100601

(13)

EEE BRANCH REVIEW

ORIGINAL: AMENDED: 9/27/78

DATE: IN 8/30/77 OUT 11/29/77 IN _____ OUT _____ IN ___ OUT _

FISH & WILDLIFE ENVIRONMENTAL CHEMISTRY EFFICACY

FILE OR REG. NO. 3125-237

PETITION OR EXP. PERMIT NO. _____

DATE DIV. RECEIVED _____

DATE OF SUBMISSION _____

DATE SUBMISSION ACCEPTED _____

TYPE PRODUCT(S): I, D, H, F,(N,)R, S Nematicide

DATA ACCESSION NO(S). _____

PRODUCT MGR. NO. (21) Wilson

PRODUCT NAME(S) Nemacur 10 G ---- 10 % A.I.

COMPANY NAME Chemagro

SUBMISSION PURPOSE Registration non-bearing fruit trees

CHEMICAL & FORMULATION Ethyl 3- Methyl -4- (Methylthio)
phenyl (1-methylethyl) phosphoramidate

21 pages

NEMACUR-10G IN: 8/30/77 -- OUT: 11/29/77 1

100.0 Pesticidal USE

Nemacur 10 G is a organophosphate compound used to control nematodes in a wide variety of agricultural crops. This proposed registration [redacted] is to add the use of Nemacur for nematode control on non-bearing fruit trees, particular limited to apples, peaches and cherries.

100.1 Application Methods: Rates

AMENDMENT To previously Registered Labeling

ADD the Following

RECOMMENDED APPLICATIONS

CROP	PEST	POUNDS NEMACUR 10% G.	REMARKS
NON-BEARING FRUIT*			
Deciduous Fruit Trees (apple, peach and cherry trees) (Connecticut, Delaware, Maine, Vermont, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Wisconsin)	Lesion nematodes	100 to 200 10 to 20 LBS A.I.	BROADCAST APPLICATION: Apply specified dosage per acre with equipment that will insure uniform distribution. Thoroughly incorporate granules into the soil by cross-disking.
		100 to 200 10 to 20 LBS A.I.	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.
		SEE REMARKS	SINGLE TREE APPLICATION: Apply proper dosage specified below in a band 2-1/2 to 5 feet wide to soil around base of the tree. Band width depends on size of tree and treated area should extend out to dripline of tree. Thoroughly incorporate granules into the soil. Band Width — Amount (10% G) Per Tree 2-1/2 feet — 3/4 to 1-1/2 ounces 5 feet — 3 to 6 ounces

*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 planting site. The recommended time of application is between April 1 and June 30.

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101.0 Chemical and Physical Properties

101.1 Chemical Name

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

102.0 Behavior in the Environment

See related Reviews: Nemacur Citrus (3125-283-236-237) Nov 25, 1977 : O'Brien

103.0 Toxicological Properties

See related Review: Nemacur Citrus (3125-283-236-237) Nov 25, 1977 : O'Brien

104.0 Hazard Assessment

104.1 Discussion

For additional information see NEMACUR on Citrus ~~(3125-253-236-237) Nov 25, 1977~~ review T.F. O'BRIEN, amended by L. Turner, 11/25/

The addition of non bearing fruit to the nemacur label should result in the following residues after soil incorporation based upon 4-6 inches of incorporation

Broadcast application:

10 to 20 LBS A.I./Acre = 2.08 - 4.164 mg/ft²

BAND Application: based upon 6 ft [redacted] bands between trees - which is estimated to be 30% of surface area treated, therefore the application rate is increased by a factor of 3.3

10 to 20 LBS A.I./ACRE = 6.86 - 13.74 mg/ft²

Single tree application - 4-6 inch soil incorporation

Band Width	Amount	Residue
2 ½ feet	3/4 to 1 ½ oz formulation	*5.42 - 10.6 mg/ft²
5 feet	3 to 6 oz formulation	*10 - 20 mg/ft²

