

From: Informed Discussion of Beekeeping Issues and Bee Biology On Behalf Of Stan Sandler
Sent: March 28, 2001 6:38 AM To: BEE-L@listserv.albany.edu
Subject: news on Imidacloprid

Submission to the Pesticide Advisory Committee: From Stan Sandler, beekeeper
Date: March 27, 2001

Concerning: **Use of Imidacloprid (Admire) on Prince Edward Island, Canada**

Imidacloprid was first given a temporary registration for use on potatoes in 1995 and its use in PEI has increased dramatically since then until today it is the probably the main insecticide used on potatoes.

Recently, partly as a result of beekeeper experience in France in particular, and Europe generally, and partly because of new techniques to measure residues and detect effects, and partly due to questions about the quality of the research proving Imidacloprid safe, concerns have been surfacing about the danger to the environment and to both natural and managed pollinators from this insecticide.

Since December of 1998 there was a moratorium on the use of Imidacloprid in three provinces of France, and four teams of independent government scientists were asked to study the toxicity of Imidacloprid to honeybees and its ability to manifest itself in succeeding crop years. That study cost many millions of Francs and is about the only good independent research that is available on the subject. I strongly urge this committee to contact the "**Commission des Toxiques**" in France and get copies of the findings of these studies and get them translated so our Minister of Agriculture can use that information.

References to their findings, and to the original papers are included in the "**Composite Document of Present Position Relating to Gaucho / Sunflower and Bees**", by three national beekeeper organizations in France. Imidacloprid is marketed by the Bayer Company as "Gaucho" in France, for sunflowers, as Admire 240 F here on Prince Edward Island for potatoes. This paper which was presented to the French Minister of Agriculture is included in this submission as Appendix 1. After that document was presented the Bayer company brought forward some additional data, and the three beekeeper organizations responded. That response is included as Appendix 2. It is very informative, but unfortunately I do not have it translated yet. Some of this committee's members may be bilingual. The moratorium on Imidacloprid use on sunflowers has now been extended to the whole country. The Advice to the Minister of Agriculture by the Commission des Toxiques is included as Appendix 3. I would draw this committee's attention to the fact that all the teams of independent French scientists found that Imidacloprid was toxic to honeybees in extremely tiny concentrations, down to single digit parts per billion (ppb). In fact the data from the manufacturer has been revised downward in just over two years so that they no longer claim that the NOEC (no observed effects concentration) is 5000 ppb, which is what they claimed at the time this insecticide was registered in Canada for potatoes, but now say it is 4 ppb. (data presented to the Commission des Toxiques on 16/12/1998) or 20 ppb (recent paper by Bayer researchers Schmuck, et.al, included as Appendix 4).

In this area (the Atlantic Provinces) there has been little study of Imidacloprid. To be exact there has been one study by Environment Canada and Agriculture Canada to determine the potential for water-borne transport from treated fields. This study was called "Field and Test Plot Studies of Dispersal of Imidacloprid (Admire) in NB and PEI (1995)". It is included in this submission as Appendix 5..

I would draw the committee's attention to this quote from page 7 of that study:

"Imidacloprid is persistent in soil (DT50 = 2 years) with a high potential for carryover and build-up of chemical residues (Mulye 1996a, Mulye 1996b)". note: DT50 is decay time for 50% of material.

Couple that with the report's conclusion that Imidacloprid shows significant translocation to other locations by water during the growing season when applied as foliar treatment, and after the growing season when applied in furrow, and you have the reasons why this insecticide is so dangerous to bees. Bees do not visit potato flowers for either nectar or pollen. But Imidacloprid is washing into the ditches and being expressed in the nectar and pollen of the goldenrod and clover there. It is also carrying over and being expressed in the crops and weeds in the years following potatoes. That is quite well known by the company. If you look at the label you will see that they do not recommend treatments of the same field in successive years for just that reason. How much is being carried over? We have no idea, because no one has done any testing. But if you look at the data from the French teams quoted in Appendix 1 you will see that when they looked in France they found concentrations significant to bees in succeeding crop years. And consider this fact: Admire can be put on potatoes, in furrow application, at 1.3 l/ha. But it can also be applied at a low dose of 0.85 l/ha. Now if you put it on at 1.3 l/ha and it has a half life of one year, then the next year the soil concentration is going to be up to 0.65 l/ha which is 75% as much as the low dose application. If the low dose application is sufficient to render the potato plants toxic to insects don't you think that 75% of the low dose might certainly be sufficient to render the clover and other plants growing the following year toxic to bees?

