

-----Original Message-----

From: Rob Fish [mailto:rob@foodformainesfuture.org]  
Sent: Tuesday, November 13, 2007 12:33 PM  
To: Jennings, Henry; John Jemison  
Subject: Caddisfly Paper Response from Union of Concern Scientists  
Attachments: Bt Stream caddisfly paper criticism comments\_Nov 13 07.doc;  
Bt Stream caddisfly paper criticism comments\_Nov 13 07.pdf

Hi Henry and John

I think you'll find this response to the criticism of the caddisflies study (attached) and how it compares with the monarch study quite interesting. The author, Doug Gurian-Sherman, Ph.D is the senior scientist at the Union of Concerned Scientists. You should also question Trady's claim that those scientists are not on the industry's payroll.

As described by a colleague privately - "a bunch of rabid pro-biotech ideologues. some definitely get money from industry for their various pro-biotech websites, like prakash and probably amman. these guys are the cream of the crop in terms of their pro-biotech rants -- you must know henry miller. i little bit of research could probably dig up a wealth of off-the-wall statements by this crowd."

Hope this helps  
Friday is certainly going to be interesting!

Rob

Doug Gurian-Sherman, Ph.D.

Senior Scientist

Food and Environment

Union of Concerned Scientists

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Having been at EPA at the time of the Monarch situation, I can attest to several significant errors in the letter from AgBio. The Losey study was a very reasonable first step, as is the caddisfly study. In the case of Monarch butterflies, the reasons that environmental impacts turned out to be relatively small were several fold. First, there were several types of Bt, one of which, Bt176, had high levels of the Cry protein in its pollen - easily high enough to

kill Monarchs at amounts found on milkweed leaves (the normal food of Monarchs) in and near corn fields.

However, fortuitously (i.e. for reasons having nothing to do with risk assessment), it was never grown on more than about 5% of corn acres, and its registration was not renewed after the Monarch studies. Second, the amounts of pollen found on milkweeds in corn fields, even with the MON810 and Bt11 events that are widely grown, can sometimes kill Monarchs. A follow-up paper by several of the authors of the field studies found up to about 24% Monarch mortality by pollen from these varieties at levels of pollen in the field (Dively et al., 2004, Environmental Entomology vol. 33, 1116-1125). A primary reason why the actual levels of mortality are not higher is that Monarch larvae happen not to be present when corn pollen is shed in most of the U.S. They are only present in substantial numbers in northern tier corn belt states like Iowa and Minnesota when pollen is present. So the overall predicted mortality in that most recent study is about 0.6% of the population in the Midwest, along with small growth effects.

None of this could have been predicted without the follow-up field studies. The letter you posted makes it sound like critics of the Losey study knew much of this before hand, but it was only after the studies were done that this could be resolved. EPA erred when it registered Bt corn by not realizing that milkweeds (and other insect host weeds) were common in and near corn fields (they assumed that the heavy use of herbicides in corn killed virtually all weeds), and that, given a dearth of unmanaged habitat in the corn belt, these milkweeds are important food sources in the Midwest. The phenology studies (the timing of corn flowering and Monarch egg laying), were critical in informing EPA about what was really going on.

The reason I am laying this out in some detail is that there is a re-writing of the events to make it appear that the whole issue was driven by hysterical environmentalists. They are trying to say that 1) Losey was irresponsible (as Chapella and Pusztai, and others have been subjected to "credibility assassination"), when he actually included caveats about limitations of his study, 2) that the "irresponsible" nature of these studies unnecessarily scared the public, and therefore, 3) the follow-up studies were a waste of public time and money. This last point (among other points that are mostly technical, and not likely to be of practical importance) is voiced in a letter that a bunch of pro-GE scientists sent to the editor of PNAS (the journal that published the Bt caddisfly study) and the head of NSF (who funded the study).