* Based upon area around tree = to 7.85 sq ft
therefore application rate = to 26-52 LBS A.I./ac
* Based upon area around tree = to 15.7 sq ft
therefore application rate = 50 - 100 LBS A.I. acre

104.1.1. Likelihood of Exposure to Non-Target Organism

The addition of non-bearing fruit trees to the Nemacur 10 G label is considered as a major crop addition. Nemacur is a highly toxic compound that is non-specific in its toxicity. The application rates called for on the label and the resultant expected residues indicate that a serious hazard is possible even with maximum soil incorporation. Orchards have heavy wildlife utilization

and therefore the likelihood of exposure to non target species is anticipated to be high. The residues that species of birds and mammals will be exposed to are greater than the mg/animal on a sq ft basis that would cause be sufficient to cause mortality.

For additional comments see Nemacur Citrus (3125-283-236-237) NOV 25, 1977 O'BRIEN

104.1.2 ENDANGERED SPECIES CONSIDERATIONS

Based upon the highly toxic nature of nemacur and its ~~lack of species specification~~ broad spectrum toxicity, the registration of Nemacur for use on non-bearing fruits on a nation-wide scale could present a high likelihood of exposure to endangered species. The possibility of exposure and the possibility of adverse ecological effects to endangered species should prompt a label restriction against any use of nemacur in areas and at times when endangered species are likely to be present in the areas to be treated.

104.1.3 ADEQUACY of Toxicity DATA

See REVIEW: NEMACUR; Citrus (3125-283-236-237) NOV 25, 1977, O'BRIEN

104.1.4 ADDITIONAL DATA REQUIRED

SEE CONCLUSIONS Section 107.5.

105.0. Classification

This product LACKS basic data upon which CLASSification criteria are made, however it is the opinion of this REVIEWER that future CONSIDERATION SHOULD be given to CLASSifying the USE Restricted, based upon available information

107.0 Conclusions

107.1 Environmental Fate and Toxicology

The Environmental Safety section has not been supplied with a current review of either Environmental Chemistry Data or Human toxicology data.

107.2 Classification

IT is not applicable at this time to evaluate the classification

107.3. Labeling

The nemacur 10G label needs the addition of the following statements to the environmental safety portion

"Do not contaminate water by cleaning of equipment or disposal of waste."

"This pesticide is toxic to bees exposed to direct application or the residues remaining on the treated areas."

This pesticide should not be applied in areas associated with use by endangered species of fish and wildlife. For guidance contact your Regional Office of the Environmental Protection Agency

107.4 Data Adequacy

The following data have been found acceptable to support the registration of this product

A. The fish acute 96 hr LC_{50} cold water fish species. Technical Nemacur

B. The fish acute 96 hr LC_{50} warm water fish species. Technical Nemacur.

107.5 Data Requests

The following data are required by the Environmental Safety Section before an environmental Hazard Assessment can be made. These data requests are to fill data gaps where previously studies have been submitted and found unacceptable or data has not been referenced or submitted and a need is felt to exist for the studies.

3.

5.

17.

A. The Avian (acute oral LD_{50} for one species of waterfowl (Mallard duck, preferably) or one species of upland game bird (bobwhite quail or ring-necked pheasant). The studies submitted are not acceptable because they were not conducted using the technical grade material as is required.

B. The Dietary LC_{50} for one species of waterfowl (Mallard Duck) and one species of upland game bird (Bobwhite Quail or ring-necked pheasant). This study must be conducted on the technical grade material

C. The ~~##~~ Acute 48 hour LC_{50} for an aq. invertebrate (Daphnia sp., preferably) study must be conducted on the technical grade material

D. An Avian Reproduction study is required on Bob White Quail and Mallard Ducks. This study is required for the technical grade material. Levels that should be tested will depend upon dietary LC_{50} values for these species and residue levels that will be expected under field conditions. The registrant should contact the environmental fate section for guidance.

E. An MAMMAL ACUTE LD_{50} on a Representative species of wild mammal will be required due to the toxic nature of the chemical, the likelihood of exposure and the possibility of exposure to endangered species.