Now I would like you to refer to data from the French team studying the persistence of Imidacloprid (the Bonmatin team) which I have included as Appendix 6. There were 68 soil samples, only ten of which were from the year of treatment, the others were from one or two years previous. In 91% of the samples Imidacloprid was detectable and it reached levels between 1 and 10 ppb. in almost half the samples. That study also showed that not only was Imidacloprid present in the soil, but it was absorbed into the maize, sunflower, wheat and rape crops growing in those later years. And if you look at the graph on the last page of that appendix you will see that not only was Imidacloprid present in those crops, but it got concentrated in them by the increased metabolic activity at the time of flowering and showed a increase of near five times in the flower head. But in PEI the situation is potentially far worse!

On sunflowers Imidacloprid is used as a seed dressing and the loading to the soil is at a rate of 52 grams of active ingredient per hectare. (0.7 mg active ingredient per seed and 75,000 seeds per hectare) This is Bayer's data from the Schmuck paper. The maximum in furrow application rate of Admire on potatoes is over 350 grams of active ingredient per hectare or SEVEN TIMES THAT AMOUNT! (1.3 litres per hectare with active ingredient 240 g/l) The French scientists found Imidacloprid residues in crops growing in successive years, so I think that we can assume that

there is a high likelihood that we will find even higher rates here, given that the application rate is seven times higher, potato soils have even longer half life values, and our winters are colder with more snow cover (which also extends the half life). Moreover, if you look at the toxicity to bee data from the abstract of the Bonmatin report (Appendix 7) you will see that they conclude that vital functions of bees are affected by sub-lethal doses of Imidacloprid in the range from 1 to 20 ppb. The graph (also in that appendix) comparing feedings on contaminated and uncontaminated syrup shows clear response at 3 ppb. Other data which you can find in Appendix 2 shows toxicity of the olefin metabolite of Imidacloprid to honeybees at only 0.75 ppb!

Now, some of you may be thinking: well in the most common PEI rotation, it is usually grain that follows potatoes and the clover in hay doesn't usually flower until the third year. But remember, that clover is usually under seeded with the grain in the second year. It sprouts and grows and absorbs toxic Imidacloprid that is still in the ground in the second year. Usually it won't flower until the third year, but it was certainly capable of taking up toxins in year two. Moreover, occasionally clover will flower in the seeding year, if the grain is harvested early enough, or if there is a blow down in the field, or a miss in the grain drill.

I recently asked a friend who grows a lot of potatoes what he used for Colorado beetle control before admire. He said "Furadan, thiodan, velmar, sevin, ripcord... We used them all. This stuff does a real good job of killing beetles". I can sympathize with my friend. Who would want to go back to using those organophosphates that are more toxic to people and have to be sprayed repetitively? And they are all highly toxic to bees as well. But for the bees they have one huge advantage: They get sprayed on potatoes, which bees do not visit, and then they quickly break down. Unless there is significant drift onto adjacent hay and pasture bees are unaffected. The spraying is usually done before goldenrod in the ditches flowers. By contrast, Imidacloprid is a ticking time bomb. Those other insecticides also are very apparent to the beekeeper when hives are affected by drift. The forager bees often die on or in front of the hive entrance and it is apparent what has happened. Imidacloprid is more insidious. At low concentrations it does not necessarily kill the foragers. But it disorients them and alters their behaviour. Many lose their way and don't return or return but cannot dance or otherwise function as foragers. The young bees and brood starve.

PEI beekeepers lost 20% of our hives last year IN THE SUMMER. That is a remarkably high number. Usually we make increase during the summer; have losses in the winter. The winter apiaries I have checked so far show 35% mortality, and enough severely weakened hives that I believe final winter mortality will probably be 50%. The snow was not the killer. I know that in my hives it was the poor condition in which they entered the winter that was the killer (poor stores and insufficient bees to take down feed and form a large enough winter cluster). And I am pointing the finger at Imidacloprid as the cause of their poor condition.