Perhaps most importantly, the author of the AgBio letter tries to tar the current study with the same so-called (and incorrectly represented) errors of the Losey study, and the miss-represented results of the follow-up Monarch studies, in order to discredit the caddisfly study. The problem is that it misrepresents the Monarch issue. In addition, it ignores several reasons why the caddisfly study should be taken seriously.

For example, in contrast to the Monarch situation, and largely ignored by the critics of the caddisfly study, is that most of the corn litter going into headwater streams is made up of LEAVES and STALKS (and cobs) that have many-fold higher Bt toxin concentrations than the pollen that was relevant to Monarchs. Monarchs don't eat corn leaves and stalks, only pollen that falls on milkweeds that are their normal food. Although it is true that the study did not look at the effects on caddisflies in the field, it did establish their presence and feeding on corn matter in the streams, and that a lot of corn material can be found in those streams. Also, although the leaves did not cause mortality, they

did cause a major growth reduction in one of the caddisfly species that may have significant implications if it occurs widely in the streams. This was basically ignored in the letter.

I won't go into the pros and cons of the criticism I have seen of the caddisfly study. As with any research, there are of necessity some limitations in the caddisfly paper (scientists have only limited time and money), and I would have done several things a bit differently. But overall, it is a valuable piece of work that shows, once again, a real hole in the possible exposure scenarios the EPA uses to evaluate GE crops, and also a major limitation in the risk evaluations it uses (i.e., focusing on daphnia and fish to determine risk to aquatic ecosystems).

The one point that I want to address, because it is mentioned in the letter you posted (and the letter to PNAS and NSF), is whether we can say that it was Bt toxin that was killing the caddisflies (or reducing their growth). This has to do with the non-Bt corn varieties used as controls (comparisons) in the research. The scientists chose deliberately to match their Bt line to non-Bt corn by lignin content, because lignin can have effects on feeding, and it is established that an unintended effect of Bt corn is higher lignin content (no one knows why). This, in my opinion is quite reasonable. In doing this, they apparently did not use the same variety of corn for both Bt and non-Bt corn (so-called isogenic varieties). This leaves open the possibility that there was something about the differences in the corn other than Bt that caused the growth reductions (and mortality) in caddisflies. It would have been better to use lines that were isogenic AND matched for lignin, but this is more difficult logistically, because it would require an extra set of experiments. This criticism cannot be dismissed, but it is probably unlikely (but possible) that differences in the background genetics of the corn varieties was responsible for the growth differences. It is even more unlikely given that two species of caddisflies had growth impacts (or mortality) from two very different Bt corn plant tissues - pollen and leaves. These two tissues express very different genes (with some overlap), so if there were substances such as natural corn toxins, feeding inhibitors, etc. found in one tissue in one of the Bt varieties, it is less likely that these were also found in the other tissue, especially at similar concentrations. The Bt toxin, on the other hand, is a known common denominator of the pollen and other corn matter. Experiments using Cry1Ab toxin should be carried out to verify that it is the cause of mortality and the growth reductions.

I was at a National Academy of Sciences meeting earlier in the week, with many ecologists including the first author of the caddisfly paper. Several ecologists that I have talked to about it seem to feel that overall, it is useful study (even if a few things should have been done a bit differently).

I agree with the AgBio letter that follow-up studies are needed before any definite conclusions can be drawn about actual environmental impacts. E.g., what level of toxicity does Bt corn have on caddisflies and other insects in streams; how quickly and under what conditions does the Bt toxin break down and is diluted as it is washed downstream; how big an ecological role do these headwater streams have, including on downstream ecology, etc. The question is, in part, whether to take a precautionary approach, or go ahead with planting in Maine, and find the answers latter. One difference between Maine and other parts of the country is that farmers are not already planting this. E.g., elsewhere, farmers would be asked to forego practices they are already using if Bt is now banned, whereas this is not the case in Maine.

