



SYNGENTA, LIES & PESTICIDES

Agro-chemical multinational **Syngenta**, earning billions of euro a year selling "plant protection products" and seed coating products, notably with **neonicotinoids**, one of the most used types of pesticides, recently launched a multi-million euro lobbying campaign across Europe, to stop European authorities from taking action to lower the use of these chemicals. At the end of January the European Commission (EC) announced a two year ban on three neonicotinoids because of their influence on the **mortality of bees**. Since the introduction of these systemic insecticides, two decades ago, deaths and disappearances amongst bee colonies in the US and Europe have reached such epidemic proportions that the term '**Colony Collapse Disorder**' (CCD) came into use [1]. Some beekeepers in the US will even apply for disaster relief from the US Department of Agriculture (USDA) [2].

On 16th January 2013, the **European Food Safety Authority (EFSA)** published three reports on the toxicity risk to bees and other pollinator species of three neonicotinoid insecticides: **clothianidin**[3] and **imidacloprid** [4] by **Bayer** and **thiamethoxam** [5] by **Syngenta**. EFSA's conclusions are quite clear: these neonicotinoids pose a **high risk to bees**, either by the presence of these insecticides in nectar and pollen, by the dust produced when sowing coated seeds or by toxic exudates produced by treated plants. EFSA recommended that the three "highly toxic" actives in question be subjected to a much more rigorous regulatory assessment.

Although banning the use of neonicotinoid pesticides on only honeybee-attractive crops would be a good step forward, this would certainly not solve the problem of the loss of pollinators. No one is denying that **other factors** like diseases (bacterial, viral, parasitic, etc) and intensive monoculture agriculture, also play a huge role in CCD. But Syngenta, who sell one of these products (thiametoxam, sold under the name Cruiser), **simply denies** that their products have anything to do with bee mortality. Syngenta and others have also put strong legal pressure on the EC not to proceed with these policy measures.

Nevertheless, the EC has recently proposed to **suspend the use of these three substances** on crops attractive to bees, namely sunflowers, oil seed rape, maize and cotton, across the EU, as a precautionary measure starting no later than 31st July 2013, for a period of two years.

There is more than enough scientific evidence that neonicotinoids are indeed **one of the factors** in the decline of bee colonies and biodiversity in general. Syngenta is simply denying this.

Although policy makers can't combat for example **climate change** or other contributing factors in the short term, what they can do is halt the widespread use of these specific pesticides: this is currently the most practical and effective policy measure that politicians can take.

In fact the EC's proposal is a **bare minimum**: after a two year ban of the three specific pesticides, bee populations will not have recovered sufficiently. This is because of **the persistence of the chemicals in the agro-ecosystems** and the continued medium-term exposure of non-target insects such as bees to the chemicals: this is why **only a full ban** makes sense eco-toxicologically. Anything less than a full ban, could lead to pesticide manufacturers again claiming that the use of neonicotinoids is not at all related to bee mortality.

With a special website [6] and full page adverts in major European newspapers, Syngenta claims that this ban on three neonicotinoids, is based on **flawed science and emotional humbug**. What Syngenta is trying to do is deliberately spread **uncertainty** amongst policy makers and politicians. By spreading uncertainty via apparently "science based" arguments, the agro-chemical companies are acting as "**merchants of doubt**" [7] and thus **blocking effective action** by the EU.

According to Syngenta (and the '**big six**' of agrochemical companies) - the proposed ban on three neonicotinoids would lead to **massive losses in agribusiness**, and will not help bees to survive. This is why we want to dismantle the most important of their so called "scientific claims" that are in fact based on **lies**, to **protect corporate profits**.

The 10 Syngenta Lies on bees and neonicotinoids

Lie No.1 Syngenta says: "We believe that EFSA found itself under political pressure to produce a hurried and inadequate risk assessment, which even they acknowledge contains a high level of uncertainty."

Our answer: If there was any pressure, then it was because European policy makers could no longer stand aside, given scientific evidence, and watch an environmental disaster unfold. The EC launched a proposal on the basis of the findings by EFSA, which is **operating independently** and gives **scientific advice** to the European Commission. If one would assume there is a bias in these EFSA-opinions, it is rather in favour of agrochemical companies like Syngenta.

Many scientists that contribute to EFSA's opinions have close ties with companies that develop the very new products that are examined by EFSA. For years EFSA has faced **serious criticism** by Greens and civil society for depending too much on only **industry data to perform risk assessments**. Specific problems concerning these '**conflicts of interests**' were one of the main reasons for a majority of the European Parliament **not to grant EFSA discharge** in May 2012 for it's annual accounts for the financial year 2010.

Due to this **democratic scrutiny** EFSA has in the meantime improved implementing its independence policy, thus answering to the recommendation formulated in Parliament's resolution of 23 October 2012. Nevertheless, also in October 2012, the **European Court of Auditors (ECA)** published an audit (carried out in 2011) aimed at evaluating the policies and procedures for the management of conflict of interest situations for four European agencies, including EFSA, and presented the results of the audit in the Court of Auditors' Special Report (No 15/2012). According to the ECA, EFSA did **not adequately manage** conflict of interest situations.

