

EEE BRANCH DIVISION

DATE: IN _____ OUT _____ IN _____ OUT _____ IN 4/5 OUT 4/24/78

FISH & WILDLIFE

ENVIRONMENTAL CHEMISTRY

EFFICACY

FILE OR REG. NO. 100-200

PETITION OR EXP. PERMIT NO. _____

DATE DIV. RECEIVED 3/3/78

DATE OF SUBMISSION _____

DATE SUBMISSION ACCEPTED _____

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

DATA ACCESSION NO(S). 096859, 096860, 096861, 096862, 096863

PRODUCT IER. NO. 16

PRODUCT NAME(S) Curacron

COMPANY NAME Ciba-Geigy

SUBMISSION PURPOSE New Compound - Cotton Expedited Review

CHEMICAL & FORMULATION CGA 15324 6E 59.6%

Profenophos

200.0 Introduction

This is a 2A submission for new registration of a new compound.

200.1 Label Claims

1. For use on cotton only 0.5 - 1# ai/A to control Bollworm, Budworm, Leaf Perforator, Beet armyworm and Boll weevil. Minimum 5 gpa ground and 1 gpa air.
2. Maximum is 4 quarts (6# ai) per season. 14 day PHI.
3. Tank mixing with guthion and methyl parathien is implied on the label.
4. Note the attached label copy.

200.2 Background

1. Note our review of 4/26/77 for 100-EUP-55.
2. In 202.0 of that review we asked for the following in addition to efficacy studies:
 - a. An explanation of the nature of the phytotoxic responses.
 - b. flavor evaluations.
 - c. compatability studies.
 - d. effects on beneficial insects.

201.0 Submitted Data

1. Accession Numbers - 096861, 096862, 096859, 096850, 096863.
2. Evaluation of Performance
 - a. Budworm/Bollworm, H. zea & H. nivescens. There were 69 tests of some validity submitted for this use pattern.

Geographic distribution is as follows:

Al - 3	Tx - 10	Ok - 2
Ms - 21	Ca - 9	NC - 3
Ga - 3	SC - 5	
La - 7	Ark - 2	

As the summary for these tests is over 50 pages long, it is not attached to this review (the reviewer is in the possession of a copy). Overall, the performance of the compounds in the submitted data was as follows:

<u>Test Compound</u>	<u>AI/Acre Rate</u>	<u>Squares X % Dam</u>	<u>Bolls X % Dam</u>	<u>Yield; # Seed Cotton/Acre:</u>
Curacron	0.5	21.6	10	Insufficient Data
Curacron	0.75	11	13	1572
Curacron	1.00	11.8	10	1481
Permethrin	0.1	13	Insuf. Data	1834
Pyarin	0.1	4.2	5	2019
Bolstar	1.0	15	14	1679
EPN & MP comb.	var.	13	15	1480
Lannate	0.5-1.0	6.4	Insuf. Data	Insufficient Data
Checks	0	32.1	37.9	572

As can be seen, there is little correlation between damage in yield where the data can be derived (check damage in the input data ranged from 6.5 - 95%, X 32.1%).

<u>% Damage</u>	<u>Projected yield</u>	<u>Comment</u>
4.2	1563	Pydrin
6.4	1499	Lannate (methomyl)
7.0	1482	{ commonly used
		{ range for
10.0	1394	{ economic threshold
11.3	1355	Curacron 0.75
11.8	1342	Curacron 1.00
12.6	1319	Permethrin
13.3	1298	EPN & MP comb.
14.6	1261	Bolstar
21.6	1057	Curacron 0.5
30.0	814	
32.1	753	$\bar{X}$ all checks
40.0	524	
50.0	234	
60.0	0	

While the previous chart predicts overall merit, it does not differentiate between a compounds ability to perform at various infestation pressures. It only evaluates a compound at the medium pressure of 32.1% damage. The following chart further projects pressure/response of the various materials in the submitted data.

