

Toxicological expert's report regarding five plant protection products applied by air in Martinique and Guadeloupe (French West Indies)

Final report of the ECERI's Scientific Committee following AMSES-Martinique's request of the case.

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Summary

In 2012, the Scientific Committee of ECERI, the European Cancer and Environment Research Institute, was requested by AMSES, the Medical Association for Health and Environment Protection in Martinique, to conduct an independent scientific study regarding 5 plant protection products used by aerial spraying in the French West Indies, in particular in Martinique, to protect banana plantations against black Sigatoka (ascomycete fungus).

The following plant protection products are concerned: TILT₂₅₀ (Propiconazole), SICO (Difenoconazole), BION (Acibenzolar-S-Methyl), GARDIAN (Fenpropidin) and BANOL (Hydrocracking of petroleum).

The present expert's report comprises two parts: an analysis of risks related to the active substance in each of the five plant protection products concerned and that of risks related to aerial spraying.

Three of the pesticides used, TILT₂₅₀, SICO and GARDIAN have active ingredients, respectively Propiconazole, Difenoconazole and Fenpropidin that are actually highly toxic: Propiconazole (TILT₂₅₀) and Difenoconazole (SICO) are active ingredients that are possible and even probable carcinogens, in addition to or through their endocrine disrupting effect. It has also been proven that Fenpropidin alters fertility and is toxic to the fetus. Moreover, the three products are extremely toxic to aquatic organisms and may cause in the end irreversible damages to the aquatic environment.

The panel of experts of the ECERI's scientific committee, in accordance with the precautionary principle, thus firmly condemns the use of these three plant protection products and unreservedly concludes that these products used in the French West Indies must be withdrawn immediately and unconditionally, owing to their harmfulness to health and the environment.

Nevertheless, the scientific analysis regarding BANOL (Hydrocracking of petroleum) and BION (Acibenzolar-S-Methyl) has led the panel of experts of the ECERI's scientific committee to approve their use in the French West Indies, in particular in Martinique, but under several conditions:

• Regarding BANOL (Hydrocracking of petroleum), provided that 1) the impurity rate (benzene, Polycyclic Aromatic Hydrocarbons) are checked on a regular basis by the firm and governmental services and that 2) the product contains no organic solvent.

• Regarding BION (Acibenzolar-S-Methyl): provided 1) that it is used over plantations located at an appropriate distance from rivers and the coast and 2) that the number of sprayings is limited.

• Finally regarding both products: provided 1) that they are shown to be truly active against Sigatoka and that 2) they are not used by aerial spraying.

Indeed, regarding aerial spraying, experts from the ECERI's scientific Committee, owing to the limited territories of islands in the French West Indies, to their limited fresh water supply and farmlands, to previous pollution phenomena related to the massive use of highly toxic organochlorinated pesticides, and to health issues deriving from them today and which affect a growing number of islanders from the French West Indies, categorically reject aerial spraying over these territories for the following reasons:

1. Aerial spraying easily spreads pesticides far beyond areas treated.

2. It thus increases contamination of the environment, in particular biota, soils and rivers (and therefore even distant coasts), creating unacceptable collateral damage when considering island territories with limited drinking water supply and farmlands.

3. It directly jeopardizes the health of inhabitants living near treated area or even away from treated areas, due to low dose and cocktail effects, whatever the plant protection product used.

4. For the foregoing reasons, it jeopardizes childhood, given the fetus extreme vulnerability to low dose and cocktail effects.

5. Though it seems to make the target application of pesticides easier, it proportionally decreases their effectiveness, owing to dilution and loss phenomena related to aerial spraying.

6. The numerous exemptions to aerial spraying, such as currently granted by the French State to the French West Indies, formally contradict the spirit of EU Directive 2009/128/CE prohibiting aerial spraying. Systematic aerial spraying, as carried out in the French West Indies is thus totally illogical, extremely dangerous, illegitimate and even illegal considering European law.

Aerial spraying of plant protection products in limited territories such as islands altogether makes no sense at all, is extremely dangerous, and therefore should be published since according EU Directive 2009/128/CE exemption to the interdiction of aerial spraying of plant protection products should not be generalized, as it is presently the case in the French West Indies.