Doug Gurian-Sherman

From: Jennings, Henry  
Sent: Tuesday, November 13, 2007 2:37 PM  
To: Schlein, Paul B  
Subject: FW: more response to tardy's comments

Attachments: Re: [Geactivists] more from the opposition trying to  
defamethe caddisflies study

-----Original Message-----

From: Rob Fish [mailto:rob@foodformainesfuture.org]  
Sent: Tuesday, November 13, 2007 1:02 PM  
To: Jennings, Henry; John Jemison  
Subject: more response to tardy's comments

please see the attached the fwd for inline responses in caps to what Tardy sent  
from the Union of Concerned Scientists - as well as more commentary on the  
authors

**From:** Doug Gurian-Sherman [dgurian-sherman@ucsusa.org]

**Sent:** Tuesday, November 13, 2007 12:58 PM

**To:** crlawn@fedcoseeds.com; Rob Fish; 'GE Activists'; Logan Perkins; Jim Gerritsen

**Subject:** Re: [Geactivists] more from the opposition trying to defamethe caddisflies study

Virtually all of the scientists are long-standing outspoken supporters of GE, and their positions often include vitriolic criticism of GE critics. GM Watch has a searchable online database on pro-industry scientists.

As to the points in the letter, they are mostly technically valid points with few practical implications. I have added a few quick notes in rebuttal to the points in this letter in the text below in caps.

Doug

>>> Rob Fish <rob@foodformainesfuture.org> 11/13/2007 10:37 AM >>>

Note: This was sent in by Bob Tardy - BIO lobbyist in Maine with the following note:

-----Original Message-----

From: Robert Tardy [mailto:tardy@roadrunner.com]

Sent: Sunday, November 11, 2007 7:21 PM

To: Jennings, Henry

Subject: NSF STUDY - Caddisfly

Henry,

Here are some other points of view regarding the Study on your agenda. Note that these scientists are not related to the industry.

Bob Tardy

Rob Fish wrote:

> Just received this from the Board of Pesticides:

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> \_Comments and letter to the editors of PNAS\_

> A consortium of scientists signing this comment in a letter to the

> editors has analyzed the paper and came to critical conclusions, which

> seriously question the conclusions of the paper.

>

> We are deeply concerned by the appearance in PNAS of a recent article,

> "Toxins in transgenic crop byproducts may affect headwater stream

> ecosystems," (10,1073 (2007)), by Rosi-Marshall et al., apparently  
> funded by NSF. We recognize that it is not unusual for papers to be  
> published with minor flaws or infelicities, even after peer review and  
> revision, but the article by Rosi-Marshall et al. contains egregious  
> methodological flaws and omissions, and presents conclusions not  
> supported by the data.

>  
> We call your attention, in particular, to the following:

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> 1) There is extensive evidence in the literature that corn pollen  
> produced by currently available Bt corn varieties contain extremely  
> low amounts of Bt toxin. This was shown in a series of six papers by  
> top scientists published in PNAS after the Losey Bt corn  
> pollen-Monarch debacle, an intensive and time-consuming effort to try  
> to set the science straight (1). How many busy scientists and how much  
> scarce money will we need to divert to calm this new scare? IT IS SAD THAT THESE SCIENTISTS, ONE  
OF WHICH (MARK SEARS), WAS APPARENTLY HAPPY TO RECEIVE FUNDING TO PARTICIPATE IN THE  
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NOTED IN MY LAST RESPONSE) THOSE STUDIES WERE NECESSARY TO INFORM EPA ABOUT ACTUAL  
RISKS IN THE FIELD.

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> 2) The authors extrapolated from a laboratory test to a field system  
> based on a single study. Such extrapolation is problematic to begin  
> with; not only did the authors lack the statistical confidence  
> necessary for a valid extrapolation, in another venue (2) they  
> reported they did not find these effects in the field, a salient fact  
> not mentioned in the PNAS paper. This discrepancy should have been  
> disclosed and discussed. In addition, earlier relevant studies  
> concluded that *Bacillus thuringiensis* (Bt) endotoxin concentrations in  
> aquatic systems are extremely low and are metabolized rapidly in water  
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FOLD HIGHER THAN IN POLLEN.

