Since the same plastic base was used for both ribbons and flakes, the main factor in the greater effectiveness of the flakes was probably the increased surface area. It is likely that the initial effectiveness was due to the release of the temephos present on the surface of the plastic base, while the lack of prolonged effectiveness was due to an insufficient migration of the temephos from the plastic matrix.

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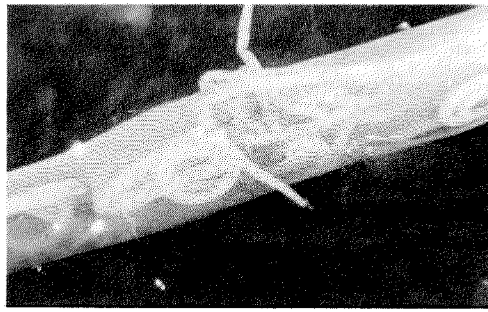

Fig. 1. *Romanomermis culicivorax* along leaf sheath and inside hollow portion of plant stem debris.

ASSOCIATION OF PLANT DEBRIS AND *ROMANOMERMIS CULICIVORAX*, A NEMATODE PARASITE OF MOSQUITOES

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The mermithid nematode, *Romanomermis culicivorax* Ross and Smith, has been studied extensively in the laboratory as a biocontrol agent of mosquito larvae. However, there still remain substantial gaps in our knowledge of the bionomics of this nematode under field conditions.

In studies to determine the depth of penetration by postparasites and adults of *R. culicivorax* in Louisiana soils, we unexpectedly encountered great difficulty in attempting to retrieve a predetermined number of nematodes from soil cores collected from fallow rice fields. The cores were established by forcing polyvinylchloride pipes (10 cm × 27 cm) into the soil and subsequently placing a known number of nematodes on the soil surface inside the pipes. The cores were left undisturbed for ca. 1 wk to allow the nematodes to penetrate into the soil. Following the exposure period, the pipes with the soil cores were removed from the field and taken to the laboratory. Each core was removed from the pipe and transversely sectioned along its entire length at 2 cm intervals. The individual portions were subjected to a soil washing process and strained through a series of graduated sieves.

Because of the consistently low percentage of retrieved nematodes, a closer examination was made of the soil and plant debris remaining in the sieves following the soil washing process. This examination revealed a substantial number of nematodes entwined among themselves and plant debris which inhibited their passage through the smaller mesh sieves. It was not uncommon also to find nematodes within the hollow portions of plant stems present in the soil samples. For example, a longitudinal incision was made along one side of a stem and several nematodes were removed. Nematodes were also found in other hollow stems as well as in between the interfacial spaces of leaf sheathes and stems (Fig. 1). After removal from the plant debris the nematodes were positively identified as *R. culicivorax*.

This is believed to be the first report associating *R. culicivorax* with plant debris in riceland soils. These initial observations indicated that hollow plant stems were used as harborage by some nematodes. It is not proposed that an obligatory relationship exists between *R. culicivorax* and plant debris or even that there is a possible association with living plant tissues. However, we want to alert other researchers to the difficulties that may be encountered if retrieval of nematodes from soil is involved in a proposed study.

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FIELD EVALUATION OF *BACILLUS THURINGIENSIS* VAR. *ISRAELENSIS* FOR CONTROL OF *AEDES TAENIORHYNCHUS* IN SALT MARSH POOLS[1]

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INTRODUCTION

Bacillus thuringiensis var. *israelensis (Bti)* was originally isolated from soil samples taken from mosquito-producing sites in Israel by Goldberg and Margalit (1977). Laboratory tests have shown the delta-endotoxin of *Bti* to be extremely toxic to mosquito larvae (de Barjac 1978, Garcia et al. 1980). Field data are limited, however, regarding the efficacy of

[1] Paper No. 8471 of the Journal Series of the North Carolina Agricultural Research Service, Raleigh, NC. Use of trade names in this publication does not imply endorsement of the products named or criticism of similar ones not mentioned.

Table 1. Efficacy of Vectobac®, a wettable powder formulation of *Bacillus thuringiensis* var. *israelensis (Bti)*, applied at 2 rates for control of *Aedes taeniorhynchus* larvae in salt marsh pools, Pamlico Co., NC, October 21–23, 1981.

Replicate[a] (pool)	Rate of applicaton (kg/ha)	Rate of applicaton (IU/ml)	Salinity (ppt)	Ave, no. larvae/dip (% control)[b] Pre-treatment	1 day Post-treatment	2 days Post-treatment
1	1.0	4.4	17.0	131	0 (100)	0 (100)
2	1.0	2.2	16.0	74	2 (96.7)	0 (100)
3	1.0	5.9	16.0	105	0 (100)	0 (100)
4	0.1	0.3	13.5	206	171 (0)	211 (32.9)
5	0.1	0.6	11.5	279	425 (0)	Dry
6	0.1	0.6	12.5	71	96 (0)	114 (0)
7	Untreated		13.0	122	109	220
8	Untreated		13.7	153	114	200

[a] Each replicate was an isolated pool. Pools ranged in size from 0.4 to 2.3 m², and 2.5 to 10.2 cm deep on the day of *Bti* application.