<u>Compound, Dose</u>	<u>Pressure and Resulting Damage</u>							
	<u>7</u>	<u>10</u>	<u>20</u>	<u>30</u>	<u>40</u>	<u>50</u>	<u>60</u>	<u>70</u>
Curacron 0.5	0	2	8	14	21	27	33	39
Curacron 0.75	1	2	6	11	16	20	25	29
Curacron 1.00	0	1	5	9	13	16	20	24
EPN & MP Var.	0	0	6	11	17	23	28	33
Permethrin 0.1 - 0.2	0	0	2	6	10	14	18	21
Pydrin 0.1 - 0.2	3	3	4	4	5	5	6	6
Methomyl 0.5	2	3	6	10	13	17	20	24
Bolstar 1.0	0	0	3	7	11	16	20	24

Thus, at low pressure (<20%) about all of the materials perform satisfactorily.

At moderate pressure (20 - 50%) the EPN & MP standards and Curacron at 0.5 - 0.75 would not be recommended. Pydrin is still below threshold level, the others are "satisfactory".

At high pressure (60-70%) the only compound with good performance is pydrin. Permethrin shows utility perhaps. Curacron 1.00, bolstar and methomyl still show activity, but only 65% control is achieved. Note that of the above compounds, only EPN & MP and methomyl are registered.

- b. Cotton Leafperforator (Bucculatrix thurberiella)

8 tests submitted, 2 from Texas and 6 from California. Overall, the results were as follows:

<u>Rate</u>	<u>% Control All Stages Reported</u>	<u>$\bar{X}$</u>
0.5	0, 94, 78, 65	59
0.75	85, 92, 75	84
1.00	83, 98, 93	91

The 0.75 - 1.00# rates are satisfactory. The 0.5# rate may or may not be sufficient, but more data is necessary to explain the lack of control in 1 test and poor control in another.

c. Beet Armyworm (Spodoptera exigua)

9 tests submitted. 3 tests do not permit good evaluation. Of the 6 tests remaining (Miss. - 1, Al. - 1, N.C. - 1, S.C. - 3) there are no evaluations of the 0.5# rate. The other results are as follows:

<u>Dose</u>	<u>% Control</u>	<u>$\bar{X}$</u>
.75	72, 91, 97, 88	87
1.00	80, 92, -, 90	87

Obviously these data are somewhat deficient for the Western U.S.

d. Boll Weevil (Anthononous grandis).

Only 9 tests for Boll Weevil were submitted. Considering the importance of this insect, this is surprising. Of these 9 tests, in test 36, the Boll Weevil data has been omitted. In tests 39, 40, & 63 the infestation pressure was extremely low (<1%!). This leaves only 5 valid studies; all from the 4E.

<u>Test</u>	<u>Site</u>	<u>Dose</u>	<u>% Dam Sq.</u>	<u>Check</u>
32	Al.	0.5	45	46
2	S.C.	0.75	3	13
		1.00	3	13
64	La.	0.75	21.7	32.3
35	La.	1.00	4.6	18.4
38	La.	1.00	4.6	6.6

The sketchy performance in these small plot tests gives the impression that much is yet to be learned about this compound and Boll Weevil.

Three tests were submitted in combination with Guthion 0.25 for weevil control. No weevil data was submitted for test 33. In the other tests, one (46) looks promising while the other (42) does not. Only one test was submitted with Methyl Parathion.

All in all, there is too little data to evaluate these tank mixes.

3. Adverse Effects

- a. Beneficials. Several tests address the impact of Curacron on parasites and predators. It is apparently fairly toxic to Big Eyed Bugs (bepcoris), Trichogramma, and Nabids. It is somewhat toxic to Minute Pirate Bugs (Oryz) and of low to moderate toxicity against lacewings, spiders, and ladybird beetles. It appears to be no better or worse than existing registered compounds.
- b. Pollinators. This compound is quite residually toxic to bees. The Johansen Report indicates the following:

Material	#Acre	3hr - LB	AB	HG	8 hr - LB	AB	HB
PP557 2EC	.125	100	90	100	88	78	93
Curacron 4EC	1.0	100	97	99	98	52	38

LB = Leafcutter Bee

AB = Alkali Bee

HB = Honey Bee

Actually, though, the effect on the bees is apparently only through prolonged exposure. Atkins tests indicate an LD₅₀ of 3.462 ug/Bee.