Thus, as the European Commission did regarding its revision about the use of BANOL, the panel of scientific experts of ECERI demands that the relevant French authorities, including ANSES, make the risks assessment inherent to the aerial spraying of pesticides in limited territories such as islands, taking into consideration public health specific to islands. The scientific experts of ECERI consequently request that ANSES reviews its aerial spraying authorization for plant protection products in these territories including Martinique and Guadeloupe.

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INTRODUCTION

In 2012, AMSES-Martinique – Medical Association for the protection of Health and the Environment in Martinique – requested from the scientific committee of ECERI, the European Cancer and Environment Research Institute, an independent toxicological expert's report regarding five plant protection products (pesticides) applied by air to treat black Sigatoka (ascomycete fungus) infecting banana plantations in Martinique (Appendix 1)

The letter from the President of AMSES-Martinique, Dr Josiane Jos Pelage (pediatrician) to the Vice-President of ECERI, Pr. Janos Frühling (Honorary Permanent Secretary of the Royal Academy of Medicine of Belgium) was worded thus:

"As the President of an organization for the protection of the environment and health, AMSES, comprising only medical doctors, and as the local representative of the French Medical Association requested to pass on advice regarding aerial spraying, I am appealing to ECERI and to you, as its Vice-President, to conduct an independent toxicological expertise of products used in the treatment of black Sigatoka that affects banana plantations in Martinique and Guadeloupe (French West Indies). Products involved are as follows: TILT₂₅₀ (Propiconazole), SICO (Difenoconazole), BION (Acibenzolar-S-Methyl), GARDIAN (Fenpropidin) and BANOL (hydrocracking of petroleum)."

On October 2012, AMSES' request was presented to the scientific committee of ECERI chaired by Pr. Janos Frühling in the presence of Pr. Dominique Belpomme, executive director of ECERI, and several experts were nominated: Pr Gérard Ledoigt (University of Clermont, UMR PIAF University-INRA, France), Mr. Jean Huss, Rapporteur of the Health and Environment Commission at the European Council (Luxemburg) and Vice-president of the European Academy of Environmental Medicine (Germany), Mr. Philippe Irigaray (Scientific Director of ARTAC, Association for Research and Treatments Against Cancer, France), Dr Ernesto Burgio, pediatrician, President of the Scientific Committee of the International Society of Doctors for the Environment (ISDE) and Mr. Anthony Tweedale (ECERI Scientific counselor, USA).

On April 4, 2012, the director of ECERI, Pr. Dominique Belpomme, sent to the President of AMSES Martinique, Dr Josiane Jos Pelage, a letter in which he provided the first results of the requested expert's report (Appendix 2).

The present report provides the final results of the requested report, following an in-depth analysis of data from the international scientific literature regarding the five plant protection products and their use by aerial spraying, which were the purpose of this scientific request. In addition to this expert's report, several regulatory and legislative aspects were also taken into account.

This report comprises two parts: the analysis of risks related to the use of each of the five plant protection products concerned and that of risks related to the aerial spraying of these products.

I. Analysis of risks related to the use of Propiconazole (TILT₂₅₀), Difenoconazole (SICO), Petroleum distillates (BANOL), Acibenzolar-S-methyl (BION) and Fenpropidin (GARDIAN).

1. General data

Martinique is a French tropical island located in the West Indies, characterized by a limited territory (1128 km2) and a low number of inhabitants (414.516).

The island's economy mainly relies on banana crops. These crops have been submitted to the proliferation of several parasites, such as the weevil and fungi, which have caused affections, such as the yellow Sigatoka, and for several years now, the black Sigatoka coming from neighboring islands, such as Dominica and Saint Lucia, also located in the Caribbean.

It must be mentioned that black Sigatoka is a disease that was already mentioned in appendix A of the French Decree dated July 31, 2000, establishing a list of pests to plants, plant-care products and other objects submitted to compulsory control measures, in compliance with article L251-8 of the French Rural code. It must also be added that in Guadeloupe, this compulsory control was set up by Decree 2006/441 dated April 6, 2006.

