100601

ECOLOGICAL EFFECTS BRANCH

REVIEW

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FILE 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 Nematocide

DATA ACCESSION NO(S). 237905

PRODUCT MGR. NO. (21) H. M. Jacoby

PRODUCT NAME(S) Nemacur 3, Nemacur 10%G, Nemacur 15%G

COMPANY NAME Mobay Chemical Corp.

SUBMISSION PURPOSE Amended Registration--New use on tobacco and non-bearing fruit trees; Data Evaluation

CHEMICAL & FORMULATION Ethyl 3-methyl-4-(methylthio)phenyl(1-methylethyl) phosphoramidate

12 pages

Pesticide Name Nemacur

100 Pesticide Label Information

100.1 Pesticide Use

Nemacur 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 Nemacur for nematode control on flue-cured tobacco and on non-bearing fruit trees.

100.2 Formulation Information

Nemacur 10% Granular and Nemacur 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 aveage bulk weight of Nemacur 10% granular is 40 pounds/cubic foot with a range of 38 to 42 pounds/cubic foot. The average bulk weight for Nemacur 15% granular is 43 pounds/cubic foot with a range of 41 to 45 pounds/cubic foot.

Nemacur 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			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 nematodes or in fields having a history of serious nematode damage. Plant crop in the usual manner.
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	

RECOMMENDED APPLICATIONS

CROP	PEST	GALLONS NEMACUR 3	REMARKS
NON-BEARING FRUIT*			BROADCAST APPLICATION: Apply specified
Deciduous Fruit Trees (apple, peach and cherry trees)	Lesion nematodes	3-1/3 to 6-2/3 10-20 lbs.ai/acre	dosage in 20 to 40 gallons of water per acre as a water emulsion spray to the soil surface.
		3-1/3 to 6-2/3	BAND APPLICATION: Apply specified dosage in 20 to 40 gallons of water per treated 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 recommended, 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
NON-BEARING FRUIT*		100 to 200	BROADCAST APPLICATION: Apply specified
		10 to 20 lbs.	dosage per acre with equipment that will
Deciduous Fruit		Active ingredient/	insure uniform distribution. Thoroughly
Trees	Lesion	Acre	incorporate granules into the soil to a
(apple, peach	nematodes		depth of 4 to 6 inches.
and cherry			
trees)		100 to 200	BAND APPLICATION: Apply specified dosage per treated acre in a 4 to 6 foot band in the orchard row. Thoroughly incorporate granules into the soil to adepth 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 recommended, 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
NON-BEARING FRUIT*		66.7 to 133.3 10 to 20 lbs. Active ingredient/ Acre	BROADCAST APPLICATION: 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	66.7 to 133.3	BAND APPLICATION: 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.

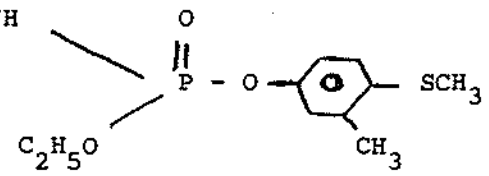
Do not apply more than once per year per planting site. The recommended time of application is between April 1 and June 30.

101 Physical and Chemical Properties

102.1 Chemical Name

Ethyl-3-methyl-4-(methylthio)phenyl(1-methylethyl) phosphoramidate

101.2 Structural Formula



101.3 Common Name

Nemacur

101.4 Through 103 See related reviews by T.F. O'Brien, amended by L. Turner for Nemacur on citrus (11/25/77) and non-bearing fruit trees (11/29/77).

103 Toxicological Properties

103.2 Minimum Requirements

103.2.1 Avian Acute Oral LD_{50}

Report No.	Species	Compound	LD_{50} (95% C.I.)	Category
66158	Bobwhite Quail	Technical (88%)	0.7 (0.5-1.1)mg/kg	Invalid
66158		Sulfoxide	1.8 (1.4-2.3)mg/kg	Invalid
66158		Sulfone	1.9 (1.2-5.8)mg/kg	Invalid
66158	Mallard Duck	Technical (88%)	1.1 (0.9-1.6)mg/kg	Invalid
66158		Sulfoxide	1.5 (0.9-2.4)mg/kg	Invalid
66158		Sulfone	1.1 (0.8-1.8)mg/kg	Invalid
54137	Mallard Duck	Technical (88%)	0.9 (0.8-1.2)mg/kg	Invalid

103.2.2 Avian Dietary LC_{50}

54042	Bobwhite Quail	Technical (88%)	36 (31-45)ppm	Core
53668	Mallard Duck	Technical (88%)	316 (221-457)ppm	Core
33423a	Japanese Quail	Technical	59 (49-71)ppm	Supplemental

103.2.3 Fish Acute LC_{50}

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_{50}

54047	Daphnia magna	Technical (88%)	1.6 (1.3-1.9)ppb	Supplemental

103.5 Field Tests

103.5.2 Simulated Field Tests

Report No.	Type	Species	Concentration	Result	Category
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

Report No.	Type	Species	Concentration	Result	Category
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 Nemacur 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 Nemacur 3, Nemacur 10% granular and Nemacur 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 followng residues can be expected following application of the different formulations.

1. Nemacur 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. Nemacur 10G and 15G, both at 6 pounds A.I./Acre would result in a surface residue of 1.25 mg/ft^2 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. Nemacur 3 at 20 lbs. A.I./Acre (Broadcast) would result in soil residues in the top 0.1 inch of 435.6 ppm.

2. Nemacur 10G and 15G, both at 20 lbs. A.I./Acre (Broadcast) would result in a surface residue of 4.16 mg/ft^2 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.
Nemacur 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 naton-wide scale of this agriculture.

Tobacco as a crop is not considered to have particularly high wildlife utilization, but application of Nemacur 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:

	Surface residue	Amount granules/animals
Bobwhite Quail	4.16 mg/ft^2	~~>3.8 mg/animal (LC_{50})~~ 0.2mg/ANIMAL (From INVALID DATA)
White-footed Mouse	4.16 mg/ft^2	>0.143 mg/animal (LD_{50})
Meadow Vole	4.16 mg/ft^2	>0.333 mg/animal (LD_{50})

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_{50} values are 17.7 ppb and 72.1 ppb for Bluegill and Rainbow trout, respectively, and Daphnia have been found to have an LC_{50} value of 1.6 ppb. Nemacaur 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_{50}'s and the concentration in runoff from treated fields could be a similar 1000 X.

A potential hazard could exist for certain benefical 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 Nemacaur 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 registraton 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 Nemacuar 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 Nemacur.

1. An Avian Acute oral LD_{50} 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 Nemacur 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 Nemacur 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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