E. Should open simulated field studies utilizing birds and mammals ~~and~~ be required, these studies should be conducted under field conditions that most closely represent the use pattern and rates of application and label directions. The registrant should contact the Environmental Safety Section for guidance.

F. The registrant should also be informed that the Environmental Safety Section is concerned about the [redacted] impurities in Technical Pesticides. Pending input of information from Environmental Chemistry, additional toxicity data may be required for the impurities and the degradates. The registrant should address this problem and the relative persistance of these impurities and their degradates

H. The registrant should also be informed that the Environmental Safety Section is concerned about the toxic nature of this chemical and its relation to beneficial insects. The registrant should address means of reducing if exposure problems will occur. THE Registrant SHOULD ALSO Stay INFORMED of possible data requirements that may come into existance in the future for beneficial insects.

107. Recommendations

The Environmental Safety Section can not concur with the registration of Kemacur K for use on non bearing fruit. The reasons for this decision are as follows.

1. The use pattern is considered as a major crop addition
2. Environmental Chemistry and Toxicology Reviews are not available for use in a hazard assessment
3. Basic data required for registration is not available
4. Application rates of this product are high and without all basic data it is not possible to predict the severity of adverse ecological effects

THOMAS F. O'BRIEN NOV 29, 1977
ENVIRONMENTAL Safety Section
EEEB - RD WH 567 FTC

AMENDED 9/27/78

100.0 Pesticidal Use

Nemacur 10 G is a organophosphate compound used to control nematodes in a wide variety of agricultural crops. This proposed registration is to add the use of Nemacur for nematode control on non-bearing fruit trees, particularly limited to apples, peaches and cherries.

100.1 Application Methods: Rates

Amendment to previously registered labeling
Add the following:

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RECOMMENDED APPLICATIONS

CROP	PEST	POUNDS NEMACUR 10% G	REMARKS
NON-BEARING FRUIT*			BROADCAST APPLICATION:
Deciduous Fruit Trees (apple, peach and cherry trees) (Connecticut, Delaware, Maine, Vermont, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Wisconsin)	Lesion nematodes	100 to 200 10 to 20 LBS A.I.	Apply specified dosage per acre with equipment that will insure uniform distribution. Thoroughly incorporate granules into the soil by cross-disking.
		100 to 200 10 to 20 LBS A.I.	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.
		SEE REMARKS	SINGLE TREE APPLICATION: Apply proper dosage specified below in a band 2-1/2 to 5 feet wide to soil around base of the tree. Band width depends on size of tree and treated area should extend out to dripline of tree. Thoroughly incorporate granules into the soil.

Band Width	Amount (10% G) Per Tree
2-1/2 feet	3/4 to 1-1/2 ounces
5 feet	3 to 6 ounces

*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 year period must be destroyed and not used for human or animal consumption.

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

9/27/7

101.0 Chemical and Physical Properties

101.1 Chemical Name

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

101.2 Common Name

Nemacur

102.0 Behavior in the environment

Nemacur review for citrus by T. F. O'Brien amended by L. Turner, 11/25/77, extracted environmental fate data from EFB review by R.W. Cook, 10/3/73. Pertinent information from that review is included below, along with data from EFB review by N. Dodd/R.E. Ney, 12/16/76.

102.1 Soil

The half-life in soil has not been well defined. The EFB review by N. Dodd did not specify what was being investigated. It may have been Nemacur (parent) or the two equally toxic degradates (sulfone and sulfoxide). The field half-life, based on 19 unacceptable studies in various soils, was nearly always less than 6 months and mostly less than 3 months.

In another study (formerly acceptable, but later determined to be unacceptable) metabolism of Nemacur and its degradates was examined in aerobic vs. anaerobic soil. Analyses were made 30 and 61 days after application. The following data were reported:

.days after application	Percent of applied remaining		
	Nemacur	Sulfone	Sulfoxide
Aerobic soil			
30 days	5.2	66.3	14
61 days	none detectable	58.7	16.2
Anaerobic			
30 days	22.2	56.2	9.5
61 days	27.6	48.4	9.8

The above data suggest a half-life for parent and degradates decidedly in excess of 60 days. This and other data indicate that the parent half-life is less than 30 days.