The French West Indies (Martinique and Guadeloupe) have been very much impacted at a health and environmental level by the use since the fifties' of numerous pesticides (chart 1).

	On the market	Maximum of use	Withdrawal from the market for agricultural use	Continuation of use	IARC classification
Technical DDT	1939	1960-90	1972		2B
Technical HCH	1940 ^a	1950-60	1988	1998	2B
Lindane	1940 ^a	1950-60	1992		2B
Aldrin/dieldrin	1950 ^a	1960	1972	1992	2B
Chlordecone	1972	1980	1990	1993	2B
Chlordanes	1960 ^a				2B
Perchlordecone (mirex)	1977 ^a	1980	1990		2B
Simazine	1991ª		2001		3 ^b

Chart 1: Cancerogenic, mutagenic and reprotoxic (CMR) and presumed CMR pesticides used since 1955 in Martinique and Guadeloupe.

^aOfficial data not available. ^bSimazine, a non-organochlorinated molecule, is associated with an increased risk of prostate cancer (43). Technical DDT is a mixture of the isomers p.p'-DDT (85%), o.p'-DDT (15%) and o.o'-DDT (<1%) and technical HCH, a mixture of the isomers α , β and γ . Chlordanes include trans-chlordane, cis-chlordane, trans-nonachlor, cis-nonachlor and heptachlor.

In 2007, in a report called *Expert's and external audit report regarding pesticide pollution in Martinique - Agrobiological consequences on food and health and proposal for a fivefold protection plan*, several researchers, including Pr. Belpomme, denounced the health and environmental risks related to the massive use of pesticides in Martinique, in particular the damaging effects of Chlordecone. Although this report was questioned at the time, current scientific data mostly confirm the validity of this report, as pesticides cause numerous diseases, including cancer and some degenerative neuropathies, and the fetus is particularly vulnerable to the effects of pesticides, as underlined in France by INSERM's report dated June 12, 2013. Furthermore, it has now been clearly determined that the rate of prostate cancer in Martinique is one of the highest worldwide and that the risk of this cancer is related not only to Chlordecone, but possibly also to other pesticides used since the fifties'. It is also true that other non-cancer diseases impact Martinique and Guadeloupe, such as type-2 diabetes (chart 2) and obesity, that these affections are also possibly caused by pesticides and that, in children, several congenital malformations and development disorders may be related to the use of pesticides.

Country or Region	Number of diabetic patients in 2000	Total population	Percent diabetic patients	Estimated number of diabetic patients in 2030
Martinique	35 000*	384 800	9.1	NA
France	1 753 243	58 892 000	2.98	2 645 444
USA	17 702 000	281 550 000	6.3	30 312 264
Cuba	479 612	11 188 000	4.3	875 643
Sainte-Lucie	5 238	156 000	3.34	11 327
Total World	171 000 000	6 058 520 773	2.82	366 000 000

Chart 2. Number of diabetics patients in different countries, according to WHO, 2002

* on average, there are 1200 new cases every year.

In 1993, the use in the French West Indies of Chlordecone was finally prohibited (Chart 1). The issue today is that of the health safety of inhabitants in the French West Indies, more particularly in Martinique and Guadeloupe, related to five current plant protection products applied indiscriminately by aerial spraying (substituting for the previously used pesticides). Martinique and Guadeloupe are relatively small islands, drinking water supply and farmlands are limited, these islands were previously highly polluted by numerous pesticides, and inhabitants traumatized by previous toxic exposures are affected by many issues of public health.

2. Propiconazole (TILT₂₅₀)

Propiconazole is the active ingredient of $TILT_{250}$, a fungicide of the triazole family with the number CAS 60207-90-1 and it is notably used to disinfect wood and preserve field crops. It is 1-[2-(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-ylmethyl]-1H-1,2,4-triazole.

In terms of acute toxicity, if swallowed, it causes pulmonary trouble (R65), whereas, if it is inhaled as vapors, it may cause drowsiness and dizziness; listed as R36/38, it may cause irritation to eyes and skin. In addition, listed as R43, it may cause sensitization by skin contact. The firm Syngenta who markets the products recommends that people using this product do "not eat, drink or smoke during use", "wear appropriate protective clothing, gloves, and goggles or face shield". As for storage, the product should be "kept away from children, food and beverages, including that of animals".