If honeybee colonies are being killed by this insecticide I think that is highly likely that bumblebees and solitary bees which forage on the same plants are also being killed. Honeybees and wild pollinators pollinate most of the fruit and many of the vegetables on this island: blueberries, apples, raspberries, strawberries, pumpkins, cucumbers, tomatoes, peas and so on. Neither your committee, Agriculture Canada, Environment Canada, the PMRA, or the provincial department of Agriculture has done any testing as to how much Imidacloprid is present in the environment and being expressed in

the wild and managed flowers that these pollinators visit. But the beekeepers of PEI have been doing a form of testing. We had about 2000 beehives on this island last year monitoring the environment in many locations. I myself had 50 apiaries all over Kings and Eastern Queens Counties. That works out to be about 100 million bees on PEI out there testing the quality of nectar and pollen. About half of those beehives are now dead. We cannot prove that Imidacloprid is what has been killing our hives and causing our bees to do so poorly, but we can say that it certainly seems to us to be the culprit, and our experience with it is very similar to the losses and symptoms it caused in France. It is not up to beekeepers to prove that Imidacloprid killed our hives. We can't do it. The bees that died or got lost did not come back to the hives. The hives died from lack of foragers and starvation. But this committee advises the minister of agriculture who has duty to the people of this provinces and to other agricultural sectors, like the bee and blueberry sectors, not to allow the use of a chemical which has not been proven to be harmless to us. There is not a single INDEPENDENT study that will show that this chemical either goes away or stops killing. The Bayer company has two studies that it will hold up as exploring the toxicity of Imidacloprid and bees, but remember, other bee researchers in France and in Canada have questioned the findings of those studies. The company paid big bucks for those studies. The company made half a billion Eurodollars last years selling Imidacloprid.

The minister is well aware of the importance and the shortage of pollinators on PEI, because he has been petitioned by the Blueberry Association to open the border to the movement of hives from Nova Scotia as a consequence of the shortage here. Letting hives in will not be a solution if those hives also get sick and die or do poorly as a result of the use of this insecticide. The blueberry industry has a list of growers requesting beehives that totals about 3,400 beehives. I doubt if there are more than 1000 beehives left on PEI this spring. And the beekeepers are hardly ordering any packages of bees for replacements. Do you blame us for not wanting to invest in bees if they are going to get poisoned?

I ask this committee to recommend to the Minister that there be a moratorium put on the use of Imidacloprid on PEI for year 2001 while the Department of Agriculture samples crops growing in soils that were treated in year 2000 and determines the levels that are present in those crops and weeds, and the levels that are present in nectar and pollen and honey. We are very fortunate to have the technology right on this island. The Atlantic Veterinary College has the equipment to detect Imidacloprid at 0.4 parts per billion which is finer detection that the Bayer company usually uses. Even if we spread no new Imidacloprid this year we will have 6.700 kg of active ingredient going into the environment as an accumulated load from previous years. We have no idea how this is affecting the insect fauna of this island, because no one except beekeepers monitors "non target species" closely. Insects are not just pests. They pollinate many of our foods, break down material in the soil, and are food for many other animals. Imidacloprid is also highly toxic to earthworms.

I am putting a good deal of material in front of this committee for examination and suggesting that this committee could obtain even more original documents and papers from France for the minister. But there is one graph that I have made that I would like to draw your attention to. It is so dramatic that I would like to see it on TV, in our newspapers and discussed on the radio and in the legislature. The facts and the calculations that I have used to create the graph are simple and do not require

testing to validate. It is included in this submission as Appendix 8, "Imidacloprid Use and Accumulation on PEI"..

Let us look first at the data used to create the graph:

IMIDACLOPRID USE AND ACCUMULATION ON PEI (KILOGRAMS OF ACTIVE INGREDIENT)

YEAR	1996	1997	1998	1999	2000	2001
Amount (kgs)	504	522	1324	5930	10,000+	

We have good exact data for four years on the amount of Imidacloprid used in this province. We do not have the figures yet for 2000, but I am fairly confident that for 2000 we will see Imidacloprid has moved into Group B (sales of active ingredient between 10,000 and 50,000 kg). Confirmation of that should be available very soon. I phoned two agrichemical dealers in PEI and one looked up the sales figures and told me that sales of Imidacloprid had quadrupled in 2000 from the 1999 level, and the other said that although their increase was not so dramatic, sales had probably more than doubled.