9/27/77

Nemacur is a slight leacher in some soils, especially lighter soils. Some residues were found tightly adsorbed to particles in heavier soils. Some runoff may occur. The parent Nemacur photodegrades rapidly into the sulfone and sulfoxide; there is no data on photodegradation of these products.

102.2 Water

Available data apparently apply only to the parent Nemacur. In one study, the half-life at pH 7 was noted to be about 5 days (R.W. Cook review). In another (N. Dodd review), Nemacur was found to be stable at 30°C and pH 5-8, with a half-life of 14 days at pH 9. At 50°C, the half-life was 19 days at pH 8 and 4 days at pH 9.

102.3 Plant

Nemacur and the sulfoxide and sulfone metabolites are taken up by plants. The sulfone and sulfoxide may be plant metabolites and occur at perhaps as much as 10x the original parent level.

102.4 Animal

No significant effects of Nemacur on microbes were noted in one study. The aerobic/anaerobic soil study mentioned above suggests that aerobic microorganisms may contribute to breakdown of the parent. In a fish accumulation study on the sulfoxide, whole body bioaccumulation was no greater than 2x.

103.0 Toxicological Properties

For fish and wildlife data, refer to Nemacur on citrus review by T. F. O'Brien amended by L. Turner, 11/25/77. The following data were taken from various specified Toxicology Branch reviews.

103.1 Acute Toxicity

103.1.1 Mammal

1. (Reference: R. D. Coberly review, 9/15/69)
   rat acute oral LD_{50} (tech)=8.1 mg/kg (males)
   rat acute oral LD_{50} (tech)=4.75 mg/kg (females)
   mouse acute oral LD_{50} (tech)=8.3 mg/kg (females)
   guinea pig acute oral LD_{50} (tech)=75-100 mg/kg
   rabbit acute oral LD_{50} (tech)=5 mg/kg
   cat acute oral LD_{50} (tech)=2.5-10 mg/kg
   dog acute oral LD_{50} (tech)> 2.5 mg/kg

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Note: The toxicology reviewer made the following comments: "...very little is accumulated in the body; with degradation occurring in approximately 72 hrs." "...the dangers appear to be limited mainly to acute exposure."

2. (Reference: R. P. Schmidt review, 6/19/72
   rat acute oral LD_{50} (%?)=15.3 mg/kg♂, 19.4 mg/kg♀

3. (Reference: R. P. Schmidt review, 7/27/73
   female rat acute oral (5%)=134.5 mg/kg
   female rat acute oral (10%)=56.5 mg/kg
   female rat acute oral (35%)=10.6 mg/kg

4. (Reference: W. E. Parkin review, 2/26/73)
   rat acute oral LD_{50} (tech)=4.75-9.6 mg/kg
   rat acute oral LD_{50} (spray concentate, %?)=25.0 mg/kg
   rat acute oral LD_{50} (10G)=100 mg/kg

5. (Reference: R. A. Gessert review, 11/14/77
   rat acute oral LD_{50} (?)=3.2 mg/kg (male)
   rat acute oral LD_{50} (?)=2.4 mg/kg (female)

103.2 Dermal Toxicity

(Reference: R. P. Schmidt review, 1/2/74)
male rabbit acute dermal LD_{50} (tech)=225 mg/kg
female rabbit acute dermal LD_{50} (tech)=178.8 mg/kg

Male rats tested with 15G in water on a clipped area had 14.5% mortality in 24 hours. Under the same conditions, female rat mortality was 25%.

