

“A REAL SILENT SPRING”

THE MCMASTER THEORY

THE PROBLEM WITH THE MOSQUITO AND INDIAN RIVER LAGOONS

The Mosquito and Indian River Lagoons are under attack. The Theory is that this predator is a “naturally” occurring organism that man has hybridized to be more virile than the original, quote natural organism. This organism is a very small (one micron) very lethal living organism referred to as BTI (Bacillus thuringiensis israelensis). The Theory also suggests that there are not only one but two “natural”, lethal chemical agents that are also potentially responsible for wildlife degeneration, sickness, and deaths in the bays. The second culprit is one of two chemical compounds or maybe both. They are called Spinosad and Methoprene and are said to be widely used as mosquito control toxins. At present, the government agencies that have been spreading these live organisms and chemical toxins have not provided the author with a statement of what exactly they are using, when they are using them, where they are using them or how much they are using. Public information requests have been submitted and the author is awaiting the information. Findings relied upon here are based on verbal comments from the County Mosquito Control personnel, representatives and website published statements. However, it is with 95% certainty that the BTI hybrid organism released by the county mosquito control department is the cause of the near total death of the brine shrimp farm belonging to Mariculture Technologies International, Inc. in Oak Hill, Florida, Volusia County.

Think of the brine shrimp farm as a controlled microcosm of natural events that can be intensely observed in a more confined space unlike trying to determine cause and effect of substances introduced to the larger natural environment. Starting in the first week of June, 2013 it was apparent to the brine shrimp farm managers that something unknown had just caused the sudden death of all shrimp growing in outside and open air environments. Shrimp that were being grown in inside rain proof and to a lesser extend wind proof structures were surviving. It was therefore obvious that the culprit had to be air or rain born. In addition, farm staff had been observing Volusia County mosquito control helicopters making spraying flight patterns just on the other side of the road from the farm. Couple that with the prevailing summer winds coming out of the Southeast one can see that there might be a connection. Farm managers had tried using all the normal anti-bacteria protocols that have been tested over the

last 40 years of farming brine shrimp including reaching out to Veterinarians for their opinions and nothing would mitigate the death spiral of the brine shrimp. This observation has been repeated all summer long until the county agreed (first week of August) to stay further away from our farm when spraying. As of September first, the outside and open air tank farm is now starting to produce live brine shrimp again. This is no fluke; it is a real cause and effect response. Production and other data and observations made during the contamination period clearly point to BTI as the culprit agent.

The mosquito control agencies refer to BTI as a larvicide. This is a compound or in this case, a living organism, that is lethal to mosquito larvae in aquatic or water environments. It is common knowledge that mosquitos start their lives in puddles to ponds where they mature over a period of a week or so. BTI was first recognized as a possible "green" approach using a quote "natural occurring" bacteria for the control of water born mosquitos worldwide. At the time it seemed to make sense. This bacterium when discovered was anything but normal. It was not found everywhere in the planet's soils. It was in fact a near Jurassic Park natural hybrid of normally found and similar soil Bacillus bacteria. It was discovered by field biologists poking around in an abandoned sugar/rum factory in the Virgin Island, as the story goes. This strain of Bacillus has not been reported to be found naturally occurring anywhere else on the planet as far as the author knows. Beyond this reality, modern science, as clever as they think they are, has now modified by intense natural selection and even gene splicing this bacterium to be even more toxic then the original find. After extensive literature review on the history of the find and subsequent testing needed for EPA registration, it appears unclear if these testing protocols included the testing of salt tolerance. What the brine shrimp farm has confirmed is that this bacterium is quite at home in saltwater as well as it is in fresh water. A second and very important possible misdiagnosis by the original scientific testers and the EPA itself is that the normal protocol for what is called LD/50 toxicity testing, required by the EPA, and using EPA guidelines to run the tests, the variable of time exposure is a major over sight in the review for registration. The normal testing protocols suggest that the time or duration of the test observations were 24 hours, 48 hours and at most 96 hours of exposure to the toxin for whatever organism the toxin was applied to. There are a number of very important differences between the classic LD/50 testing for liquid chemical solutions and living bacteria. How many of these variables were studied and for what period of time the exposure was, is unknown at this time. Nonetheless, the observations at the live brine farm on the virulence, the hardiness, the resistance to commonly available bactericides all point to this release of this one micron monster as an environmental disaster.

Keep in mind that this larvacide pesticide is a living organism and not a man-made chemical that degrades away over time. At the farm study area, trained staff has observed at least five episodes over the summer of large puddle hydration by rain and subsequent drying up (desiccation) due to no rain. Each time the puddle hydrated both frog tadpoles and a few mosquito larvae would show up within 24 to 48 hours after hydration. Also, keep in mind that no truck or helicopter has been noticed on or over the farm property this summer but that does not mean that it has not happened in the past or when personnel were not around to notice. The theory says that air distribution of the spores of this bacterium from a Government helicopter has in fact distributed these spores everywhere and in a much wider area than the applicator may realize. A single spore is only one micron in size and has no discernible mass; therefore it can float in the wind for miles just like all natural soil bacteria are doing. Here is the concern with this pesticide, it does not die off or go away for any reason, and it is the bully in the soil. During the re-hydration of the observed puddle, within two days after noticing live mosquito larvae in the puddle there were no more, they all were dead. This bacterium kills its prey by destroying the gut tissue upon ingestion by the prey. Simple and clean one might think. But, it never goes away so it continues to kill future prey for an undetermined period of time. That might be all right for some folks if it were just limited to killing mosquitos as its prey, but it does not, it kills a lot of other organisms other than live brine shrimp and mosquitos. As an experienced wildlife observer and scientist I can represent that here on the farm there has been a major reduction in many of the commonly seen insects, birds, raccoons, mussels, and many more organisms.