In terms of chronic toxicity, the product is listed as a *possible carcinogen* (group C) by the Environmental Protection Agency of the United-States (US-EPA) (Appendix 3), though to our knowledge it has still not been listed by the International Agency for Research on Cancer (IARC) as a carcinogen. Nevertheless, the product causes liver cancers in mice if chronically swallowed and question related to understanding the mechanisms of carcinogenesis in this case are in the process of being solved.

Moreover, Propiconazole is an endocrine disruptor. This could be due to alterations in the hepatic metabolome including increases in glycolysis, oxidative stress and the cholesterol biosynthesis pathway. It has in particular a low estrogenic effect and mainly a pro-androgenic effect by aromatase (CYP19) inhibition.

What actually needs to be considered here in terms of carcinogenicity is not so much aromatase (CYP19) inhibition, which remains relatively low compared to other azole fungicides (triazoles), as its synergetic potentialization of the effect of other chemical pollutants (cocktail effects) has been described.

As highlighted by the US-EPA, Propiconazole could be neurotoxic, based on results obtained on animals. Moreover, it may have an impact on fertility, according to different recent experimental data.

Finally, it has been proven in the Wistar rat that Propiconazole combined with other pesticides can be found in the amniotic fluid, which clearly means that it crosses the placental barrier, thus contaminating the fetus, a crucial risk, given the complexity and thus vulnerability of development.

Although it is in fact a health-threatening substance, the product has been authorized in the USA (Appendix 3) and in Europe authorized as a biocide for human use as a wood preservative, disinfectant for private area and public health areas, food and feed areas, as metal working-fluid preservative (Commission Decision 2008/809/EC), as masonry preservative, slimicides (Commission Decision 2010/72/EC) and as Preservative for food and feed stocks (Commission Decision 2010/72/EU).

However, at the time of this analysis, to our knowledge it appears Propiconazole is not currently approved for aerial application in the USA.

Indeed, released into the environment, Propiconazole listed as R50/53 is known to be very toxic to aquatic organisms and may cause long term adverse effects on the aquatic environment.

Although in France, the French Food Agency (AFSSA), on November 10, 2008, and the French Agency for Food, Environmental and occupational Health Safety (ANSES), on March 01, 2011, following a request from the company Syngenta Agro SAS, have approved the use of Propiconazole by aerial application, there is no doubt that this product used in places where water supply and farmlands are limited should in fact be considered as extremely hazardous for health and environment when used at low doses combined with other pesticides (cocktail effects). Moreover pregnant women, fetuses and children are first and foremost affected.

3. Difenoconazole (SICO)

The active ingredient of SICO is Difenoconazole. Listed with CAS 119446-68-3, this fungicide is a triazole molecule similar to Propiconazole. It is 1-[2-[2-chloro-4-(4-chlorophenoxy) phenyl]-4-methyl-1,3-dioxolan-2-ylmethyl]-1*H*-1,2,4-triazole.

This substance has in fact seldom been studied. As Propiconazole, it is an endocrine disruptor, acting as an aromatase (CYP 19) inhibitor. It would thus have anti-estrogenic and androgenic properties. In the US, in 1994, the Carcinogenicity Peer Review Committee (CPRC) listed Difenoconazole as a *possible human carcinogen* and in March 1999, the US-EPA listed this substance as a *likely human carcinogen*, in accordance with the proposed Guidelines for Carcinogenic Risk Assessment (Appendix 4). Moreover, the product listed as Xn and R48/22 is considered to be harmful, in other words, causing serious effects on health if swallowed over a prolonged period of time. This is notably what the SICO Safety Data Sheet coming from Syngenta, the company that markets the product, points out.