[b] Average no. larvae per dip based on 10 dips with a 0.47 liter enameled dipper in each pool. Percent control was corrected using Abbott's formula.

various commercial formulations of *Bti* for control of mosquitoes in brackish waters. Garcia and Desrochers (1980) conducted preliminary field trials of a Sandoz formulation (WDC-I) of *Bti* for control of *Aedes dorsalis* (Meigen) and *Culex tarsalis* (Coq.) in brackish water habitats in California. Purcell (1981) studied the effects of a Biochem Products wettable powder formulation of *Bti* on *Aedes taeniorhynchus* Wied. and some non-target organisms in a Florida salt marsh. The objective of this investigation was to evaluate Vectobac®, a wettable powder formulation of *Bti* produced by Abbott Laboratories, for control of *Ae. taeniorhynchus* larvae in salt marsh pools in North Carolina.

MATERIALS AND METHODS

The *Bti* tested was a wettable powder formulation designated ABG-6108-II (lot no. 8278-55) provided by Abbott Laboratories, North Chicago, IL. The material had a potency of 2,000 International *Aedes aegypti* toxic units/mg (9.1×10^8 IU/lb).

A field test was conducted in salt marsh pools in Hobucken, Pamlico Co., NC on October 21–23, 1981. The pools had formed in small depressions after flooding by high tides and rain ca. 2 days before treatment. The pools were isolated from one another, had surface areas ranging from 0.4 to 2.3m², and were 2.5 to 10.2 cm deep on the day of *Bti* application. Second instar *Ae. taeniorhynchus* larvae were present in each pool. Applications of the *Bti* formulation were made to the surface of each pool using a hand-pumped, compressed air sprayer at rates of 1.1 kg/ha (2.2 to 5.9 IU/ml of water in the pools) to 3 pools and 0.1 kg/ha (0.3 to 0.6 IU/ml) to 3 other pools. The amount of the formulation required for each treatment rate was determined by calculating the total surface area of the water in each pool. The volume of spray was standardized at 380 ml/m² surface area for all treatments. Two untreated pools served as controls. The mean numbers of mosquito larvae present in the pools were based on 10 dips with a 0.47 liter white enameled dipper taken at ca. equal intervals around each pool before treatment, and at 1 and 2 days posttreatment. Percent control in the treated pools was corrected for any changes in the mosquito populations in untreated pools by Abbott's formula. Water temperatures (measured by a continuous recording thermograph) ranged from 11.1 to 27.8°C, and salinities (measured daily in each pool with a YSI Model 33 SCT Meter) ranged from 11.5 to 17.0 parts per thousand (ppt) during the course of study.

RESULTS AND DISCUSSION

Application of a wettable powder formulation of *Bti* at 1.1 kg/ha (2.2 to 5.9 IU/ml) to salt marsh pools produced 100% control of *Ae. taeniorhynchus* larvae (Table 1) at 1 and 2 days posttreatment. Garcia and Desrochers (1980) found that *Bti*, when applied at 1 kg/ha, gave 90% control of *Ae. dorsalis* in a Marin Co., California salt marsh with 32 ppt salinity. Our results are also similar to those of Purcell (1981), who reported that *Bti*, when applied at a concentration of 4.5 IU/ml, killed 99% of the *Ae. taeniorhynchus* larvae in a Florida salt marsh. Purcell (1981) also reported an LD_{90} of ca. 3.5 IU/ml for *Ae. taeniorhynchus* larvae, and that mean survival of *Ae. taeniorhynchus* larvae in treated containers was equal to that of larvae in untreated containers at *Bti* concentrations of 0.6 IU/ml or lower. In our investigation, those pools in which *Bti* failed to control mosquito larvae were treated at 0.1 kg/ha, and contained *Bti* concentrations of 0.6 IU/ml and 0.3 IU/ml. Although a precise threshold amount of *Bti* required for effective *Aedes* mosquito control in salt marshes can not be calculated, it appears that 2–5 IU/ml would be effective in the saline water.

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PHOTOGRAPHS FROM THE 25TH ANNIVERSARY MEETING OF THE LOUISIANA MOSQUITO CONTROL ASSOCIATION, METAIRE, LOUISIANA, OCTOBER 26, 1982*

Presentation of Honorary Membership certificates by Joyce Chester to four of the original Louisiana Mosquito Control Association Incorporators. Left to right: Mrs. A. B. (Bobbie) Ritter, Mr. Pete J. Manena, Mr. Fred Deiler, Mr. Charles H. Triche and Joyce Chester.

*Appreciation is expressed to Joyce Chester for the photographs and captions.