UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

OFFICE OF
PESTICIDES AND
TOXIC SUBSTANCES

March 22, 1990

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MEMORANDUM

SUBJECT: Biological Evaluation of Public Interest Documentation Submitted by Ecogen Inc. in Support of Section 3 Conditional Registration for Foil Oil Flowable Bioinsecticide for Control of Colorado Potato Beetle, European Corn Borer, armyworms and loopers in Irish Potatoes.

FROM: Pat Bagley, Entomologist/Efficacy Reviewer
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TO: Dave Brassard, Senior Entomologist
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DWB

THRU: Phil Hutton - Product Manager 17
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INTRODUCTION

I have reviewed the Public Interest Documentation submitted by Ecogen Inc. in support of their request for a Section 3 Conditional Registration and am submitting the following discussion and conclusions for your consideration.

The active ingredient in Foil Oil Flowable (Foil OF) Bioinsecticide is Bacillus thuringiensis subspecies kurstaki strain EG2424. This strain has been altered by intraspecies transconjugation. The Agency has determined that the Bacillus thuringiensis registration standard (December 1988) covers strains that have been altered in this manner. The applicant is proposing conditional registration of a 0.64 lb ai/gallon oil flowable formulation for control of Colorado potato beetle (CPB), European corn borer (ECB), armyworms and loopers.

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The applicant makes the following claims for a public interest finding:

1. Foil OF is effective against strains of CPB which have developed resistance to currently registered conventional chemicals.

2. This product is unique in that it controls both Colorado Potato Beetle and caterpillars. Foil OF has a broader spectrum of activity than any Bt product currently registered.

3. The product has been shown to be as effective as currently registered conventional chemical pesticides. In addition, Foil OF has been shown to be as effective as Kryocide for control of resistant CPB in the Long Island, New York potato growing region (a Section 18 use). Kryocide has repeatedly been granted Section 18 registrations in spite of its lack of progress towards a Section 3 registration. Foil OF offers growers an effective and less toxic alternative to Kryocide.

4. Extensive testing on potatoes has shown that Foil OF is consistently more efficacious than currently registered Bt-based products against CPB.

5. Foil offers farmers an effective and less toxic alternative to current products.

DISCUSSION

In support of these claims the applicant has submitted efficacy data from the following field trials:

Control of Colorado Potato Beetle and European Corn Borer on Potatoes in Delmar, DE 1988.

		6-18-88			
Treatment	Rate/A	No. of Large CPB Larvae	No. of CPB Adults	No. of ECB Tunnels/ 100 Stems	% Def.
Foil OF	2 qts	7.25a	1.75a	22.0 a	44.5 a
Foil OF	4 qts	0.5 a	0.5 a	14.75a	37.5 a
Vydate	1.0 lb ai	0.25a	0.5 a	49.25b	38.25a
Untreated	-	55.25b	41.5 b	80.5 c	95.5 b

Means followed by the same letter are significantly different by Duncan's Multiple Range Test (p=0.05).

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Control of Colorado Potato Beetle at South Deerfield, Massachusetts in 1988.

Treatment	Rate/A	July 22 No. of Early Larvae	July 22 No. of Late Larvae	July 22 % Defol.	Yield cwt/A
Foil OF	2 qt	0.5a	1.6b	7.5	139.7
Foil OF	4 qt	0.6a	0.5a	5.0	213.0
Asana 1.9 EC	0.5 lb ai	3.5b	5.2c	17.0	168.8
Untreated	-	*	*	*	73.4

Means followed by the same letter are not significantly different by Duncan's Multiple Range Test (p=0.05).

* Control plants were greater than 90% defoliated.

Control of Resistant Colorado Potato Beetle in Potatoes in Riverside, New York, 1989.

Treatment 1/	Rate/A	No. of large CPB larvae 2/	Defoliation 3/
Untreated	---	124b	7.8d
Foil OF	3 qt	37a	2.0a
Foil OF	4 qt	33a	1.8a
Kryocide	12 lb	24a	2.0a
Trident I	4 qt	100b	4.5c
M-One 5.6	2 qt	95b	3.3b

Means followed by the same letter are not significantly different by Duncan's Multiple Range Teat (p=0.05).

1/ Treatments applied on June 27, July 3, 11, 19, 25 and August 2, 1989.

2/ Seasonal mean number of large CPB larvae per 10 foot of row.