As for Propiconazole, its acute toxicity, listed as R36/38, causes irritation to eyes and skin. Moreover, listed R43, it may also cause sensitization by skin contact. Finally, listed R50/53, it is considered as for Propiconazole very toxic to aquatic organisms and may cause long term adverse effects on the aquatic environment

Owing to the low number of papers in the scientific literature, it is clear that the toxicological study of this product is insufficient. Its immediate and thus long-term effects are unknown. This explains why in 2010, the US-EPA had requested many further studies prior to authorizing the marketing of this product.

Regardless in France, ANSES following the request of Syngenta Agro SAS has approved the use of Difenoconazole by aerial application, the fact remains that, applied on islands as exiguous as Martinique and Guadeloupe, the product can only be considered as extremely hazardous in terms of environment and public health, in particular due to low dose and cocktail effects, as well as the extreme vulnerability of the fetus, which eventually constitutes a major risk, and this risk is incompatible with the precautionary principle; all the more so, if we consider that scientific data currently available are still insufficient to provide safe recommendations.

CONCLUSION:

Owing to the proven harmfulness of Propiconazole and Difenoconazole, to the fact that these are two close molecules belonging to the triazole group, to their possible or even probable carcinogenic effect, according to US-EPA, to still insufficient scientific data, and consequently, to the uncertainty in both cases of long-term effects, and finally, due to the proven toxicity for both products to flora and fauna of the aquatic environment, the panel of scientific experts of ECERI, in accordance with the precautionary principle, concludes that both plant protection products must be withdrawn immediately and unconditionally due to their harmfulness to health and the environment. Indeed, if not so, it is clear that the pollution already existing and public health issues will worsen on both islands and may cause in years to come a new health scandal, such as that Chlordecone did.

4. Paraffin oils (BANOL)

The scientific assessment of paraffin oils and more particularly the product called BANOL, which contains them, constitutes a difficult problem. Initially registered under the reference CAS 64742-46-7, the product was listed as carcinogenic due to impurities, such as benzene and polycyclic aromatic hydrocarbons (PAHs), all considered to be known carcinogens (group 1) by IARC (WHO). As stated in the European Chemical Substances Information System, and in compliance with the European Regulation in Appendix 1 of Directive 67/548/CEE, BANOL was listed in group 2, in other words, considered as a carcinogenic product due to positive data on two animal species, and therefore carcinogenic for man.

Furthermore, in terms of labeling, listed as R45, it was considered to cause cancer due to impurities.

In 2008, a peer review conclusion drawn up by the European Food Safety Authority (EFSA) regarding pesticide risk assessment of active substances such as paraffin oils was released (Appendix 5). Paraffin oil products were divided into 3 categories according to their chain lengths: CAS N° 64742-46-7: chain lengths C_{11} - C_{25} ; CAS N° 72623-86-0: chain lengths C_{15} - C_{30} ; CAS N° 97862-82-3: chain lengths C_{11} - C_{30} . Experts confirmed that "benzene and PAHs impurities are relevant and that the specification as proposed by the notifier could not be accepted on toxicological grounds due to the high levels of relevant impurities". It was noted however that "if highly purified paraffin oils were considered (*i.e.* no concern would be raised from the impurity profile of the active substance), then no toxicological concern would be raised for consumers, operators, workers and bystanders".

Thus, in the SANCO/2676/08-final report dated January 28, 2011 (Appendix 6), the conclusion is that "provided that Total's BANOL paraffin oils undergo a highly sophisticated refinement process" - which makes paraffin oils free from any impurities (less than 0.0000005% w/w Benzene and less than 0.000009% w/w PAH) - "it may be expected that plant protection products containing paraffin oils CAS N°64742-46-7, CAS N°72623-86-0 and CAS N°97862-82-3 will fulfil safety requirements laid down in Article 5 (1)(a) and (b) of Directive 91/424/EEC." "This conclusion is however subject to compliance with the particular requirements in section 4,5,6 and 7 of this report, as well as to the implementation of the provisions of Article 4(1) and the uniform principle laid down in Annex VI of Directive 91/414/EEC, for each plant protection product containing paraffin oils CAS N°64742-46-7, CAS N°72623-86-0 and CAS N°97862-82-3 for which Member States will grant or review the authorization."