Then I figured the **cumulative** amount going in to the environment at the start of the next season:

YEAR	1996	1997	1998	1999	2000	2001
cumulative amount in PEI environment. at start of the year	0	252	388	856	3,393	6,696

I arrived at those figures by using the half life value of one year for Imidacloprid and applying that value to the amount of Imidacloprid in the environment at the start of the previous season. For a discussion of the half life of Imidacloprid please see page 4 of Appendix 9, a document on Imidacloprid by the National Pesticide Telecommunication Network. The US Environmental Protection Agency considers the half life of Imidacloprid to be one year. Our Pest Management Regulatory Agency in Canada put out a document on August 15, 1997 on Admire called Regulatory Note R97-01 which I have included as Appendix 10. In that document it states on page 2 that terrestrial field dissipation studies indicate that the half life of Imidacloprid in Canada in soil planted with potatoes ranged from 266 to 457 days, so the one year half life figure I have used should not be controversial.

So, to visualize what the graph is showing, you take the use of 'Admire' in one year (the blue bar) and add it to the accumulated load from the year before (the brown bar). Then you divide the sum by half since half of that degrades during the year. The result is the accumulated load for the next year (the brown bar). From this anyone can clearly see that using such a persistent toxin is madness. Even if the people of this province see this graph and raise their voices to demand that its use be stopped, and the Minister hears them and acts quickly, we will still be loading the environment with over 6,700 kg of active material this year and over 3,350 kg. the next. Our pollinators and other beneficial insects will continue to die. And if we don't stop now the brown bar keeps getting closer to the blue bar and the situation keeps getting far, far worse. We will have more toxins expressing themselves in the environment this

year just from accumulated load than from all the material we spread in 1999. That is several tons of material that ALL researchers, even the Bayer company ones, have shown to be toxic to essential pollinating insects in unbelievably tiny amounts; amounts far smaller than what was previously thought and presented by the company when the material was registered. And that material will be active in plants growing in fields that are no longer in potatoes, killing insects it was never intended for.

There are a few factors that I have not included in the graph. They are minor, but I should deal with them now, because potato growers have invested a lot of money in specialized equipment to make in furrow applications of Admire, it works well on potato beetles, and they are not going to be pleased if it is deregistered and will be looking for flaws in a graph that is so simple that almost everyone can understand why we can't keep spreading this.

First, some growers will say that they do not use the high in-furrow application rate of Admire. This is really of little consequence. At the low rate they are still spreading four times the rate that is applied to sunflowers with demonstrated residual effects to bees in successive crop years. The graph does not even look at rate. It is simply concerned with the amount of the toxin that is in the environment.

Some Imidacloprid does leave the environment in the potatoes that are harvested. Let us say that 50,000 kg of potatoes are taken from a hectare of treated field. If those potatoes all had the maximum rate of Imidacloprid residue that is allowed in Canada (Appendix 11) on potatoes, 300 parts per billion, that would still only remove 15 grams of active material from a field dose that ranged between 200 grams and 350 grams. And it is most likely, and I know all potato farmers will agree, that the residue in potatoes is far less than the allowable limit, and so much less than this is leaving in that manner. The other parts of the potato plant return to the soil.

Some toxin does leave in water. The study by Gary Julien on Environment Canada (Appendix 5) looked at this. And soon, we should have results on testing of water wells on the island that might give us some data. But when I asked Gary Julien, who I actually hoped might be able to be here, whether he thought that the removal by water would be significant to the graph, he did not. Apparently much of the dispersal that they found and documented in their study was not in the form of dissolved Imidacloprid, but more in the form of sediments that were removed from the fields by water (erosion basically) and by windblown particles of soil. That does not really remove Imidacloprid from the PEI environment, it merely spreads it around and it should still be included in the graph. For the bees the ditches are one of the most dangerous places to have the material because that is where many of the weeds like goldenrod that the bees work hard are found.