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> 3) The title implies transgenic crops are the only source of Bt  
> toxins, but endotoxins in commercial Bt insecticides such as Dipel,  
> Xentari, Foray, and Thuricide are also used by farmers, including  
> organic farmers, to control insects, and in some areas intensively. If  
> the authors are measuring the effect of Bt toxin at all, how do they  
> know the toxin comes from the transgenic Bt crops rather than from

- > these organic Bt insecticides? If they lack data to distinguish the
- > sources, isn't the term `transgenic' in the title simply gratuitous
- > and sensationalistic?

THE LAB EXPERIMENTS USED Bt CORN, NOT Bt MICROBIALS. IN TERMS OF EXPOSURE IN THE FIELD, THE AMOUNT OF Bt FROM Bt CORN GREATLY OVERSHADOWS THE AMOUNT OF MICROBIAL Bt USED (USDA/NASS DATA COULD BE CONSULTED, AND I AM SURE THAT IT WILL BE VERY LOW USE, IF ANY, ON FIELD CORN - THE CROP OF THE CADDISFLY PAPER). IN AREAS WHERE CORN IS HEAVILY GROWN, THE AMOUNTS OF Bt MICROBIAL WOULD BE INSIGNIFICANT COMPARED TO Bt FROM FIELD CORN. SO THIS IS ONE OF THOSE POINTS THAT IS TECHNICALLY CORRECT, BUT MEANINGLESS IN PRACTICE.

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- > 4) The authors seem unaware that there are several variant forms of Bt
- > endotoxin, as they failed to disclose which one(s) they were seeking
- > and measuring. Toxicological studies use known quantities of known
- > toxins, and look for a dose response. If their study included specific
- > assays, they were not reported. If they were not conducted, the report
- > was, at best, premature.

THE AUTHORS MENTION IN THE PAPER THAT THEY USE CRY1Ab CORN, SO UNLESS THEY WERE MISTAKEN, THEY DO IDENTIFY THE TYPE OF Bt CORN.

- >
- > 5) The authors do not disclose which Bt-corn isolines were tested.
- > Different hybrids can differ significantly in both secondary
- > metabolites and in antinutrient quantity (as well as in kind and
- > amount of Bt toxin expressed). By not using isolines, they could have
- > been seeing the effect of different concentrations in different
- > hybrids of antinutrients or of other factors unrelated to Bt toxin.
- > Similarly, the authors do not disclose quantitative measurements of
- > tissue sampled, e.g., "Leaves were added. as needed." This lack of
- > detail precludes others from replicating their study.

I ADDRESSED THE FIRST POINT IN MY LAST COMMENTS. ON THE SECOND POINT, ALTHOUGH (AGAIN) TECHNICALLY TRUE THAT THE PAPER AUTHORS DON'T QUANTIFY THE AMOUNT OF Cry TOXIN, THEY ADEQUATELY DESCRIBE THE FEEDING FOR A QUALITATIVE ECOLOGY PAPER (WHICH IS WHAT IT IS - NOT A TOXICOLOGY PAPER). THEIR FEEDING METHODS FALLS UNDER THE GENERAL APPROACH OF AN "AD LIBIDIUM" FEEDING STUDY (I.E., YOU LET THE BUGS EAT AS MUCH AS THEY WANT BY MAKING SURE THERE IS A CONTINUOUS SUPPLY) - WHICH IS FINE AS A FIRST APPROACH.