Thus, as in the United States, the product has been authorized in Europe provided it fully complies with Directive 91/414/EEC and conditions of use of each Member State.

CONCLUSION:

The panel of scientific experts of ECERI refers to the conclusions drawn up by the European Commission Health and Consumers Directorate General in the SANCO/2676/08 report dated January 28, 2011, which specifies that paraffin oils being chemically inert substances, the use of BANOL to protect crops and in particular banana crops in tropical climates, is possible in theory, but under certain conditions.

Provided:

- 1. That the rates of impurities (benzene, PAHs) in the different batches to be used are systematically and regularly checked, not only by the manufacturer's agents, but also by State authorities specialized in that type of measurements.
- 2. That safe storage conditions on the island are secured and identical for every batch.
- 3. That the product contains no organic solvent.
- 4. That the product is not used by aerial application (which is not currently authorized in France), given the known risks of aerosolized oil inhalation.
- 5. And finally that the firm provides studies proving the absence of risks to the environment, in other words, to the flora and fauna and in particular to aquatic organisms, as requested in the first EFSA analysis (Appendix 5).

Thus, provided that these 5 requirements are met, the panel of scientific experts of ECERI will approve the use of BANOL to treat banana plantations in the French West Indies and more particularly, in Martinique and Guadeloupe.

5. Fenpropidin (GARDIAN)

Fenpropidin is the active ingredient of GARDIAN, a fungicide registered as CAS 67306-00-7, more specifically used to protect cereals, such as wheat and barley. Fenpropidin is a compound of the chemical family of morpholines. It is (RS)-1-[3-(4-tert-butylphenyl)-2-methylpropyl]piperidine.

GARDIAN, marketed by Syngenta, is for acute toxicity labeled Xn = harmful. Listed as R36, it causes irritation to eyes. Listed as R21/22, it is harmful if swallowed and in contact with skin.

As stated in the GARDIAN Safety Data Sheet dated November 22, 2012, provided by Syngenta, the product is not just harmful if swallowed (H 302), fatal if swallowed and inhaled (H304), cause skin irritation (H 317), may cause severe eye injuries (H 318), harmful by inhalation (H 332), may irritate respiratory track (H 335), may cause drowsiness and dizziness (H 336); but most of all:

- May harm the fetus (H 360D)
- Is likely to adversely impact fertility (H 361F)

• Is very toxic to aquatic organisms (H400), with likely long-term adverse effects (H410, H411)

Some scientific studies have specified how Fenpropidin works and how the phenomena of resistance to the product are acquired: these are related to the overproduction of enzyme sterol-14-reductase. Moreover, it has been shown that this molecule does not degrade by photolysis in the environment and that it thus remains in soils over long periods of time.

Yet, to date and to the best of our knowledge, no carcinogenic effect has been brought to light.

Although Fenpropidin is clearly an extremely toxic molecule to health and the environment, this active ingredient has however been registered in Appendix I of Directive 91/414/CEE through Directive 2008/66/CE.

In France, Fenpropidin is authorized in compounds approved on the French market. In fact, though AFSSA, on June 20, 2008, and then ANSES, on October 4, 2011, upon request of Syngenta Agro SAS, approved the use of GARDIAN by aerial spraying, it appears that those approvals did not take into consideration scientific data currently available in terms of public health, which stated that Fenpropidin is extremely toxic, in particular to fertility and the fetus.

Moreover, it seems that the targeted delivery of the product with a set quota by aerial spraying, such as suggested by ANSES in its recommendations dated October 4, 2011, is in fact impossible in practical terms, due to the fact that Martinique and Guadeloupe have relatively limited territories and have been previously highly polluted. Thus, it finally appears that neither the previous episode of Chlordecone, nor the extreme pollution of these islands, nor, finally, nagging public health issues have been considered.

CONCLUSION:

Although GARDIAN has been approved, the panel of scientific experts of ECERI thus solemnly condemns the use of this fungicide in the French West Indies owing to its extreme toxicity, not only to health but also to the environment.

Sterility and fetal alteration risks should be considered here, as well as extinction risks to aquatic organisms due to the toxicity of the product.