Contrary to what Syngenta says, neither EFSA nor the EC acted hastily. **On the contrary**, in it's very recent publication "**Late lessons from early warnings: science, precaution, innovation**" [8] , the **European Environment Agency (EEA)** describes how European authorities were driven for too long into inaction by all kinds of studies and **flawed risk assessments** that were leaning too heavily on scientists working for the pesticide industry. The annex of the EEA-report describes how independent scientists and researchers were **threatened and intimidated** by the pesticide industry [8].

In its communication of 29th January 2013 the EC writes: "As highlighted in the Commission Communication on **Honeybee Health** published in December 2010 [9] , and **agreed virtually by all leading scientists** and most stakeholders, bee health is influenced by many, often interacting factors of different nature, including diseases (bacterial, viral, parasitic, etc) and the availability or lack of appropriate treatments against them; the introduction of invasive species, the environmental changes including the losses of biodiversity, available feed (especially pollen) for the bees, climate change **and the use of pesticides in agriculture.**"

The "high level of uncertainty" as Syngenta describes, was in fact about certain **"data gaps"**. Syngenta should know that any **good science will always raise more questions**. But this doesn't mean that **above all** there is no real risk to bees in these areas, just that more research is needed to fill knowledge gaps. And **secondly** it does not mean that the EU can't take action based on the **precautionary principle**, as mentioned in EU Pesticide Regulation 1107/2009. Precaution means that if it can't be proved that there is no risk to bees then it should not be used: this means that data gaps, although undesirable for a full picture, do not provide grounds to oppose a ban.

Pesticide companies and their lobbyists also claimed that EFSA based its conclusions only on laboratory studies, and thus not on the real field situation. This is false: field trials were indeed used, as EFSA confirmed during the AGRI committee meeting in the European Parliament of 20th February 2013. Laboratory studies (not under field conditions) were also used to identify risk. Mr Fontier (EFSA) said on this occasion: "I'm aware of this allegation by Bayer which leaves me a little puzzled, because we have indeed requests all applicants to submit all available data, which they have. We have evaluated all the data package from the first to the last study."

On the **data gaps** the EC explained this as follows: "In addition, EFSA identified several data gaps, many of them linked to the fact that the assessment was carried out by applying a **new risk assessment scheme**. This scheme is not yet finalised (a guidance document is under preparation by EFSA) and therefore data are not yet **been generated and made available by industry**."

The following issues could not be concluded upon because of lack of studies and data gaps, such as: **long-term risk on colony survival** and development and risk to pollinators other than honey bees. Crucially, EFSA was also unable to form a complete view of the risks to **all types** of bees because 'limited information was available for pollinators other than honey bees'.

This is important because, as EFSA reported, the biology, behaviour and ecology of **bumble bees and other pollinators differ** from honey bees and therefore **special consideration** in a risk assessment is necessary....The risk to pollinators other than honey bees should be further considered. EFSA also reported that, "the risk to pollinators also depends on other factors (e.g. landscape factors). The most important of these, which is also crop-dependent, is the attractiveness of the crop...(and that) It should be noted that the attractiveness of a crop to honey bees is not necessarily the same as to other pollinators..."

The **Pesticides Industry and the US Environmental Protection Agency (US EPA)** admitted in 2010 that: "Many who are familiar with pesticide risk assessment recognize that the methodology and testing scheme for foliar application products (where exposure may be primarily through surface contact) is **not adapted to assess potential hazard and risk from systemic pesticides**" [1].

But nevertheless, as already mentioned, EFSA could **identify or not exclude specifically high risks for bees** from exposure via dust drift in uses in maize, oil seed rape and cereals for all three substances: **imidacloprid, thiamethoxam and clothianidin**.

Lie No. 2. Syngenta says: "There is no direct correlation between neonicotinoids use and poor bee health, although a correlation can be drawn between bee losses and the presence of the Varroa mite."

Our answer: As said before, the European Greens fully recognise that the use of neonicotinoid pesticides is not the **only factor** of bee mortality, as reflected in their resolution (A7-0359/2011) in the European Parliament of November 2011. Banning the use of neonicotinoid pesticides on only honeybee-attractive crops would nevertheless be a good step forward.

Let's stick to the **EFSA findings** [3,4, 5], the most "neutral source" for policy makers. EFSA tested 3 of 7 neonicotinoids in the EU market (there is also a systemic, Fipronil which works in a similar way, and other new generation neonicotinoid pesticides, such as Sulfoxaflor, pending EU registration):

For **Clothianidin** EFSA concludes there is a **high acute risk and a high chronic risk** to honeybees from residues in nectar and pollen, and a high risk for its use on oilseed rape. There is also a high acute risk to bees from dust drift from seed treatment uses in maize, oilseed rape and cereals. For Syngenta's **Thiamethoxam** EFSA identifies a **high acute risk to honeybees** via dust drift from uses in cereals, cotton, oilseed rape, maize, and sunflowers and a high acute risk was also identified for exposure via guttation (dew) in maize. For Bayer's **Imidacloprid** EFSA says there is a high acute risk to honey bees via dust drift from uses in cereals, cotton, maize and oilseed rape and a **high acute risk** was also identified for exposure via **residues in nectar and/or pollen** for uses in cotton, oilseed rape and sunflowers.

