

US EPA ARCHIVE DOCUMENT

EEB BRANCH REVIEW

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PETITION OR EXP. PERMIT NO. _____

DATE OF SUBMISSION 10-16-81

DATE RECEIVED BY HED 10-27-81

RD REQUESTED COMPLETION DATE 11-13-81

EEB ESTIMATED COMPLETION DATE _____

RD ACTION CODE/ TYPE OF REVIEW 510 / Section 18

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

DATA ACCESSION NO(S). No F&W Data Submitted (Referenced PP 6E1794)

PRODUCT MANAGER NO. D. Stubbs (41)

PRODUCT NAME(S) Monitor 4

COMPANY NAME State of Florida

SUBMISSION PURPOSE Proposed Section 18 for Celery in Florida (Leafminer)

SHAUGHNESSEY NO.	CHEMICAL, & FORMULATION	% A.I.
<u>101201</u>	<u>Methamidophos (O,S-Dimethyl Phosphoramidothioate)</u>	<u>75 %</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

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100 Section 18 Application

100.1 Nature and Scope of Emergency

The vegetable leafminer (Liriomyza sativa (Blanchard)) is the insect of major concern to celery producers in Florida. Leafminers have great potential for rapid population growth and subsequent crop damage under rigorous conventional insecticide application schedules. This is due, in part, to the very short life cycle of the leafminer, the relatively high population densities in celery, a large variety of crops suitable as hosts for the leafminer in the agro-ecosystem and the fact that few insecticides provide an acceptable mortality rate of the larvae within the celery leaf.

100.2 Target Organism(s)

Control of vegetable leafminer (Liriomyza sativa) in Florida celery.

100.3 Date, Duration

October 1981 to July 1, 1982.

100.4 Application Methods, Directions, and Rates

Directions for use were submitted by the Florida Department of Agriculture in a mailgram to EPA dated October 7, 1981. The use directions suggested for celery were application of 1 to 2 pints (0.5-1 lb. a.i.) per acre per application with a maximum of 8 applications per season made at 7-day intervals. At the option of the grower, applications may be made aurally in 3-5 gallons of water or on the ground in 40-100 gallons of water.

100.5 Treatment Areas

Limited to commercial celery production areas of Zellwood in Orange County; Belle Glade, Pahokee, and South Bay in Palm Beach County, Oviedo in Seminole County and Sarasota County. Application of Monitor 4 not to exceed 10,000 gallons of active material may be made on a maximum of 11,000 acres. The 11,000 acres of celery represent essentially all celery, since the 1980 Agricultural Statistics indicate a total of 11,557 acres of celery in Florida (9,866 acres in Palm Beach County alone).

100.6 Precautionary Labeling

No label was submitted and no precautionary labeling was included.

101 Physical and Chemical Properties

Refer to the EEB review dated 8/30/78 by N. Cook for Monitor 4, Reg. No. 3125-280.

102 Behavior in the Environment

Refer to the EEB review dated 8/30/78 by N. Cook for Monitor 4, Reg. No. 3125-280.

Toxicological Properties (Data extracted from Data Evaluation Sheets)