The condemnation of ECERI experts is all the more firm and coercive since this product persists in soils in the long term. The use of this pesticide should be prohibited urgently not only by aerial, but also ground applications.

6. Acibenzolar-S-methyl (BION)

Acibenzolar-S-methyl is the active ingredient of BION, which stimulates the natural defense mechanisms of plants and is marketed by Syngenta. It is mostly used to protect tomato and tobacco crops against some bacterioses. The molecule registered with CAS 135158-54-2

belonging to the benzothiadiazole family. It is S-Methyl 1,2,3-benzothiadiazole-7-carbothioate used in ester form.

Acibenzolar-S-methyl is in fact an analogue of salicylic acid that is naturally produced by plants, which induce, when attacked by predators, secondary defense reactions including synthesis of this molecule. BION is therefore not a pesticide strictly speaking, since it is said to act by increasing plant resistance to different pests. This makes it unique at a scientific and conceptual level.

Unfortunately, listed as N, Acibenzolar-S-methyl is hazardous to the environment.

Although Acibenzolar-S-methyl is degraded by abiotic (photolysis) and biotic processes, the substance is yet listed as R50/53, very toxic to aquatic organisms and likely to cause long term adverse effects on the aquatic environment.

Moreover, in terms of health, this substance is listed as R36/37/38, i.e. irritating to eyes, respiratory system and skin. And listed as R43, it may cause sensitization by skin contact.

One should note however the absence of known carcinogenic effects and the absence of known risks to the fetus. But it is clear in this case that the available scientific literature is not well documented.

A relatively comprehensive analysis of scientific data has been carried out in the United States by the US-EPA (Appendix 7). What emerges from this analysis is that the molecule does not in fact appear to be so highly toxic to health and that the toxicity to aquatic organisms could be manageable. Nevertheless, studies regarding the true protective effects of the molecule remain to be determined. To our knowledge, no scientific data proves the protective role of Acibenzolar-S-methyl against black Sigatoka.

The action mechanism of this molecule in phenomena of stress resistance has been specified. The role of certain genes in the increase of the secondary response has been demonstrated. Applying Acibenzolar-S-methyl or even salicylic acid to plants would increase the expression of these genes through chromatin modifications or alterations of defense gene promoters.

Although the principle itself of stimulating natural defense mechanisms in plants by using an active ingredient, such as Acibenzolar-S-methyl (or acetylsalicylic acid), is quite unique, the limited use of BION on extremely polluted islands, such as Martinique or Guadeloupe, may adversely impact the environment, due to the toxicity of Acibenzolar-S-methyl on aquatic organisms, while having no reported effect on health.

However, it must be pointed out that in the European Union, Acibenzolar-S-methyl has been registered in appendix I of Directive 91/414/CEE by Directive 2001/87/CE and that in France this active ingredient is authorized in approved compounds.

CONCLUSION:

Owing to available scientific data and notably relatively reassuring scientific data from EPA in the USA, the panel of scientific experts of ECERI approves the use of BION in the French West Indies, thus in particular in Martinique and Guadeloupe, provided the following requirements are met:

1. BION should not be used by aerial application.

2. The use of BION by ground application should be strictly limited, i.e. the product should be sprayed on lands located at an appropriate distance from rivers and the coast. Consequently, the use of this product should be dedicated to well-targeted crops.

3. The number of applications should be minimised.

4. The product must be proven to act against the Sigatoka.

Provided these four requirements are met, the panel of experts of ECERI approves the use of BION.

II. Aerial application

As specified in the foreword of ANSES' recommendations dated December 2011, relating to the assessment of risks associated with the aerial spraying of plant protection products, the European Directive 2009/128/CE relating to the use of pesticides compatible with sustainable development stipulates in article 9.1 that Member States make sure that aerial spraying (by plane) is prohibited and in article 9.2, that by way of derogation from paragraph 9.1, pesticides should be specifically approved for aerial spraying, after a specific assessment of risks related to this route of exposure. Yet, an assessment of risks related to plant protection products used by aerial spraying was submitted on June 10, 2011, by the Food Administration (DGAI) to ANSES and was approved on December 2, 2011, authorizing without restriction aerial spraying. It is worthy of note that this authorization was given without taking into account neither specific territorial conditions related to islands, nor potentially protected areas in terms of flora and fauna, nor finally public health risks inherent to any environmental contamination.

