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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

MAR 24 1993

To: Benjamin Chambliss
Registration Division

From: Anthony F. Maciorowski
Ecological Effects Branch
H7507C

Subject: New Use of Tebuconazole on Bananas and Plantains

The Ecological Effects Branch has reviewed the proposed registration of a new use for tebuconazole on bananas and plantains. EEB concluded that there are no concerns for terrestrial, aquatic or endangered species.

Enclosed is the Ecological Effects Branch review. If you have any questions please contact Conchi Rodríguez (308-2805) or Harry Craven (305-5320).



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CONCURRENCES

SYMBOL	H7507C	H7507C	H7507C				
SURNAME	Rodriguez	Craven	AM				
DATE	3/23/93	3/23/93	3/24/93				

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ECOLOGICAL EFFECTS BRANCH REVIEW

TEBUCONAZOLE (ELITE 45 DF)

100 - Submission Purpose and Label Information

100.1 Submission Purpose and Pesticide Use

Miles Corporation is requesting registration of a new use for tebuconazole. This chemical will be used on bananas and plantains for control of black leaf streak and yellow sigatoka.

100.2 Formulation Information

Active Ingredient:

Tebuconazole, a-[2-(-Chlorophenyl)-ethyl]-a-(1,1-dimethylethyl)-1H-1,2,4-triazole-1-ethanol.....45%

Inert Ingredients.....55%

100.3 Application Methods, Directions, Rates

Elite 45 DF can be applied at a rate of 3.2 ounces per acre (0.09 lb a.i./acre) as a foliar spray. It is not to be applied through any type of irrigation system. A maximum of 16 ounces per acre (0.45 lb a.i./acre) may be applied per harvest cycle. The first application is done before the disease becomes established and it can be repeated at 14 days interval if necessary. Elite 45 DF may be applied up to the day of harvest.

100.4 Target Organisms

Black leaf streak and yellow sigatoka

100.5 Precautionary Labeling

The label should read as follows:

This pesticide is toxic to estuarine and marine invertebrates. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high-water mark. Runoff may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwater or rinsate.

Hazard Assessment

Tebocunazole is a broad spectrum, systemic fungicide. It is stable in sterile water at 25 C and pH of 5, 7, and 9. Photodegradation in water takes place with half-life of approximately 600 days. The half-life in sandy loam soils under aerobic and anaerobic conditions is 610 and 400 days, respectively. Photodegradation in soil is more rapid with a half-life of 191 days. There is little potential for leaching.

Tebocunazole is very resistant in the environment, for which reason the following risk analysis will consider exposure from the total amount of active ingredient that may be applied in one growing season.

101.1

Discussion

The data requirements for the registration of this manufacturing use product were submitted by Mobay Corporation. A summary of the studies is presented here.

Guide. Ref. No.	Test Species	% a.i.	Test Type	Test Results	Study Status	MRID No.
71-1 (a)	<u>Colinus virginianus</u>	94.7	Avian Single Dose	LD50= 1988 mg/kg	Core	407009-05
71-2 (a)	<u>Colinus virginianus</u>	96.28	Acute Oral	LC50 = >5000 ppm	Core	407009-08
71-2 (b)	<u>Anas platyrhynchos</u>	96.28	Acute Oral	LC50 = >4816 ppm	Core	407009-07
71-4 (a)	<u>Colinus virginianus</u>	97	Avian Reproduction	MATC = 156-320 ppm	Core	416242-01
71-4 (a)	<u>Colinus virginianus</u>	97.4	Avian Reproduction	NOEC >73.5 ppm	Core	407009-10
71-4 (b)	<u>Anas platyrhynchos</u>	97.4	Avian Reproduction	NOEC >75.8 ppm	Core	407009-09

71-4 (b)	<u>Anas platyrhynchos</u>	96.9	Avian Repro- duction	MATC = 320- 611 ppm	Supp.	418183 -01
72-1 (a)	<u>Lepomis macrochirus</u>	96.28	Acute Toxicity	LC50 = 5.7 ppm	Core	407009 -12
72-1 (c)	<u>Salmo gairdneri</u>	96.28	Acute Toxicity	LC50 = 4.4 ppm	Core	407009 -11
72- 2(a)	<u>Daphnia magna</u>	96.28	Acute Toxicity	EC50 = 4.0 ppm	Core	407009 -13
72-3 (a)	<u>Cyprinodon variegatus</u>	96.28	Acute Toxicity	LC50 = 5.9 ppm	Core	409959 -04
73-3 (b)	<u>Crassostrea virginica</u>	96.28	Shell Deposi- tion	EC50 = 2.7 ppm	Core	409959 -03
73-3 (c)	<u>Mysidopsis bahia</u>	96.28	Acute Toxicity	LC50 = 0.49 ppm	Core	409959 -02
72-4 (a)	<u>Salmo gairdneri</u>	96.3	Fish Early Life Stage	MATC 12-25 ppb	Core	407009 -14
72-4 (a)	<u>Cyprinodon variegatus</u>	97.5	Fish Early Life Stage	MATC 21.9- 47.5 ppb	Core	420382 -02
72-4 (b)	<u>Daphnia magna</u>	96.28	Life Cycle	MATC 0.12- 0.23 ppm	Core	407009 -15
72-4 (b)	<u>Mysidopsis bahia</u>	97.5	Life Cycle	MATC 35-61 ppb	Core	420382 -01

Likelihood of Adverse Effects to Non-target Organisms
Terrestrial Organisms

The data submitted by the registrant showed that Tebuconazole is slightly toxic to bobwhite quail (LD50 = 1988 mg/kg) on an oral basis. It also shows that Tebuconazole is practically non-toxic to the bobwhite quail (LC50 >5000 ppm) and to the mallard duck (LC50 >4816 ppm) in a dietary study.