Test	Species	Material	LD/LC50	Validation Status
Oral LD50	Rat (Male)	95 % a.i.	15.6 mg/kg	
	Rat (Female)	95 % a.i.	13.0 mg/kg	
	Rat (Male)	75 % a.i.	21.0 (16.3-27.1) mg/kg	
	Rat (Female)	75 % a.i.	18.9 (17.2-20.8) mg/kg	
	Rat (Male)	Monitor 4?	17.8 (12.6-25.0) mg/kg	
	Rat (Female)	Monitor 4?	20.0 (13.4-29.8) mg/kg	
Dermal LD50	Rabbit	95 % a.i.?	118 (97.5-143) mg/kg	
	Rabbit	Monitor 4?	285.6 (188-432) mg/kg	
Dietary Effects				
90 days	Rat	75 % Tech.	NEL: 0.3-1.0 ppm (Erythrocyte-Che) (No deaths at 10 ppm*)	
2 years	Rat	97 % Tech.	NEL: 10 ppm (40/64 rats died at 30 ppm*, but deaths were attributed to "natural" causes)	
3-generat.	Rat	75 % Tech.	NEL: 10 ppm (3/24 parents died at 30 ppm*)	
Avian	Bobwhite (M)	75 % Tech.	10.1 (7.9-13.1) mg/kg	Core
Acute	Bobwhite (F)	75 % Tech.	11.0 (8.5-14.0) mg/kg	Core
Oral	Bobwhite	75 % Tech.?	8.0 (6.2-10.32) mg/kg	Suppl.
LD50	Mallard	75 % Tech.?	29.5 (27.3-31.9) mg/kg	Suppl.
	Dark-eyed Junco	73 % Tech.	8.0 mg/kg	Invalid
8-Day	Bobwhite	75 % Tech.	57.5 ppm	Invalid
Dietary LC50	Bobwhite	75 % Tech.	47.04 (38.7-57.2) ppm	Invalid
	Mallard	75 % Tech.	about 1000 ppm	Suppl.
	Mallard	75 % Tech.	1302 (906-1872) ppm	Core
Avian Reprod.	Bobwhite	73 % Tech.	NEL: 3 ppm (Sign. diff. p=0.01 in viable embryos, live 3-week embryos, normal hatchlings, and 14-day old survivors at 5 ppm)	Core
	Mallard	73 % Tech.	NEL: 15 ppm*	Core
Aquatic 96-Hour LC50	Bluegill	74 % Tech.	34 (30-38) ppm	Core
	Bluegill	75 % Tech.	46 (34-62) ppm	Suppl.
	Rainbow Trout	74 % Tech.	25 (21-29) ppm	Core
	Rainbow Trout	75 % Tech.	51 (36-72) ppm	Suppl.
Aquatic Invertebrate 48-Hour EC50	<u>Daphnia magna</u>	74 % Tech.	26 (20-34) ppb	Core
	<u>Daphnia magna</u>	72 % Tech.	50 (40-70) ppb	Core
	<u>Daphnia magna</u>	? % Tech.	27 (14-53) ppb	Invalid

* Highest concentration tested.

104 Hazard Assessment

104.1 Discussion

A Section 18 request for use of Monitor 4 on celery is requested by the Florida Department of Agriculture to control vegetable leafminers on no more than 11,000 acres, essentially all of Florida's celery (11,557 acres). Aerial or ground treatments are requested at 1-2 pints (0.5-1.0 lb. a.i.) per acre per application with a maximum of 8 applications at 7-day intervals per growing season from October 1981 to July 1, 1982 in Zellwood, Orange County; Belle Glade, Pahokee, and South Bay in Palm Beach County; Oviedo in Seminole County; and Sarasota County.

104.1.1 Likelihood of Exposure

Application of Monitor 4 to celery will result in residue levels of about 58 to 240 ppm on various vegetation in or immediately adjacent to treatment areas following a single treatment. Attachment 1 shows expected residue levels ranging from 104 to 432 ppm on various wildlife food items following eight applications at 1.0 lb a.i. per acre at 7-day intervals and a demonstrated Monitor residue half-life of 6 days.

Data available on wildlife in celery fields indicate that rabbits and a wide spectrum of avian species (over 50 species) utilize celery fields and adjacent areas for feeding and/or nesting. Comparison of representative toxicity values (LC50 and LD50) for mammalian and avian species with expected residue levels on food sources following one or more applications indicate that Monitor 4 is highly toxic to wildlife and will pose a threat to birds and mammals in and adjacent to treated fields.

Given avian reproduction effects in bobwhite quail at 5 ppm resulting in a significant reduction in viable embryos, live 3-week embryos, normal hatchlings, and 14-day old survivors, multiple applications may be expected to represent a chronic hazard to birds nesting in or adjacent to treated fields.

Information submitted on avian field censuses taken during January-May in 1979 in Zellwood, Florida and in April, 1979 in Belle Glade, Florida, are inconclusive due to the transient nature of these birds as seen in their fluctuating numbers and the knowledge that sick or dying wildlife are not going to remain in the relatively open areas of celery fields, rather they seek secretive areas of thick brush or burrows for refuge. Meaningful evaluation of pesticide effects on wildlife require that the fate of exposed animals must be monitored by using some type of tracking system, such as radiotelemetry or animals caged in the treatment area with sufficient space to feed on treated food sources.

Methamidophos is not very toxic to representative fish species (25-51 ppm) and it is doubtful that fish would be killed acutely by either an accidental direct spray to canals and drainage ditches that commonly transverse or surround celery fields in South Florida or from runoff of as much as 10 percent of the residues from adjacent fields even after accumulation of residues from multiple applications. However, the

frequency of applications (every 7 days for as many as 8 applications), persistence in soil, frequent rainfall, and stability in water (2 weeks to 1 month) indicate that methamidophos has the potential for chronic aquatic exposure. Summarization of bioaccumulation studies in Cook's review dated 8/30/78 indicated little accumulation in bass exposed to 0.01 and 1.0 ppm for 8 and 28 days, respectively. The highest residue level measured in bass was 0.072 ppm, which is far below levels which might adversely effect wildlife feeding on chronically exposed fish. No data are available on the potential for chronic effects of methamidophos on the reproductive capacity of aquatic species.