This authorization which, according to Directive 2009/128/CE dated October 21, 2009, may only occur for certain pesticides after an assessment of very specific risks of proposed applications, i.e. as an exemption to the general prohibition of aerial spraying of pesticides thus contradicts the above mentioned European Directive.

Without taking into account the requirements of Directive 2009/128/CE and as a consequence of the ANSES authorization dated December 2, 2011, the prohibition of aerial

spraying have been granted annually for 4 out of the 5 pesticides concerned by the Prefects of Martinique and Guadeloupe. And this has been done without taking into account the harmfulness of several of these pesticides, the extreme fragility of the territories concerned in terms of vital water supply and farmlands, the already existing environmental pollution, or the vulnerability of the flora and fauna they shelter, the extreme vulnerability of the fetus and infants to any kind of pollution and of the serious public health issues resulting from aerial releases of dangerous chemicals (issues that have been highlighted over the last 10 to 20 years on those islands), and finally the particular history of these islanders living far away from metropolitan France who have suffered the latest public scandal of Chlordecone and have deemed it a true negligence of governmental services.

CONCLUSION:

Thus, owing to the islands' exiguous territory, whether it be Martinique or Guadeloupe, the members of the panel of experts, agreeing with the opinion of the Scientific Committee of the National Park of Guadeloupe dated June 20, 2012 (Appendix 8 and 9), have unanimously rejected the use of aerial spraying, whatever the plant protection product, used to treat crops, for the following reasons:

1. Aerial spraying easily spreads pesticides far beyond areas treated.

2. It thus increases contamination of the environment, in particular biota, soils and rivers (and therefore even distant coasts), creating unacceptable collateral damage when considering island territories with limited drinking water supply and farmlands.

3. It directly jeopardizes the health of inhabitants living near treated area or even away from treated areas, due to low dose and cocktail chronic effects, whatever the plant protection product used.

4. For the foregoing reasons, it jeopardizes childhood, given the fetus extreme vulnerability to low dose and cocktail effects.

5. Though it seems to make the target application of pesticides easier, it proportionally decreases their effectiveness, owing to dilution and loss phenomena related to aerial spraying.

6. The numerous exemptions to aerial spraying, such as currently granted by the French State to the French West Indies, formally contradict the spirit of EU Directive 2009/128/CE prohibiting aerial spraying. Systematic aerial spraying, as carried out in the French West Indies is thus totally illogical, extremely dangerous, illegitimate and even illegal considering European law.

Aerial spraying altogether makes no sense at all, is extremely dangerous and its generalization in islands such as Martinique and Guadeloupe reveals to be illegals with regards to EU Directive 2009/128/CE.

Thus, as the European Commission did regarding its revision about the use of BANOL, the panel of scientific experts of ECERI demands that the relevant French authorities, including ANSES, complete its risks assessment inherent to the aerial spraying of pesticides, taking into account notably public health risks in limited territories such as islands. The scientific experts of ECERI consequently request that ANSES reviews its aerial spraying authorization for plant protection products in the French West Indies, including Martinique and Guadeloupe.

GENERAL CONCLUSION

The panel of experts of ECERI:

1. Rejects the use of Propiconazole, Difenoconazole and Fenpropidin in the French West Indies, in particular in Martinique and Guadeloupe to treat banana crops, owing to their extreme toxicity to human health, as well as the environment, especially to aquatic organisms.

2. Cautions that despite a plant protection product being approved it may be hazardous to the flora, fauna and health.

3. Approves the use of BANOL (Paraffin oils) and BION (Acibenzolar-S-methyl), under strict conditions.

4. Firmly condemns any aerial spraying in relatively small islands, which consequently have limited fresh water supply and farmlands.

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Mr Jean HUSS Rapporteur of the Health and Environment Commission at the European Council (Luxemburg) and Vice-president of the European Academy of Environmental Medicine (Germany)

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APPENDICES