- c. Phytotoxicity. There is no doubt that phytotoxicity occurs with this compound. In tests 38, 39, 40, 45, 58, & 59 some degree of phytotoxicity was described by the researcher at 0.75 - 1.00# ai/A with only 3 sprays. This phytotoxicity was described as; "reddening of leaves"...."customary leaf reddening"...."older leaves stripped with purple spots"....and "moderate phyto.". There were two specifically valid phytotoxicity tests. 4 (Miss) and 5 (Calif). Results of these follow:

<u>Test</u>	<u>Rate</u>	<u>#APPS</u>	<u>INT</u>	<u>Acala</u>	<u>Lockett</u>	<u>Coker 310</u>	<u>DPL 16</u>	<u>Stoneville 213</u>	<u>$\bar{X}$</u>
4	1.0	23	4-7	1.0	0.7	1.0	0.8	0.7	0.8
	2.0		G	1.4	2.0	1.9	1.3	1.1	1.5
	4.0			2.7	3.6	3.5	2.8	2.5	3.0
5	1.0	20	5-7	1.9	2.1	1.9	1.9	1.9	1.9
	2.0		G	3.0	3.0	3.0	3.0	3.0	3.0

As 3.0 is normally the commercial cut-off phytotoxicity, and the company did not submit the photographs requested in our E.U.P., it would seem that a label statement is warranted.

4. Flavor and Palatability

- a. Tests were made on chickens and cows using spiked feed. Results as follows:

<u>Cows</u>		<u>Pre-test</u>	<u>Post-treat.</u>
<u>ppm</u>	<u>Dose</u>	<u>Consumption</u>	
0	-	18.7 kg/kay	23.9
.25	0.4x	22.9	24.7
.75	1.3x	21.0	25.3
2.5	4x	22.6	24.2

<u>Chickens</u>		<u>Consumption</u>
<u>ppm</u>	<u>Dose</u>	
0	-	104.5 gm/bird/day
.25	0.4x	104.3
.75	1.3x	103.0
2.5	4x	103.5

- b. Tests on human subjects by University of Wisconsin. Two samples tested, 1 from Arizona and 1 from Mississippi.

Az - The test samples were derived from fields treated 10 times at 1 & 2# ai/A. The 1# rate showed some off-flavor, but nothing statistically significant. The

2# rate showed significant off-flavor in both oil and salad dressing.

Miss. - Six applications 1 & 2# ai/A. No off-flavors for either oil or salad dressing were recorded.

The results should be considered on the basis of table rate 6 (@ 1#) or 6# total ai/season. Thus:

Miss 1# = 1x
Az. 1# = 1.75x
Miss 2# = 2x
Az. 2# = 3.33x

Therefore, no off-flavor occurred at 1x - 2x. Off-flavor did occur at 3x. This isn't surprising with a phytotoxic compound like this.

202.0

Conclusions

1. Budworm/Bollworm, Cotton Leafperforator ...N.A.C.
2. Beet Armyworm - O.K. for Eastern U.S. only.
3. Boll Weevil - Data quite deficient for registration.
4. Phytotoxicity - An O.P. reddening statement appears warranted.
5. Flavor - Letter comment to inform the agency of adverse effects is necessary.
6. Beneficials - New "unofficial" bee statement as for Pydrin - Permethrin is called for.
7. Because of various factors, the 6# max ai/A/season rate should not be increased without additional phytotoxicity and flavor evaluation data.

202.1

Claims Supported

1. The data are acceptable to support label claims for Bollworm/Budworm and Cotton Leafperforator.

202.2 Claims Not Supported

1. The label claims for Boll Weevil are not supported by the submitted data. Additional data are necessary to support these claims.

202.2.1 Modified Claim Supported

1. The claim for Beet Armyworm would be accepted if restricted to Eastern U.S. only.

202.2.2 Other

1. The warranty disclaimers would appear to be unacceptable.
2. The label should bear a statement that prolonged use of this product at high rates is likely to cause reddening in cotton.
3. The bee statement should be amended to read:

"This product is toxic to bees exposed to direct treatment or residues on crops or weeds. Do not apply this product or allow it to drift to crops or weeds on which bees are foraging. Additional information may be obtained from your Cooperative Extension Services."

4. While the combined data indicate little chance for adverse effects from phytotoxicity or off-flavor from applications according to label directions, the potential for adverse effects is demonstrated in the organoleptic and phytotoxicity studies. For this reason, any increase in rate or number of applications must be supported by additional palatability and phytotoxicity studies.

Phil Hutton, Entomologist
Efficacy Section, EEEB