Methamidophos is very toxic to aquatic invertebrates. The daphnia EC50 is 26 to 50 ppb - about 1,000 fold more sensitive than fish. Concentrations of methamidophos lethal to aquatic invertebrates in adjacent shallow waters may be expected from spray drift, accidental spraying, and/or runoff from treated fields. No data are available on the chronic effects of methamidophos on aquatic invertebrates.

104.1.2 Endangered Species

Although several endangered species are to be found in counties covered by this Section 18 request, it is doubtful that many of these species would be impacted from methamidophos use on celery. The only species which might be exposed are: Bachman's warbler, eastern indigo snake, and the American alligator. The Florida panther and manatee are large mammals and are not likely to encounter sufficient concentrations to be hazardous. The bald eagle and the everglades kite feed primarily on aquatic organisms and the bass accumulation study indicated that residues should not reach levels hazardous to birds. The red-cockaded woodpecker is found only in mature forests. The brown pelican and sea turtles are found along the coastline, while celery is grown in more inland areas.

104.1.3 Adequacy of Toxicity Data

Five of the six basic fish and wildlife requirements for registration and two avian reproduction studies are available. The missing study is an avian dietary LC50 study on an upland game species. From the available toxicity data it is apparent that methamidophos use on celery might be expected to produce adverse lethal effects on mammals, birds, bird reproduction, and aquatic invertebrates. No toxicity data are available from which to evaluate the effects of chronic exposure of methamidophos on fish and aquatic invertebrate reproduction.

104.1.4 Additional Data Required

No additional data are necessary to support this Section 18 request. Prior to reregistration and/or registration of celery use, an avian dietary LC50 on an upland game species, preferably bobwhite quail. It is also desirable that field monitoring and a caged bird study be conducted to assess the impact of methamidophos use prior to the registration of this or any other spray use of methamidophos in areas of wildlife utilization. A fish embryolarvae and aquatic invertebrate life-cycle study should be submitted for the registration of outdoor methamidophos uses involving multiple applications in a single crop season. S

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Conclusions

EEB has completed a risk assessment on the proposed Section 18 of Monitor 4 for use on celery. Based on the available data EEB concludes that the proposed use will result in potentially serious hazards to nontarget organisms. Methamidophos is highly toxic to mammals, birds, and aquatic invertebrates and residues from a single application will result in levels lethal to these species in or adjacent to celery fields, which are widely utilized by rabbits and numerous avian species for feeding and/or nesting. Multiple applications will result in chronic exposures that will also effect avian reproduction. While no acute effects fish in adjacent waters, no data are available to assess the impact of chronic exposure on fish reproduction.

The impact of methamidophos use on celery on endangered species is unknown. Although numerous endangered species are found in celery-growing counties, only three species might be expected to be exposed to potentially lethal residue levels. The three species are: Bachman's warbler, the eastern indigo snake, and the American alligator.

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Attachment 1.

MAXIMUM EXPECTED RESIDUES (PPM) ON VEGETATION FOLLOWING EIGHT APPLICATIONS

Short Grass

ACCUMULATED RESIDUES

240.	RES	
8.	APP	
7.	INT	
6.	T1/2	
.8352175483		
2.710217548		
6.919450229		
16.3688581		
37.58206154		
85.2040931		
192.1119393		
432.1119393	TOT	

Leaves and Leafy Crops

ACCUMULATED RESIDUES

125.	RES	
8.	APP	
7.	INT	
6.	T1/2	
.4350091397		
1.41157164		
3.603880328		
8.525446929		
19.57399039		
44.37713182		
100.0583017		
225.0583017	TOT	

Long Grass

ACCUMULATED RESIDUES

110.	RES	
8.	APP	
7.	INT	
6.	T1/2	
0.382808043		
1.242183043		
3.171414688		
7.502393298		
17.22511154		
39.051876		
88.0513055		
198.0513055	TOT	

Forage and Small Seeds

ACCUMULATED RESIDUES

58.	RES	
8.	APP	
7.	INT	
6.	T1/2	
.2018442408		
.6549692408		
1.672200472		
3.955807375		
9.082331539		
20.59098917		
46.42705199		
104.427052	TOT	