- >
- > 6) The authors conclude that growing Bt-corn may cause downstream
- > adverse effects in waterways, but they fail to consider alternative
- > explanations. Moreover, they analyze their results in a vacuum. In the
- > real world, the choices are not `Bt-corn' versus `no intervention',
- > and to imply that that is the case displays a remarkable ignorance of
- > agriculture. Farmers grow more than one species and cultivar, and
- > often use more than one pesticide strategy. For example, if a farmer
- > were to control insects using conventional pesticides (that is, absent
- > Bt corn plants), how would those pesticidal treatments affect
- > caddisflies? For all we know, Bt corn may be environmentally
- > preferable to traditional pesticides or other strategies to control
- > insects. The authors imply otherwise without providing the comparative
- > evidence.

THIS MIS-REPRESENTS THE REGULATORY MANDATE OF EPA - THE AGENCY RESPONSIBLE FOR Bt CROPS. FIFRA REGULATES A PESTICIDE (SUPPOSEDLY) SO THAT IT CAUSES 'NO UNREASONABLE HARM' TO THE ENVIRONMENT. IT IS NOT A COMPARATIVE STANDARD (I.E., IT DOES NOT BASE ITS RISK ASSESSMENT ON WHETHER SOMETHING ELSE MAY CAUSE GREATER HARM). IF Bt CAUSES UNREASONABLE HARM, THEN IT IS TECHNICALLY IN VIOLATION OF FIFRA. OTHER HARMS NEED TO BE ADDRESSED ON THEIR OWN BASIS.

- >
- > The points above illustrate sloppy experimental design and
- > interpretation that should have been detected by even a cursory peer
- > review. Where were the crucial qualitative and quantitative data on
- > source tissue, distinction of diverse types of Bt toxins, and
- > discussion of alternate explanations for their results? We are at a
- > loss to explain how qualified reviewers and editors could be unaware
- > of flaws of this magnitude. Publication of this flawed paper has
- > seriously jeopardized the credibility of PNAS as a high quality,
- > scientific forum.

>

> Sincerely,

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- >
- > Alan McHughen, Professor, University of California, Riverside.
- > Brian Federici, Professor, University of California, Riverside.
- > Henry Miller, M.D., The Hoover Institution, Stanford University.
- > Klaus Ammann, Prof. emerit. Delft University of Technology, the
- > Netherlands
- > C. Kameswara Rao, Professor. Foundation for Biotechnology Awareness
- > and Education, Bangalore, India.
- > Prof. Dr. Ingo Potrykus, Chairman, Humanitarian Golden Rice Board &
- > Network
- > Dr. Piero Morandini, Dept. of Biology, University of Milan, Italy
- > C. J. Leaver, CBE, FRS, FRSE, Sibthorpe Professor of Plant Science,
- > University of Oxford, UK
- > S. Shantharam, Director, Biotechnology Education Programs, Asian
- > Institute of Technology, Bangkok, Thailand
- > Mark Sears, University of Guelph, Ontario, Canada.
- > C. S. Prakash, Professor, Plant Molecular Genetics, Tuskegee
- > University, USA

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> Citations

- > 1. PNAS 2001. 98: 11908-11912; 11913-11918; 11919-11924; 11925-11930;
- > 11931-11936; 11937-11942.

> 2.

> <http://www.benthos.org/database/allnabstracts.cfm/db/Columbia2007abstracts/id/370>

>

- > 3. Douville, M., F. Gagné, L. Masson, J. McKay, and C. Blaise. 2005.
- > Tracking the source of Bacillus thuringiensis Cry1Ab endotoxin in the

- > environment. Biochemical Systematics and Ecology 33(3): 219-232.
- > 4. Douville, M. and F. Gagné. 2003. Tracking the Source of Bacillus
- > thuringiensis Cry1Ab Toxin in the Environment. Scientific and
- > Technical Report ST-226. Environment Canada - Quebec Region,
- > Environmental Conservation Branch, St. Lawrence Centre.