But it goes **much further** than EFSA's very prudent conclusions. More and more scientific evidence [1] shows that there might even be a correlation between diseases and pests that lead to Colony Collapse Disorder and death of pollinators and other animals. Mason et al published in October 2012 their alarming study "**Immune Suppression by Neonicotinoid Insecticides at the Root of Global Wildlife Declines**" (Journal of Environmental Immunology and Toxicology). The abstract is quite clear: "Outbreaks of infectious diseases in honey bees, Fish, amphibians, bats and birds in the past two decades have coincided with the increasing use of systemic insecticides, notably the neonicotinoids and Fipronil. A link between insecticides and such diseases is hypothesised. **Firstly**, the disease outbreaks started in countries and regions where systemic insecticides were used for the first time, and later they spread to other countries. **Secondly**, recent evidence of immune suppression in bees and fish caused by neonicotinoids has provided an important clue to understand the **sub-lethal impact** of these insecticides not only on these organisms, but probably on other wildlife affected by emerging infectious diseases. While this is occurring, environmental authorities in developed countries ignore the calls of apiarists (**who are most affected**) and do not target neonicotinoids in their regular monitoring schedules. Equally, scientists looking for answers to the problem are unaware of the new threat that systemic insecticides have introduced in terrestrial and aquatic ecosystems."

Sub-lethal means insufficient to cause immediate death. Low dose, sub-lethal exposure of some substances can have negative effects. Seed-coating dust or dust

from residues contaminating bee-processed hive materials may cause sub-lethal impacts. **Chronical exposure** of honeybees to sub-lethal doses of neonicotinoids can also result in serious effects, which include a wide range of behavioural disturbances in bees, such as **problems with flying and navigation**, impaired memory and learning, reduced foraging ability, as well as reduction in breeding success and disease resistance.

It is also a fact that diligent or "good" beekeepers who treat regularly against the Varroa mite still see their colonies collapse, so it can't be blamed solely on the parasite. The Varroa mite is a parasite, and parasites do not kill the host (a biological fact). The industry often blames "bad" beekeepers, accusing them of not doing their job properly, an unfair accusation which the beekeepers reject. Yes, mortality is multi-factorial, but if the resilience or immunity of the individual bees and the colony are decreased by sub-lethal effects of pesticide poisoning, they have less chance to survive stress factors such as bad weather, poor flowering and food availability, diseases and parasites. One feasible hypothesis is that if the nervous system of the bees is no longer working properly because of sub-lethal doses of neonicotinoids, they cannot perform their normal grooming behaviour which can remove the Varroa parasite. In fact Bayer CropScience advertises the mechanism by which sub-lethal doses of imidacloprid acts on termites, which stop grooming and become infected with pathogens.

Lie No.3. Syngenta says: Since we do not believe pesticides cause bee losses, banning them will not make any difference to bee health. This is also the view of the Swiss and other Governments. Banning neonicotinoids on maize, sunflower, and growing oilseed rape without neonicotinoids in France between 2004 and 2008 did not improve the situation of beekeeping in France and did not stop heavy bee losses during that time. Bee colonies still collapsed in areas where no neonicotinoids are being used."

Our answer: The industry and the public have no data on where these neonicotinoids are used, so we challenge Syngenta and others to supply this information for an open, evidence-based science-based debate. There is until very recently, no honeybee monitoring over most of the EU so where do their figures come from? The industry relies on lack of knowledge and information to spread misinformation and unsubstantiated pseudoscience, to fool the public. Which is in fact a well established tactic by "merchants of doubt", that stems from the tobacco industry in the sixties and has been successfully used since, to delay or even stop policies on environmental issues such as acid rain or climate change [7].

Syngenta cites Switzerland as not using neonicotinoids but in fact they do. In Switzerland, neonicotinoids are authorised for spraying on orchards and as seed treatment on, for instance, use of thiamethoxam (Syngenta's neonicotinoid) for oilseed rape and for other crops.

And while the Humboldt study (financed by industry) estimates that no neonicotinoid ban has been introduced, the reality is that a number of member states already have introduced national bans on these chemicals with positive results. France introduced a permanent ban on imidacloprid seed treatment on sunflowers in 1999. The French government also recently agreed on a permanent ban on seed treatment on oilseeds with thiamethoxam. After the French Minister of Agriculture in 2004 temporarily banned the neonicotinoids Gaucho® in maize seed-dressing and RégentTS® for all agricultural uses, French beekeepers reported a cessation of high summer mortality, between 2005-2007. The report is that colony recovery is gradual but winter losses vary [8]. Also in Slovenia, a Neonicotinoid ban resulted in a cessation of bee colony collapses. In Italy, the government funded the Apenet experiment [10] that banned Neonicotinoids and saw a decrease of colonies dying during the sowing period from 35% to 15%, which is the natural background rate.