3/ Mean defoliation rating of potatoes per 10 foot of row. 0 = No Injury, 10 = Complete Defoliation

The above data from Delaware and Massachusetts indicate that Foil OF used at the 4 qt/A rate provided reduction in CPB numbers equal to or better than two industry standards, Vydate and Asana. Foliage protection and % defoliation from CPB with 4 qt/A Foil OF were equal to or better than the Vydate and Asana treatments. Foil OF at the 4 qt/A rate provided higher yields than Asana in the Massachusetts study. Foil at both the 2 qt/A and 4 qt/A rates provided significantly better protection from ECB tunneling than Vydate used at 1.0 lb ai/A (highest labeled rate) or the untreated control. Since Vydate is not labeled for ECB control in potatoes, comparisons between Foil OF and Vydate ECB control are not valid.

The data from Riverside, New York, which tested populations of CPB that are highly resistant to most conventional insecticides, indicate that Foil OF is more efficacious than the recently registered Bt products, Trident (Bacillus thuringiensis variety tenebrionis) and M-One (Bacillus thuringiensis variety San Diego), for control of CPB when used at comparable rates. The data also indicate that Foil OF provided equal to or better control of CPB when compared to Kryocide. Kryocide has become the standard CPB control material on Long Island in recent years.

It is well known and documented 1/ that under severe pesticide induced selection pressure, CPB have displayed resistance to every conventional pesticide currently labeled for CPB control in potatoes. Introduction of new control agents such as Foil OF will provide alternatives to control this pest. In addition, aldicarb, which is one of the most effective and widely used insecticides for early to mid season CPB control in potatoes is under special review. The loss of aldicarb would remove one of the most effective CPB control materials available for potatoes.

Conclusions

The following comments are offered with regard to the claims listed above:

Claim 1 indicates that Foil OF is effective against strains of CPB which have developed resistance to currently registered conventional chemicals.

Response: Two of the above tests were performed in areas with known populations of resistant CPB (New York and Massachusetts). Therefore, the data provided for Foil OF have demonstrated efficacy against strains of CPB which are resistant to registered conventional chemicals.

Claim 2 states that the product is unique in that it controls both CPB and lepidopterous pests and has a broader spectrum than other Bt products currently registered.
Response: Foil is the only known microbial insecticide that is effective against both Colorado potato beetle and European corn borer. It is unique for a microbial insecticide to have activity on both a coleopteran and lepidopterous pests. Carbofuran, a conventional insecticide, is also registered for use on potatoes against these two pests.

Claim 3 indicates that Foil OF is as effective as commonly used conventional insecticides and offers growers an effective and less toxic alternative to Kryocide.
Response: The above data indicate that Foil OF provides control of CPB which is equal to or better than control provided by the registered conventional insecticides, Asana and Vydate, or the Section 18 material, Kryocide. Foil OF would offer growers an effective alternative to Vydate, Asana or Kryocide. The claim that Foil OF is a less toxic alternative to Kryocide is deferred to the risk-assessment portion of the Agency. Two insecticides for CPB control, aldicarb and carbofuran, are currently under Agency Special Review.

Claim 4 states that Foil OF is consistently more efficacious than currently registered Bt-based repellents.
Response: The submitted data indicate that Foil OF is more efficacious for control of CPB than the two Bt-based products which are registered for the same use, however, the registrant would need to provide more data to support the claim that "Foil OF is consistently more efficacious than currently registered Bt-based repellents". Additional data, not provided by the registrant, indicate that Foil OF provides control equal to or better than Trident when used at comparable application rates 2/.

Claim 5 states that Foil OF offers farmers an effective and less toxic alternative to current products.
Response: Foil OF does offer an effective alternative to other products registered for use on the same sites including oxamyl, carbofuran, aldicarb, parathion, azinphos-methyl and the synthetic pyrethroids permethrin and es-fenvalerate. In addition, Foil OF provided equal to or better control of CPB than Bacillus thuringiensis variety San Diego or Bacillus thuringiensis variety tenebrionis when used at comparable application rates.

The documentation provided is sufficient to support a Public Interest Finding for Foil Oil Flowable Bioinsecticide.

cc: Dave Brassard Mike Mendelsohn
Dave Thomas

REFERENCES

Casagrande, R.A. 1987. The Colorado Potato Beetle: 125 Years of Mismanagement. Bull. Entomol. Soc. Amer., Volume 33, p 142-150.

Slocombe, A. C., D.N. Ferro and A.F. Tuttle. Colorado Potato Beetle Control on Potato, 1988. Insecticide & Acaricide Tests, Volume 14, paper number (92E).