The beekeepers on this island would like to see the use of this product suspended until it can be proved safe to our bees and other essential pollinating insects. We can't afford to do the testing necessary. The Atlantic Vet College has the equipment necessary, and it is very precise, and can do the tests for about \$160 a sample. But they need a minimum number of samples which is large for each matrix that they test (nectar, honey, pollen, flowers). If the potato growers want to use this product in the future, and if the company wants to sell it, they should have to prove it is safe. And if that requires expensive testing, then the sale of it should be subject to a tax to fund that testing. But if the Minister has the good sense to halt the sale of this, then I

suppose that it would be up to the company to fund the testing to show it is harmless and try and get it reintroduced. On this same subject, the use of Imidacloprid, I believe that Walter Bradley when he was Minister of Agriculture responded to a question by Pat Mella concerning its safety by saying that the Province of PEI did have the power to regulate the sale of materials it deemed potentially hazardous. I think that if this committee looks carefully at the material I have presented it will have to recommend to the Minister that Imidacloprid is potentially hazardous to bees and other pollinators at least.

From: Informed Discussion of Beekeeping Issues and Bee Biology On Behalf Of Stan Sandler

Sent: March 28, 2001 7:02 AM

To: BEE-L@listserv.albany.edu Subject: Re: news on Imidacloprid

I wrote:

I had produced a graph which showed use and accumulation on PEI and held it up under my head throughout the whole news interview after my presentation, but it was NOT shown on TV because the lawyers at CBC (our national public television station) head office did not stand up to the lawyers from the Bayer company.

I now have a little more info, and it was not quite so dramatic as I portrayed. Bayer raised complaints about the validity of my persistence data, and the reporter did not have sufficient time to get all my documentation to the CBC's lawyer so that he would allow them to run with it. The document I had pulled the half life figure's from (R9701 from the Pest Management Regulatory Agency "potato soils... 266 to 457 days" I used one year) was not available to the reporter. So I should not fault our CBC for an otherwise good story and apologize if I portrayed them as gutless.

Part 2:

We had another meeting of our pesticide advisory committee yesterday. We had experts from Bayer present, and we had a phone link to PMRA in Ottawa. I gave the committee the short addendum to my previous submission, which I have attached.

The results of the meeting were that although there is not likely to be any moratorium on the use of Admire on PEI, the company has agreed that there is no good data on what is happening in the rotational crops and weeds (red clover, alsike clover, goldenrod) and they have agreed to cooperate with our dept. of agriculture and do some testing.

PESTICIDES ADVISORY COMMITTEE : ADMIRE ADDENDUM FROM STAN SANDLER Since my earlier presentation to this committee, I have continued to access and review the research relating Imidacloprid's toxicity to bees. I appreciate being allowed to present this new material to the committee.

In my initial presentation I gave you an appendix which was a paper by Bayer authors Schmuck, Schoning, Stork and Schramel , "Risk to Honeybees...." which I think will certainly be mentioned today. It says in the abstract that to bees Imidacloprid has "...high oral toxicity...with values between 3.7 and 40.9 nanograms per bee, corresponding to a lethal food concentration of between 0.14 and 1.57 mg/kg." Those food concentrates translate to 140 to 1,570 parts per billion. This is a

very important statement because Bayer is using it to relate an LD50 (an experimental value of the dose weight per bee, which when taken orally is lethal to 50 % of the victims in 48 hours) to a toxic concentration in plants, and it is completely speculation. 3.7 billionths of a gram per bee only translates to 140 ppb in a plant if you dose the bees with the toxin in 26 milligrams of solution (or 20 mg of solution and apply the formula on page 235 of the paper).

From Bayer's book, *The Life of the Bee*: "Despite itself weighing barely 100 mg, it (a bee) is able to transport up to 75 mg of pollen and nectar. ... It can make 30 pollen-gathering flights daily or 150 visits to a source of nectar or 110 water collecting flights. If you use those figures, you can calculate that a forager bee can gather 10 grams of nectar or 4.5 grams of pollen in 48 hours. Now I would not be so foolish as to claim that we use those amounts. The bee does not metabolize most of the nectar it is carrying. Nor would I claim that the bee is contacting all the toxin in the pollen it is carrying (the contact LD50 according to Bayer's Schmidt is 81 nanograms/bee). Much would be in the endoplasm of the pollen and would only poison the nurse bees and the brood. But it is equally foolish for Bayer to claim that they can relate an LD50 to a ppb using a single dose of 26 mg. Their own book says that bee foragers will fly 800 km in a couple of weeks. They need to metabolize one honey stomach of nectar (75mg) for each 10 to 13 km of flight, so they certainly metabolize many times more than 26 mg. in 48 hours.