Lie No. 4. Syngenta says: *"Efsa's report, has not taken account of the comprehensive scientific studies that preceded the launch of neonicotinoids, and many years of extensive monitoring in the field which proves the safety of this vital technology."*

Our answer: EFSA clearly stated they evaluated **all existing studies** in this field. In spring 2012, **new scientific evidence** on the sub-lethal effects of neonicotinoids on bees was published (Mickaël Henry et al.[11]; Penelope R.Whitehorn et al.[12]; Schneider C. et al.[13]). After the publication in March 2012, of a French study on the sub-lethal effects of neonicotinoids on bees [8], France withdrew in June 2012 the authorisation of Syngenta's product Cruiser OSR (containing thiametoxam) for the seed treatment of oilseed rape and requested the Commission to take appropriate measures at EU level. That is what the EC did, also pressured by a Resolution of the European Parliament adopted in November 2011.

In its communication of 29th January 2013 the EC writes that following the **new scientific studies** on toxicity of neonicotinoids in spring 2012, DG SANCO, according to Article 21 of the Pesticide Regulation (EC No 1107/2009) requested EFSA to first **assess this new information** and to verify the doses reported in these scientific articles were comparable with those occurring in the fields sowed with seeds treated with neonicotinoid insecticides. Secondly the EC asked EFSA to review the risk assessment of neonicotinoids as regards their impact on bees. In a first step EFSA published the statement on 1st June 2012, where they made clear that further data were necessary before drawing definite conclusions on sub-lethal effects of these chemicals. In addition, EFSA clearly indicated that the **sub-lethal effects** observed on honeybees and bumblebees for **imidacloprid, thiametoxam and clothianidin** are not likely to occur for acetamiprid and thiacloprid, due to their lower toxicity.

Following the first EFSA statement in 2012, DG SANCO agreed with EFSA to prioritise **the review of the risk assessment for bees to the 3 most toxic neonicotinoids** (imidacloprid, thiametoxam and clothianidin) in particular for their use as **seed treatment and granular application** and to consider in particular the concerns linked to dust, residues in pollen and nectar, and guttation."

This does not mean that there is no risk to bees in these areas, just that more research is needed to fill knowledge gaps. After it's evaluation of **virtually all existent scientific studies** EFSA recommended that **the three "highly toxic" actives** in question be subjected to a much **more rigorous regulatory assessment**.

Mason et al pointed out that some of "the EFSA conclusions were that for the research on bees and bumblebees, the concentrations used by the authors were too high to be "field realistic" and that the experiments should be repeated. However, the EFSA scientists, in their calculations, had failed to take into account evidence of **pesticide residues in soil and water.**"

Mason et al write: "Imidacloprid is stable in water, **not easily biodegradable** and can **accumulate in soil and sediments**, where it persists for a few months (half-life 191 days). Data on clothianidin, based on laboratory and field studies, are similar and show that this compound is more persistent (half-life over 500 days) and mobile, stable to hydrolysis, and has potential to leach into ground water and be transported

via runoff to surface water bodies. Imidacloprid and clothianidin are highly toxic to aquatic invertebrates.[1]"

Indeed, in their recent study "Multiple Routes of Pesticide Exposure for Honey Bees Living Near Agricultural Fields" [14], Krupke et al write that "Populations of honey bees and other pollinators have declined worldwide in recent years. A variety of stressors have been implicated as potential causes, including agricultural pesticides. Neonicotinoid insecticides, which are widely used and

highly toxic to honey bees, have been found in previous analyses of honey bee pollen and comb material. However, the routes of exposure have remained largely undefined."

The researchers analyzed samples of honey bees, pollen stored in the hive and **several potential exposure routes** associated with plantings of neonicotinoid treated maize. Our results **demonstrate** that bees are **exposed** to these compounds and several other agricultural pesticides **in several ways**

throughout the foraging period. During spring, **extremely high levels** of clothianidin and thiamethoxam were found in planter exhaust material produced during the planting of treated maize seed. We also found neonicotinoids in the soil of each field we sampled, including unplanted fields. Plants visited by foraging bees (dandelions) growing near these fields were found to contain neonicotinoids as well. This indicates deposition of neonicotinoids on the flowers, uptake by the root system, or both. Dead bees collected near hive entrances during the spring sampling period were found to contain clothianidin as well, although whether exposure was oral (consuming pollen) or by contact (soil/planter dust) is unclear. (...) These findings clarify some of the mechanisms by which honey bees may be exposed to agricultural pesticides throughout the growing season. These results have implications for a wide range of **large scale annual cropping systems that utilize neonicotinoid seed treatments.**"

Lie No.5. Syngenta says: "Seed treated with thiamethoxam has been used across millions of hectares of European crops for over ten years. When used properly the technology does not damage bee populations and this is why many EU countries have continued to support its use."