103.4 Chronic Toxicity

(Reference: R. A. Gesser review, 11/14/77

90 day dog feeding study	CHE NEL=1ppm
2 year dog feeding study	CHE NEL=1ppm
90 day rat feeding study	CHE NEL=4ppm
3 generation rat reproduction	no impairment at levels up to 30ppm

104.0 Hazard Assessment

104.1 Discussion

For additional information see Nemacur on citrus review by T.F. O'Brien, amended by L. Turner, 11/25/77. The addition of non-bearing fruit to the Nemacur label should result in the following residues after soil incorporation based upon 4-6 inches of incorporation.

9/27/1

Broadcast Application:

10-20 pounds a.i./acre results in 104-208 mg/ft^2. With thorough incorporation by cross-disking (assume the equivalent of 4-6 inches), the SDF (R. Felthousen memo on granulated formulation) is 50. This would yield surface residues of 2.08-4.16 mg/ft^2.

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 applicators might apply the broadcast dosage concentrated into a narrow band.

Single Tree Application:

Apply in a band 2 1/2 or 5 foot wide to soil around the base of the tree, out to dripline. Since these are young (non-bearing) trees, it is expected that the band will extend from the dripline to the trunk; and since the band goes all the way around the tree, the band width will be the radius of the circle.

1. For 2 1/2 foot band, $A=\pi r^2=3.14x(2\ 1/2)^2$ $=19.6$ ft^2. Maximum dose for this area is 1 1/2 ounces of 10G=45g=4.5 g a.i.=4500 mg a.i. The residues would then be 4500 mg÷19.6 ft^2=230 mg/ft^2. After thorough (assume 4-6 inch) incorporation, residues would be 230 mg/ft^2 ÷ 50 (SDF)=4.6 mg/ft^2

2. For 5 foot band, $A=\pi r^2= 3.14x(5)^2=78.5$ ft^2. Maximum dose is 6 ounces formulation=180g=18,000 mg a.i. Residues would be 18,000 mg ÷ 78.5 ft^2=230 mg/ft^2, which would also yield, after incorporation, 4.6 mg/ft^2.

104.1 Likelihood of exposure to non-target organisms

Nemacur is a highly toxic, non-specific pesticide for use against nematodes in non-bearing fruit trees. The application rate will result in expected residues of up to 4.6 mg/ft^2, even after soil incorporation. Comparisons with several species of non-target animals indicate that these residues exceed the LD_{50} (in mg/animal) for bobwhite quail (0.152 mg/animal), mallard duck (2.016 mg/animal), white-footed mouse (0.143 mg/animal), and meadow vole (0.333 mg/animal). See citrus review for Nemacur by T. F. O'Brien amended by L. Turner, 11/25/77, for development of these toxic levels, and related information.

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. Even with the ~~solid~~ soil incorporation, exposure is anticipated to be high, and with the demonstrated toxicity of Nemacur, non-target mortality is very likely. This could possibly be somewhat reduced by irrigation immediately following application.

For additional comments refer to related review of Nemacur on citrus by T. F. O'Brien amended by L. Turner 11/25/77.

104.1.2 Endangered Speciees-Considerations

Based upon the highly toxic nature of Nemacur and its broad spectrum toxicity, the registration of Nemacur for use on non-bearing fruits on a nation-wide scale could present a high likelihood of exposure to endangered species. The possibility of exposure and the possibility of adverse ecological effects to endangered species should prompt a label restriction against any use of Nemacur in areas and at times when endangerd species are likely to be present in the areas to be treated.

104.1.3 Adequacy of Toxicity Data

Toxicity data were validated in Nemacur on citrus review by T. F. O'Brien, amended by L. Turner, 11/25/77. See that review for adequacy data.

104.1.4 Additional Data Required

See section 107.5

105.0 Classification

This product requires additional data before classification can be made. However, based upon available information, it is the opinion of this reviewer that this use should seriously be considered for restricted use.

107.0 Conclusions

107.1 Environmental Fate and Toxicology

Environmental Fate data was taken from previous Ecological Effects review and the most recent available EFB review by N. Dodd/R.E. Ney, 12/16/76. Toxicology data was taken from Toxicology Branch memos by R.D. Coberly (9/15/69), R.P. Schmidt (6/19/72, 7/27/73, and 1/2/74), W.E. Parkin (2/26/73), and R.A. Gessert (11/14/77).