Avian reproduction studies indicate that the NOEC and LOEL for the mallard duck are 320 and 611 ppm respectively. The NOEC and LOEL for the bobwhite quail are 156 and 320 ppm respectively.

The following residues on different substrates will be expected after a single application of 0.09 lbs ai/acre and following the maximum seasonal application rate of 0.45 lb ai/acre:

Substrate	Residues (ppm)	
	0.09 lbs ai	0.45 lbs ai
Short Grass	21.6	108
Long Grass	9.9	49.5
Leaves and Leafy Crops	11.25	56.25
Forage, alfalfa, clover	5.22	26.1
Pod Containing Seeds	1.08	5.4
Fruit	0.63	3.2

Residues of tebuconazole after one application (0.09lb ai/acre) will not affect birds. The residues are lower than the NOEC (156 ppm) for the quail and lower than 1/10 of the LC50 (481.6 ppm) for the mallard duck. Average residue in short grass after 5 applications (14 days intervals) is 61.8 ppm, the maximum residue is 97.8 ppm (See Appendix 1). Residues after application of the maximum seasonal rate (0.45 lbs ai/acre) will not affect birds.

Aquatic Organisms

The data submitted by the registrant showed that Tebuconazole is moderately toxic to the bluegill sunfish (LC50 = 5.7 ppm), to the rainbow trout (LC50 = 4.4 ppm) and to water flea (Daphnia magna) (LC50 = 4.0 ppm) on an acute basis. Tebuconazole is moderately toxic to estuarine organisms with an LC50 of 5.9 ppm for sheepshead minnow, 2.7 ppm for eastern oyster. It is highly toxic to mysid shrimp (Mysidopsis bahia) with an LC50 of 0.49 ppm.

Chronic studies show that the MATC for rainbow trout is between 12-25 $\mu\text{g}/\text{l}$. The affected parameter for the trout was larval survival. The MATC for the sheepshead minnow is between 21.4-47.5. The affected parameter was reproductive success. The rainbow trout seems to be the most sensitive organism.

Chronic studies for aquatic invertebrates showed that the MATC for the water flea (Daphnia magna) is between 0.12-0.23 ppm (geometric mean 0.16 ppm). The affected parameters were adult length and number of young produced. For estuarine invertebrates, the MATC for the mysid shrimp (Mysidopsis bahia) is 35-61 ppb). The affected parameter was reproductive success.

The estimated environmental concentration (EEC) after 5% runoff of a single application of 0.09 lb ai/acre to a 6 feet deep pond is estimated to be 2.7 ppb (Appendix 2). Average residues after 5 applications with 14 days intervals are 8.2 ppb (Appendix 3). The maximum residue is 13.1 ppb which occurs at the time of the fourth application (Appendix 3). This concentration does not exceeds acute or chronic levels of concern for fish or aquatic invertebrates since the LOEL for rainbow trout, the most sensitive species, is 25 ppb.

The estimated environmental concentration (EEC) after 5% runoff of the maximum seasonal application rate of 0.45 lb ai/acre to a 6 feet deep pond is estimated to be 13.7 ppb (Appendix 2). This concentration does not exceeds acute or chronic levels of concern for fish or aquatic invertebrates since the LOEL for rainbow trout, the most sensitive species, is 25 ppb.

The major concern is with repeat applications. Given that environmental fate studies show no degradation after 28 days in waters ranging from pH 5 to 9, residues could rise to levels that would adversely affect freshwater and estuarine species.

The risk assessment cannot be completed for non-target aquatic plants. No valid studies has been submitted to the Agency.

101.3

Endangered Species Considerations

Tebocunazole is not expected to affect endangered species as a result of this use pattern.

101.4 Adequacy of Toxicity Data

The following is a data gap:

122-2 Aquatic Plant Growth Selenastrum capricornutum

Aquatic plant studies are required for fungicides with a water solubility > 10 ppm.

101.5 Adequacy of Labeling

The label should include the following:

This pesticide is toxic to estuarine and marine invertebrates. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high-water mark. Drift and runoff may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwater or rinsate.

103 Conclusions

The Ecological Effects Branch has completed the review for a new use pattern (bananas and plantains) for tebocunazole. There are no concerns for terrestrial, aquatic or endangered species. A risk assessment can not be completed for aquatic plants due to the lack of an algae study.