Our answer: A range of EU-member states actually support the proposal of the EC for a partial ban, with at least the Netherlands, Austria, Belgium, France, Italy, Slovenia, Poland and Denmark are in favour.

Furthermore some European countries have (temporarily) suspended the use of certain neonicotinoids in response to incidents involving acute poisoning of honeybees - most cases were due to dusting during sowing.

France: In January 1999, the French Ministry of Agriculture decided to ban Bayer's Gaucho® in sunflower seed-dressing for two years, thus applying the precautionary principle. The conflict shifted to court, as Bayer challenged the ministerial decision in the administrative court of Paris (March 1999). The French Beekeepers association UNAF defended the Minister's decision in court. In France sunflower and corn seed treatments of imidacloprid are still suspended; other imidacloprid seed treatments, (sugar beets and cereals), are allowed, as are foliar uses.

Germany: the use of a number of seed treatment pesticides was temporarily suspended in May 2008 after an incident. After investigation, **Germany** lifted the suspensions with the exception of neonicotinoid clothianidin as seed treatment for corn.

Italy: clothianidin, thiamethoxam, imidacloprid and fipronil seed treatment uses have been suspended temporarily, but foliar uses are allowed.

Slovenia: neonicotinoid seed treatments for maize and oil seed rape were temporarily suspended. The suspension was due to the release of dust during the seed sowing process. In August 2008, the suspension of oil seed rape seed treatments was lifted due to improved seed treatment methods and seed sowing equipment.

Mason et al write that on 17th April 2012 the **EU Ombudsman** [15] opened an investigation into bee mortality and neonicotinoid insecticides following a complaint from the **Austrian Ombudsman Board**, "alleging that the European Commission (EC) had failed to take into account new scientific evidence arguing in favour of restricting the use of these insecticides as plant protection products. According to the Austrian Ombudsman Board, observations from beekeepers, as well as new scientific evidence, suggest that certain neonicotinoids have led to increased bee mortality in recent years."

Dr.Henk Tennekes [1]recently said this about his research: "If you look at bees, the level of neonicotinoids that are found in pollen, will kill bees within a week. Relatively small amounts already will do. 98% of neonicotinoids remain active in the soil and has impact on soil fertility. There is simply no safe dose for these products. They attack the genome and central nervous system... and thus have unacceptable risks! The receptors in the brain, that these pesticides act upon, are important in developing brain. These products act as nicotine, and this is a known cause for all kinds of medical problems on unborn children..."

Lie No.6. Syngenta says: "Neonicotinoid seed treatment is an environmentally safe insecticide. It provides instant, early-season, broad-spectrum pest control, improving plant vigor and crop yield. Seeds treated with neonicotinoids include corn, cotton, cereals, sugar beet, oilseed rape (canola), vegetables, and rice. The insecticide is absorbed and distributed within the plant as it grows and hence only affects insects which feed on the growing plant."

Our answer: Saying that Neonicotinoid seed is "environmentally safe" is like saying **the earth is flat**. Neonicotinoids have become the most used pesticides world-wide. In Europe they are mostly used by spraying (70%), used to coat seeds (20%), and are also used in granules. But the active substance which coats the seeds is only partially absorbed by the plants (20%), the rest goes to the ground, groundwater and surface water and thus **contaminates** the entire environment. The chemicals can then be taken up by successive plantings and exposed to bees and other non target insects via nectar and pollen - even after usage has ceased [16] and via guttation [17]. A variety of non-target arthropods may also become exposed via puddle contamination and damp soil (Edney 1977).

The insecticides are **systemic**, meaning they are chosen to stick around in the soil water and enter the vascular system of plants. They end up in the nectar and the pollen and also in **guttation** which is the appearance of drops of xylem sap on the tips or edges of leaves of some vascular plants, such as grasses, and should not be confused with dew, which condenses from the atmosphere onto the plant surface, from which non target insects may drink.

These are **neurotoxins** [18], meaning they work on the nervous system of insects. Neonicotinoids bind irreversibly to critical receptors in the central nervous system of insects and cause **irreversible** effects. The damage is cumulative, and with every exposure more receptors are blocked [1].

The poisons are **not species-specific**, as can be confirmed by examining patents for neonicotinoid formulations. Thus they put at risk other **non-target insects** or invertebrates which are also poisoned when they come into contact with the active compound. Exposure can be acute, causing immediate death, it can be chronic (cumulative exposure which builds up in the bee or colony over time) and effects can also be sub lethal so that whilst effects are not immediate or direct, by impairing the natural functioning of the insect (immunity, colony function, behavioural characteristics) eventual death is inevitable.

On their website [6] and in their adverts bought at great cost in the major newspapers in all Member States, Syngenta denies the nectar, pollen and guttation exposure pathways outlined above.