107.3 Labeling

The label for Nemacur 10G requires modification to reflect environmental hazards. The exact changes necessary cannot be determined until additional fish and wildlife studies are available.

107.4 Data Adequacy

The warmwater and coldwater 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 for various reasons specified below and in section 104.1.3 of Nemacur on citrus review by T.F. O'Brien, amended by L. Turner, 11/25/78.

107.5 Data Requests

The following studies are required by Ecological Effects before an environmental hazard assessment can be made. These requests are to fill data gaps where no studies have been previously submitted or where submitted data was found unacceptable to support registration. These studies must be conducted on the technical grade of Nemacur.

1. Avian subacute dietary LC_{50} studies for both wild water fowl (preferably mallard duck) and upland game bird (preferably bobwhite quail or ring-necked pheasant).

2. An avian acute oral LD_{50} study for one of the species tested in (1) above. Previously submitted studies were unacceptable because the formulated product was tested, inappropriate species were tested, or numbers of birds tested were insufficient.

3. An aquatic invertebrate acute 48 hour LC_{50} study (preferably for Daphnia magna).

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In addition to the above studies using the technical grade of Nemacur, small pen field studies are required, using the 10G or 15G formulations. Previous small pen field tests for this use pattern provided some information, but were not acceptable to support registration because of several deficiencies in cage movement and supplemental feeding. Small pen studies have been previously requested for citrus. If these studies are adequate, they will, in combination with the previous test for non-bearing fruit tree use, probably will satisfy the requirement for this use pattern.

Information on the toxic nature of Nemacur as it relates to beneficial insects should be provided.

It is imperative that this Branch be supplied with the average and range of both sizes and weights of the granules.

107.7 Recommendations

The Ecological Effect Branch cannot concur with the registration of Nemacur 10 G on non-bearing fruit trees. There are insufficient fish and wildlife data to complete a hazard assessment.

Thomas F. O'Brien
November 29,1977

Amended by: Larry W. Turner
September 27,1978
Ecological Effects Branch Section 1

James W. Akerman, Section Head
Ecological Effect Branch, Section 1

Clayton Bushong, Acting Branch Chief
Ecological Effects Branch

9/27/7

REPORT OF TELEPHONE CALL OR VISITOR

NOTE: Complete Items 1 thru 10 "N/A" where not applicable.

	INCOMING CALL		VISITOR
X	OUTGOING CALL		CONGRESSIONAL

DATE: 9/26/78

TIME OF CALL: 11:30

NAME AND ADDRESS OF CALLER OR VISITOR:

Glen Dudderer
F&W extension specialist
Michigan State University
Lansing

PHONE NO. (Include Area Code or FTS No.): (517) 355-7493

REGISTRATION, ID NO. OR FILE SYMBOL: 3125-237

DATE OF LATEST SUBMISSION: 8/30/77

BRIEF SUMMARY OF CONVERSATION

I called to inquire about differences in wildlife utilization of young, non-bearing fruit orchards (apples, cherries, peaches) as opposed to bearing trees. I was told that there was very little difference in use by mammals that related to the age of the trees. The treatment of the understory is more important, and is quite variable from orchard to orchard.

ACTION TAKEN OR RECOMMENDED

In general, mammalian use of these orchards is by deer, mice, porcupines, ground squirrels, woodchucks, and predators. Upland game bird use by pheasants or quail can be moderate to high, depending on the understory. However, song bird utilization is markedly decreased, except by a few birds that might nest in isolated trees, including robins, dove, song sparrows. Grackles, blackbirds, cedar waxwings, starlings, and others that eat fruit are not likely to be found unless they nest in such isolated trees.

RECORDED BY (Name)

REFERRED TO (Name)

EPA Hq Form 8500-5 (8-72) REPLACES PR FORM 1-5 WHICH MAY BE USED UNTIL EXHAUSTED.