnia have been found to have an LC<sub>50</sub> value of 1.6 ppb. Nemacur can bind to heavier soils and could possibly be surface transported into aquatic environments. Nemacur is soluble more than 1000 X of the fish LC<sub>50</sub>'s and the concentration in runoff from treated fields could be a similar 1000 X.

A potential hazard could exist for certain beneficial insects which are present in a field during application or much later due to the systemic uptake of Nemacur, by plants and persistence of its sulfoxide and sulfone metabolites.

It is important to note here that Ecological Effects is lacking acceptable acute studies for birds and an acceptable acute study for an aquatic invertebrate. Without this information, the extent of the hazard cannot be adequately assessed.

#### 104.1.2 Endangered Species Consideration

Based upon the highly toxic nature of Nemacur and its lack of species specification it is very likely that registration of Nemacur on tobacco and non-bearing fruit trees could have an adverse impact on endangered species if they became exposed to it. Because of the wide use on a nation-wide scale the only way to handle endangered species with Nemacur would be to label against its use in areas frequented by endangered species.

#### 104.1.3 Adequacy of Toxicity Data

See section 103 and T.F. O'Brien, amended by L. Turner, 11/25/77.

#### 104.1.4 Additional Data Required

See Section 107.5

#### 105.0 Classification

The product requires additional data before classification can be made. However, based upon available information, it is the opinion of this reviewer that these uses should seriously be considered as an RPAR candidate.

#### 107.0 Conclusions

The Ecological Effects Branch does not concur with the registration of Nemacur 3, 10G and 15G on tobacco and non-bearing fruit trees. There are insufficient fish and wildlife data to complete a hazard assessment (see below).

#### 107.1 Environmental Fate and Toxicology

Environmental Fate and Toxicology Data were included in related reviews by T.F. O'Brien, amended by L. Turner, for Nemacur use on citrus (11/25/77) and non-bearing fruit trees (11/29/77).

#### 107.3 Labeling

The labels for Nemacur 3, 10G and 15G require modification to reflect environmental hazards. The exact changes necessary cannot be determined until additional fish and wildlife studies are available.

#### 107.4 Data Adequacy

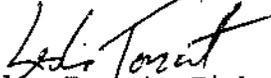
Only the avian dietary  $LC_{50}$  and fish acute 96-hour  $LC_{50}$  studies for technical Nemacur were found acceptable to support registration. All other studies were not acceptable to support registration.

107.5 Data Requests

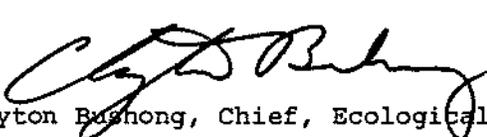
The following studies are required by Ecological Effects before an environmental hazard assessment can be made. These studies must be conducted on the technical grade of Namacur.

1. An Avian Acute oral LD<sub>50</sub> study for Bobwhite Quail or Mallard Duck. Previously submitted studies were unacceptable.
2. An acceptable small pen simulated field study is required, using either the 10G or 15G formulations with maximum recommended application rate for non-bearing fruit tree use.

Additionally, information on the toxic nature of Namacur and its sulfoxide and sulfone metabolites as it relates to beneficial insects should be provided. It is recommended that studies be undertaken to determine the effects of Namacur on avian reproduction, preferably in conjunction with a large pen field test as described in EPA proposed guidelines of July, 1978.

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Ray Matheny, Head, Section I

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Clayton Bushong, Chief, Ecological Effects Branch