There are, apart from scientific studies mentioned already, **at least six scientific studies** [19] that back the exposure pathways. The "draft assessment report" that the agro-chemical companies are obliged to file when they have a new active substance (pesticide) they want to market, includes a section on the honeybee eco-toxicology. So they already have to provide concentrations of the toxins in pollen and nectar, meaning this is an established and scientifically accepted exposure pathway. The EFSA study clearly accepted these exposure pathways in its approach.

Lie No.7. Syngenta says: "A recent study (Humboldt) showed that without neonicotinoid seed treatment, crop yields would fall by up to 40% and cost the EU economy around €17bn over 5 years."

Our answer: The economic cost of natural services by pollinators outweighs the presumed costs claimed by Syngenta and other agro-chemical companies [20]. The highly criticised "**Humboldt study**" does not take into account the real value of pollinators, for cultivated crops as well as for biodiversity. The economic value of pollination by bees is given as 15 billion- 22 billion per year,[21], more than five times the Humboldt study estimate. Researchers have found that crops which rely heavily on pollinators have lower yields compared to less pollinator-dependent crops [22]. They also have slower growth in yields and less stable yields from year to year. The results highlight the importance of managing biodiversity to support ecosystem services, such as pollination, on which much modern agriculture depends. So it is a choice of pollination versus poisoning.

Around 70% of the world's most produced crop species rely to some extent on insect pollination, **contributing an estimated €153 billion to the global economy.** Pollinator-dependent crops are growing faster than pollinator abundance. There are already regions where there have been limitations on available pollinators, mostly bees, like in some almond orchards in California or in strawberry fields in the South of Spain. This means that **beehives need to be transported for kilometres to make bees available in orchards**, or that pollination needs to be done artificially by hand. This of course raises the cost of food production considerably. In some regions, the value of insect pollination is more than 1 500 US dollars per hectare.

One reason the EC has not applied the precautionary principle so far, is the presumed economic cost that a ban on neonicotinoids would represent. These claims are based on an economic desk-study ("Humboldt") which is being passed off as "science", although it has not undergone peer review.

Pesticide Action Network (PAN) recently published an evaluation of the Humboldt report [23]. PAN recognises "that it was a good media stunt to release the Humboldt "scientific study" on neonicotinoids the day before EFSA published its highly critical opinion on 3 neonicotinoid insecticides harmful to bees", but "contest the finding in this pesticides **industry-sponsored study** (HFFA 1/2013) on socio-economic impact of neonicotinoids suspension in Europe". The baseline on which the Humboldt study is done is unrealistic: calculations do not take into account actual national bans; calculations only consider that neonicotinoids (NNi) will be replaced by other

chemicals though in reality non chemical alternatives exist; calculations do not take into account implementation of EU plant health policy and the EU sustainable use directive; calculations do not take into account the "externalities" (side effects on beneficial insects and entire ecosystems, water pollution, human illness...). And to conclude PAN writes that "at the same time the calculations in the Humboldt study are dependent, biased and nontransparent".

Italy banned neonicotinoids seed-coating on maize in 2008. However, an Italian scientific study carried out in the Apenet project [10] was able to prove that productivity remained unchanged and that there was no increase in economic

damage due to pests, while Italian beekeepers reported a decrease in yearly honeybee colony losses from 50% to around 15% (which is the natural background rate). Far from being a threat to farming, this suspension should stimulate agronomic innovation and encourage farmers to move towards more sustainable agricultural practices, for example crop rotation, which is in line with the aims of our amendments to the CAP reform. (<http://www.greens-efa.eu/cap-reform-9316.html>) due to be voted on March 13, 2013.

In order to safeguard our bees and other pollinators, which supply such a vital service (estimated at at least 15 billion - 22 billion euro per year across the EU [9 and 20], far outweighing the economic losses claimed by industry) and help ensure that we have a plentiful and diverse food supply, this proposal is essential and long overdue: it is both precautionary and a minimum response.

The **Humboldt report** was released accidentally just one day before the EFSA report. The report was conducted by Steffen Noleppa (agripol) and Thomas Hahn et al. (a-connect). Based on an analysis of 10 EU countries (Germany, Poland, Hungary, Romania, Slovakia, Italy, Spain, France, the UK and the Netherlands) and six focus crops (corn, sugar beet, oilseed rape, wheat, barley and sunflower), the project team assessed the potential value of neonicotinoid seed treatment to EU societies, economies and selected stakeholders. As the report was commissioned and paid for by Bayer Crop Sciences and Syngenta and supported by Copa-Cogeca, ESA and ECPA, with the endorsement of the Humboldt Forum for Food and Agriculture (HFFA), it was probably unlikely to conclude that neonicotinoids should be banned.