Concepción Rodríguez
Biologist
Ecological Effects Branch

Concepción Rodríguez
3/23/93

Henry T. Craven
Supervisory Biologist
Ecological Effects Branch

Henry T. Craven
3/23/93

Anthony F. Maciorowski, Chief
Ecological Effects Branch

HTC for
3/23/93

DAILY ACCUMULATED PESTICIDE RESIDUES---MULTP. APPL.

Chemical name ----- Tebocunazole
Initial concentration (ppm) ----- 21.6 *Short grass*
Half-life ----- 191
A number of application ----- 5
Application interval ----- 14
Length of simulation (day) ----- 75

DAY RESIDUE (PPM)

0	21.6
1	21.52176
2	21.44379
3	21.36612
4	21.28872
5	21.2116
6	21.13476
7	21.0582
8	20.98192
9	20.90591
10	20.83018
11	20.75472
12	20.67954
13	20.60463
14	42.12999
15	41.97738
16	41.82531
17	41.67381
18	41.52284
19	41.37243
20	41.22256
21	41.07323
22	40.92445
23	40.7762
24	40.62849
25	40.48131
26	40.33466
27	40.18856
28	61.64298
29	61.41968
30	61.19718
31	60.9755
32	60.75462
33	60.53454
34	60.31526
35	60.09677
36	59.87907
37	59.66216
38	59.44604
39	59.23069
40	59.01613
41	58.80235
42	80.18933
43	79.89885

44	79.60942
45	79.32104
46	79.03371
47	78.74741
48	78.46215
49	78.17792
50	77.89473
51	77.61255
52	77.33141
53	77.05127
54	76.77216
55	76.49405
56	97.81696
57	97.46262
58	97.10957
59	96.75778
60	96.40729
61	96.05805
62	95.71008
63	95.36338
64	95.01793
65	94.67374
66	94.33078
67	93.98907
68	93.64859
69	93.30936
70	92.97135
71	92.63456
72	92.29899
73	91.96464
74	91.63151
75	91.29957

Maximum residue	-----	97.81696
Average residue	-----	61.86234

APPENDIX 2

CALCULATION SHEET FOR ESTIMATED ENVIRONMENTAL CONCENTRATION (EEC)

1. For foliar application at one application rate of 0.09 lb a.i./acre to bananas and plantains. Solubility of Tebocunazole is 25 ppm.

For un-incorporated ground application

Runoff

$$0.09 \text{ lbs ai} \times 0.05 \text{ (5\% runoff)} \times 10 \text{ (A) (from a 10 A drainage basin)} = 0.045 \text{ lbs Total Runoff}$$

EEC of 1 lb ai direct application to 1 acre pond 6 feet deep is 61 ppb.

Therefore, EEC = 61 ppb X 0.225 lbs = 2.7 ppb at 6 feet

2. For foliar application at the maximum seasonal rate of 0.45 lb a.i./acre to bananas and plantains. Solubility of Tebocunazole is 25 ppm.

For un-incorporated ground application

Runoff

$$0.45 \text{ lbs ai} \times 0.05 \text{ (5\% runoff)} \times 10 \text{ (A) (from a 10 A drainage basin)} = 0.225 \text{ lbs Total Runoff}$$

EEC of 1 lb ai direct application to 1 acre pond 6 feet deep is 61 ppb.

Therefore, EEC = 61 ppb X 0.225 lbs = 13.7 ppb at 6 feet

DAILY ACCUMULATED PESTICIDE RESIDUES---MULTP. APPL.

Chemical name -----
Initial concentration (PPM) -----
Half-life -----
A number of application -----
Application interval -----
Length of simulation (day) -----

Tebocunazole
2.7 PPB EEC at 6 feet
600
5
14
75

DAY RESIDUE (PPM)

0	2.7
1	2.696883
2	2.693769
3	2.690659
4	2.687552
5	2.684449
6	2.68135
7	2.678254
8	2.675162
9	2.672073
10	2.668988
11	2.665907
12	2.662829
13	2.659754
14	5.356684
15	5.350498
16	5.344321
17	5.33815
18	5.331988
19	5.325831
20	5.319682
21	5.31354
22	5.307405
23	5.301277
24	5.295157
25	5.289043
26	5.282936
27	5.276837
28	7.970744
29	7.961541
30	7.952349
31	7.943167
32	7.933996
33	7.924836
34	7.915686
35	7.906547
36	7.897418
37	7.8883
38	7.879193
39	7.870096
40	7.861009
41	7.851932
42	10.54287
43	10.5307

44	10.51854
45	10.50639
46	10.49426
47	10.48214
48	10.47004
49	10.45795
50	10.44588
51	10.43382
52	10.42177
53	10.40974
54	10.39772
55	10.38571
56	13.07372
57	13.05863
58	13.04355
59	13.02849
60	13.01345
61	12.99843
62	12.98342
63	12.96843
64	12.95345
65	12.9385
66	12.92356
67	12.90864
68	12.89373
69	12.87885
70	12.86398
71	12.84913
72	12.83429
73	12.81947
74	12.80467
75	12.78989

Maximum residue	-----
Average residue	-----

13.07372
8.260943