Toxicity tests were performed at the brine shrimp farm this summer to determine if BTI was the toxic agent involved in the death of the brine shrimp farm. Quantification of the concentration of the toxic chemical cannot be done the same way as it is done for liquid chemicals. However, using the time tested protocol of bio-assay it is clear that BTI kills live brine shrimp. The test was simple in design. Five gallon buckets were used and filled with saltwater for the brine shrimp and freshwater for the mosquito larvae. At a retail store the product called Mosquito Dunks manufactured by Summit Chemical and label identified that BTI was the pesticide in the Dunks. The pesticide, remember, is bacteria spores and not a chemical that will dissolve into the test water. Following the label instruction the same amount of dry Dunk was placed in each bucket that contained live mosquito larvae and others with live brine shrimp. The health of the organisms were observed twice per day to determine if they were alive or dead. The same observations of the pond cycle were observed in the freshwater bucket with live mosquito larvae. Within 24 hours 75% of the mosquito larvae were dead and within 48 hours all the mosquito larvae were dead. The buckets containing live brine shrimp told a different story. By 48 hours when all mosquito larvae were dead there were no dead brine shrimp. The

observations continued for 10 days. On day 7 of the experiment the live brine shrimp were dying. By day 10 all the brine shrimp were dead. What this says is that the live brine shrimp are not as sensitive as mosquitos as it takes a longer period of exposure to kill them. The theory suggests that back at the beginning, EPA calls for toxicity test to normally be run for 24 to 96 hours and the observer would have concluded that exposure to BTI was not toxic within the allotted short time frame. Secondly, the bacteria cell concentration would be important to the test protocol. In the wild, these soil bacteria live and multiply by consuming nitrogen rich earth and the subsequent cell density in the wild would relate to the amount of food available for the population of BTI live bacteria. It then would be assumed that the more organic nitrogen available in the soil or water for that matter would cause a much larger bacterium bloom. If the bucket experiments were feed organic nitrogen (fertilizer) they would have multiplied to a great cell density. The greater the cell density the more efficient the filter feeding prey organisms are at stuffing themselves with the toxic bacteria. This situation would suggest a more rapid death from exposure to higher cell counts. Now, apply this principal to the Mosquito Lagoon and the Indian River Estuary. Both bodies of water have accumulated over time, while being exposed to great human development, a richer accumulation of nitrogen products in the bottom soil (mud). This modified (hybridized) BTI bacteria is living everywhere in the lagoons and in the author's judgment burning its way through those mud environments like an out of control forest fire. What is being left behind are the dissolved nitrogen and phosphate residues that are now available to phytoplankton as food. The lagoons are suffocating in massive phytoplankton (algae) blooms. The algae will only grow if the nutrients they need are available and if they remain available then the algae sticks around because life is good for them. The first question is; when will this issue resolve itself in the lagoons? The Theory suggest decades. The second question is, is BTI the sole culprit in the death of wildlife in the lagoons? The Theory does not believe so. The method of toxicity within the BTI cell appears not to lend itself easily to the suggestion that the toxin itself can bio-magnify in the food web. There remains much more work to be done before this connection can be positively made from a biological perspective. The third question, will the perpetual existence of this new hybrid BTI affect the bio-diversity of the natural populations in the lagoons? The Theory suggests that it will have a major impact on the diversity of organisms because some filter feeding organism cannot tolerate the BTI toxin and therefore would not be expected to return to the lagoon until nature eliminates this new BTI. The Theory cannot see how that will happen any time soon.

The two liquid pesticides cited at the beginning are not assumed to have anything to do with the death of the brine shrimp farm at least at this time. However, a literature review would suggest that they could be causing negative issues in the natural environment. The County of Volusia website says that they are using Spinosad which again is being called a natural

pesticide. It is the author's view that labeling it as such is not true. Nowhere in nature will you ever find this liquefied compound in the concentrations that are sprayed by trucks and aircraft. The active toxin is distilled from a culture of a natural occurring bacterium (*Saccharopolyspora spinosa*). This highly concentrated solution is man-made and in the wild most organisms would never experience short or long exposure to this toxin at the applied concentration. Again, the literature supporting the EPA registration of this product seems only to use the standardized time testing protocols but further literature and registration data review may show customized time trials. Just the same, the literature demonstrates that at least for Spinosad, it has a 200 day or longer life in alkaline water (sea water for example). It is said to have an affinity to plant material and macro algae's like those growing in the seawater environment of the lagoons. It is possible that those macro algae's are absorbing this toxin and no doubt are. These liquefied toxins can therefore potentially bio-magnify in the environment. The Theory will suggest that large animals like Manatee may have a very limited tolerance to this toxin and the method of transmission to them is through the macro algae's that they eat while in the lagoon. The same might be true for the other toxin Methoprene. For a few years now there have been public reports of many shell fish, birds, dolphins, manatees and other organisms dying in large number with the authorities not being able to determine the cause of death. The Theory suggests that it is time that those authorities start looking outside the box. Other investigators will hopefully add their talents to this issue and maybe together we can better identify the problem. With that, there is some hope that an antidote can be identified.

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Note: Considerable support data is available to substantiate the Theory's claims.