But the main problem with this paper is that it completely ignores findings from the French independent studies. It says that the NOEC (no observed effects concentration) is 20 ppb. Consider the statement of Richard Schmuck in "No Causal Relationship between Gaucho Seed Dressing in Sunflowers and the French Bee Syndrome": "With the field studies from the French Ministry of Agriculture there are now 10 field/tunnel tests available which were conducted at different locations and under different climatic conditions. All these studies show concomitantly that bee-hives exposed to Gaucho treated sunflower fields did not develop any unusual symptoms." How then do they explain then the conclusions of Colin (of the French equivalent to Agriculture Canada) and Bonmatin (of the National Scientific Research Centre) which were that "Pour l'imidaclopride (3 ppb) et l'olefine (0.75 ppb) et probablement pour le monohydroxyimidaclopride (3 ppb) nous n'avons donc pas atteint le "No Observable Effects Level".... They say that the harmful effects on the bees are demonstrated in the range of concentration from 1 to 3 ppb. They further state that they not only find levels higher than that in pollen and nectar of sunflowers, but also levels exceeding that in the sunflowers growing in fields not treated in the current year, but that were treated in previous years. Bayer claims that they stopped using Gaucho on sunflowers, and problems persisted with the bees. These researchers showed that Imidacloprid is still a problem to the bees from the previous use of Gaucho. If they can find that in France, and that is why the ban was extended for two more years, what can we expect to find in fields in PEI receiving up to seven times the level of toxin per ha.? I think that is certainly sufficient cause to call a moratorium on use while we test.

Klaus Wallner found levels in phacelia pollen and nectar between 3 and 10 ppb, based on a soil application rate of 50 g a.i. /ha, which is less than half of the rate that is remaining in the soil in the year after potatoes. Phacelia is a plant which is more similar to clover than sunflowers. I have been unable to locate a single bit of data on what levels are in clover following potatoes, or in goldenrod in the ditches, so we should gather that data before we continue to use this chemical. There is a study of

Imidacloprid in rotational crops by Vogeler (of Bayer). It has a serious math error in the conclusions (Page 56) when compared with the results (Page 41). But it shows (in results) that 56% of the compound was still in the soil at day 412. And the residues in wheat straw were 2,500 ppb in the first rotation (the treated one), 2,380 ppb in the second (following) and 960 ppb in the third rotation (harvested 408 days after treatment). That was with a soil application rate of 454 g ai/ha, not that much higher than the high registered rate for admire on potatoes (350 g ai/ha). With residue rates like that we need to know what they are in clover before we keep using Admire.

Bayer says that the fact that aphids come back onto sunflowers late in the season is "sure proof" that the levels have gone below lethal. The LD50 for aphids may be lower than that of bees, but aphids are not complex social insects like bees. Sub-lethal effects on the behaviour of individual bees can be lethal or highly detrimental to the beehive. That is what I saw in my beehives. And at application rates closer to those of potatoes than sunflowers, Sclar and Cranshaw found control of elm aphids and longhorn beetles for two years. I must emphasize that the high application rate on potatoes makes any conclusions the French drew about hazards to bees even more dangerous here.

Bayer claims in many of its publications that the problems with bees are due to disease, not this insecticide. But I would draw your attention to this quote, from the label of Premise 75, a Bayer product with 75% Imidacloprid and 25% inert used to kill termites and ants (other social insects like bees): "Premise causes a range of effects in termites, they stop feeding and are unable to maintain their colony. A second effect, exclusive to Premise, is called Premise plus Nature. This product makes termites susceptible to infection by naturally occurring organisms. Either way, the termites die and your home is protected". Exactly, my point, weaken the colony of bees with lethal and sub lethal effects and surely disease will set in, and it is crass to use this effect to advertise a product, and then use it to blame beekeepers' problems on diseases