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- > Geactivists mailing list
  - > Geactivists@geaction.org
  - > [http://geaction.org/mailman/listinfo/geactivists\\_geaction.org](http://geaction.org/mailman/listinfo/geactivists_geaction.org)

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From: Jennings, Henry  
Sent: Tuesday, November 13, 2007 2:38 PM  
To: Schlein, Paul B  
Subject: FW: [Fwd: Re: [Geactivists] more from the opposition trying to defame the caddisflies study]

Attachments: Re: [Geactivists] more from the opposition trying to defame the caddisflies study

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**From:** Doug Gurian-Sherman [dgurian-sherman@ucsusa.org]

**Sent:** Tuesday, November 13, 2007 1:12 PM

**To:** crlawn@fedcoseeds.com; Rob Fish; 'GE Activists'; Logan Perkins; Doug Gurian-Sherman; Jim Gerritsen

**Subject:** Re: [Geactivists] more from the opposition trying todefame the caddisflies study

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- > Similarly, the authors do not disclose quantitative measurements of
- > tissue sampled, e.g., "Leaves were added. as needed." This lack of
- > detail precludes others from replicating their study.

I ADDRESSED THE FIRST POINT IN MY LAST COMMENTS. ON THE SECOND POINT, ALTHOUGH (AGAIN) TECHNICALLY TRUE THAT THEY PAPER AUTHORS DON'T QUANTIFY THE AMOUNT OF Cry TOXIN, THEY ADEQUATELY DESCRIBE THE FEEDING FOR A QUALITATIVE ECOLOGY PAPER (WHICH IS WHAT IT IS - NOT A TOXICOLOGY PAPER). THEIR FEEDING METHODS FALLS UNDER THE GENERAL APPROACH OF AN "AD LIBIDIUM" FEEDING STUDY (I.E., YOU LET THE BUGS EAT AS MUCH AS THEY WANT BY MAKING SURE THERE IS A CONTINUOUS SUPPLY) - WHICH IS FINE AS A FIRST APPROACH.

- >
- > 6) The authors conclude that growing Bt-corn may cause downstream
- > adverse effects in waterways, but they fail to consider alternative
- > explanations. Moreover, they analyze their results in a vacuum. In the
- > real world, the choices are not `Bt-corn' versus `no intervention',

> and to imply that that is the case displays a remarkable ignorance of  
> agriculture. Farmers grow more than one species and cultivar, and  
> often use more than one pesticide strategy. For example, if a farmer  
> were to control insects using conventional pesticides (that is, absent  
> Bt corn plants), how would those pesticidal treatments affect  
> caddisflies? For all we know, Bt corn may be environmentally  
> preferable to traditional pesticides or other strategies to control  
> insects. The authors imply otherwise without providing the comparative  
> evidence.

THIS MIS-REPRESENTS THE REGULATORY MANDATE OF EPA - THE AGENCY RESPONSIBLE FOR Bt CROPS. FIFRA REGULATES A PESTICIDE (SUPPOSEDLY) SO THAT IT CAUSES 'NO UNREASONABLE HARM' TO THE ENVIRONMENT. IT IS NOT A COMPARATIVE STANDARD (I.E., IT DOES NOT BASE ITS RISK ASSESSMENT ON WHETHER SOMETHING ELSE MAY CAUSE GREATER HARM). IF Bt CAUSES UNREASONABLE HARM, THEN IT IS TECHNICALLY IN VIOLATION OF FIFRA. OTHER HARMS NEED TO BE ADDRESSED ON THEIR OWN BASIS.

>  
> The points above illustrate sloppy experimental design and  
> interpretation that should have been detected by even a cursory peer  
> review. Where were the crucial qualitative and quantitative data on  
> source tissue, distinction of diverse types of Bt toxins, and  
> discussion of alternate explanations for their results? We are at a  
> loss to explain how qualified reviewers and editors could be unaware  
> of flaws of this magnitude. Publication of this flawed paper has  
> seriously jeopardized the credibility of PNAS as a high quality,  
> scientific forum.

>  
> Sincerely,

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>  
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> Brian Federici, Professor, University of California, Riverside.  
> Henry Miller, M.D., The Hoover Institution, Stanford University.  
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