The UK's Soil Association heavily criticised the report: "The Humboldt report claims neonicotinoid insecticides make a significant contribution to crop production in the UK and if UK farmers no longer had access to neonicotinoid pesticides, it would result in a loss of approximately £630million to the economy each year. Some £1.8 bn is the estimated cost of replacing natural pollination of UK crops with **hand pollination**, as happens in some regions in China. The Soil Association's "Keep Britain Buzzing" campaign is calling for neonicotinoids to be banned in the UK and has been campaigning along with other NGOs to highlight this issue." Peter Melchett, Soil Association policy director said: "On the one hand, the chemical companies say we risk the additional costs to farmers amounting to £630 million. On the other, the possible cost of losing pollinating insects is thought to be worth three times as much (£1.8 billion) to UK farmers."

Lie No. 8. Syngenta says: "Neonicotinoids have proven to be extremely popular with farmers wherever they have been sold. They reduce the number of pesticide applications and decrease the amount of pesticide used per hectare. If neonicotinoids were banned, then pesticides even more harmful to bees would be used."

Our answer: Mason et al write in their study [1]: "Over the last 20 years or so, the shift in pest management has moved away from reactive to prophylactic. Now many fungicides, pesticides and herbicides are applied to the seeds before sowing. Application of the chemical before pest damage has occurred often involves routine (calendar-based) spraying and pre-emptive treatments. The phenomena of insect and herbicide resistance have locked US farmers into a pesticide treadmill. Target pests and weeds are capable of becoming resistant to the repeated use of a single insecticide or herbicide such that successively larger doses have to be applied. Farmers and weed scientists across the heartland and cotton belt are now struggling to devise affordable and effective strategies to deal with the resistant weeds emerging in the wake of herbicide-tolerant crops. Similar resistance to insecticides has developed in pests as a result of which new insecticides had to be developed.

The neonicotinoids and fipronil appeared to be the ideal candidates for the replacement of the old generation of insecticides; they are very effective in controlling insects, particularly sucking pests such as aphids, and at the same time quite innocuous to fish and vertebrates in general. Thus, in England in 2010, about one third of arable land was treated with neonicotinoid insecticides out of a total cropped acreage of about 9.9 million acres."

The industry claims it is helping farmers, yet the prices of insecticides have increased **five times** over the last ten years, adding hugely to farmers' production costs. Simple and proven agronomic techniques like crop rotation can be just as effective and much less costly methods to limit the growth of and control pests, like *diabrotica* or maize root borer. We simply don't need pesticides by using crop rotation [10]. If absolutely needed in the worst case, there are other pesticides that can be used, which are not so harmful (as mentioned by Commissioner Borg, in EP AGRI committee 20th February 2013). There are a number of EU laws in place encouraging alternative techniques. For instance the EU Directive on sustainable use of pesticides (Directive 2009/128/EC) encourages the use of non chemical alternatives for all crops, while the EU's plant health regulation makes it mandatory for farmers in certain zones to apply crop rotation in maize (Commission Decision 2003/766/EC on emergency measures to prevent the spread within the Community of *Diabrotica virgifera* Le Conte", Commission Decision 2006/564/EC and "Recommendation 2006/565/EC).

Lie No.9. Syngenta says: "There has been a lot of publicity and media coverage about the presumed impact of neonicotinoids on bees. But while some of the publicity may suggest that neonicotinoid products are responsible for some bee losses, the only way to investigate this properly is to examine the science. Neonicotinoids are insecticides and as such are designed to kill insects. However, they have been extensively tested and have gone through a thorough scientific approval process with government authorities. Their application is designed so that they present a minimal risk to insects except those pests for which they are specifically targeted. The registration of all pesticides relies on a strict set of rules relating to risk assessment and information which defines, for each use, conditions that ensure that the highest possible safety conditions are met before any products are placed on the market."

Our answer: This argument in itself brings into the question the whole **legality or potential illegality of these substances**, given that EU law requires insecticides must be proven not to pose unacceptable risk to honey bees **prior** to regulatory approval and not after! This is enshrined in

EU Regulation 1107/2009 (Annex II, 3.8.3.) which states: "An active substance, safener or synergist shall be approved only if it is established following an appropriate risk assessment on the basis of Community or internationally agreed test guidelines, that the use under the proposed conditions of use of plant protection products containing this active substance, safener or synergist: will result in a negligible exposure of honey bees, or has no unacceptable acute or chronic effects on colony survival and development, taking into account effects on honey bee larvae and honey bee behaviour."

Next to this, Reg 178/2002 on EU general food law says the following on the **Precautionary Principle**: "1. In specific circumstances where, following an assessment of available information, the possibility of harmful effects on health is identified but scientific uncertainty persists, provisional risk management measures necessary to ensure the high level of health protection chosen in the Community may be adopted, pending further scientific information for a more comprehensive risk assessment. 2. Measures adopted on the basis of paragraph 1 shall be proportionate and no more restrictive of trade than is required to achieve the high level of health protection chosen in the Community, regard being had to technical and economic feasibility and other factors regarded as legitimate in the matter under consideration. The measures shall be reviewed within a reasonable period of time, depending on the nature of the risk to life or health identified and the type of scientific information needed to clarify the scientific uncertainty and to conduct a more comprehensive risk assessment."

As the EFSA conclusions informed the Commission's proposal for a partial ban, key aspects of risk to bees may be missing, meaning a partial ban is the minimum action possible. Also Mason et al rightfully state that "in Pesticide Regulation (EC) no 1107/2009, concerning the placing of plant protection products on the market, Annex II, Criteria for approval, page 43, it states that a plant protection product should not be persistent in the environment. The persistence criterion is fulfilled where the half-life in soil is higher than 120 days. EU law says: "Assessment of

persistence in the environment shall be based on available half-life data collected under appropriate conditions, which shall be described by the applicant." Registration documents from the companies confirm that the neonicotinoid insecticides are persistent in the environment. Therefore, according to EC laws, imidacloprid, clothianidin and thiamethoxam (which is metabolised to clothianidin) should never have been registered in the first place.

However, as these scientists write, it seems that the European authorities "let economics prevail when they register pesticides". On page two of the summary of the April 2012 Report by the EFSA Panel on Plant Protection Products and their Residues (PPR) states: "The final decision on protection goals needs to be taken by risk managers. There is a trade-off between plant protection and the protection of bees. The effects on pollinators need to be weighted against increase in crop yields due to better protection of crops against pests." This suggests that crucially important pollinators may have to take second place to economics. [1]

Lie No.10. Syngenta says: "This is not about our sales. Neonicotinoids are for us only a small segment in the European market."

Our answer: All neonicotinoids stand for at least 25% of global sales of pesticides. Syngenta advertises its neonicotinoid product Cruiser by saying "Our seed care portfolio protects the seed from the moment of planting and ensures good crop establishment. Cruiser® is a key component of the portfolio for insect control and early vigor." In its annual report Syngenta does not specify, but indicates that of the 6.5 billion dollar profit in 2011, the sale of insecticides and seed coatings (in the range of plant protection products, often with neonicotinoids) are the fastest growing segments (+ 20%) and account for roughly 2.8 billion dollar in sales. Europe is one of the biggest markets for Syngenta. Syngenta writes in the annual report 2011: "Seed care sales exceeded US\$ 1 billion in 2011 demonstrating the continued acceleration in adoption rates, notably in the emerging markets. Cruiser® growth of more than 50 percent in Europe reflected expanded registrations in major markets as well as increased adoption in oilseeds."

If the EU would finally push ahead with a partial ban on neonicotinoids, this would be very bad business for the pesticide companies. Governments and civil society in other continents know very well that the EU would not take such a measure without sound scientific backing. It could therefore help other societies defend the sustainability of their natural environment as well.

Conclusions

We believe that in order to safeguard our bees and other pollinators, which supply such vital services, and help ensure that we have a plentiful and diverse food supply, that this proposal is long overdue: it is both precautionary and a minimum response. We believe that as politicians we have the obligation to protect and therefore believe that approval for these products should end. The Commission proposal is not enough: why we need a FULL BAN and not a partial ban:

- High PERSISTENCE of the substances in the environment. If coated cereals are grown one year and a crop attractive to bees the following years, neonicotinoids can be found in nectar (for up to two years according to Bonmatin et al. 2005) [24].
- Sowing of coated seeds produces dust and contaminates adjacent fields of crops and soil which have not been treated directly. [25]
- The active substance which coats the seeds is only partially absorbed by the plants (20%), the rest goes to the ground, groundwater and surface water and thus contaminates the entire environment.
- Either contaminated via dust or via soil water, the plants visited by bees in field margins were also found to contain neonicotinoids . [26]
- In some cases cereals can produce honeydew (excretion by aphids) that can be attractive to bees. So limiting to crop not attractive to bees and to winter crops is eco-toxicologically useless.
- Sub-lethal doses are important because they can be present at field margins, or can occur through residues from previous treatments. They may contaminate the environment during application, or contaminate small bodies of surface water used by insects in the field.
- If exposure to bees still occurs we will still see a decrease in bee numbers, as bees will continue to die. The agro-chemical companies will claim that as proof it's not their chemicals' fault, and the ineffectual ban may be overturned after the 2 years foreseen.
- An appropriate 'phase-out' period during which professional users and suppliers can use or dispose of stocks of the prohibited neonicotinoid insecticides could take years! - they may be stock piling now - and who will monitor?

General ecotoxicology

- Other non-target species affected and wider eco-toxicological effects. Of course, there are effects on other non-target species as these are systemic neurotoxins working on invertebrates (EFSA only looked at honeybees). What about the effects of the neurotoxins on all invertebrates, including aquatic ones, especially considering sink habitats where the compounds end up? The ecotoxicological and food chain effects are huge. [27]
- As a group, all of the neonicotinoids are extremely toxic to the aquatic larvae of several key insect groups . [28, 29]
- At the moment, neonicotinoid residues in soil and water are not routinely

measured in the UK or Europe (or globally for that matter) .

- fish, amphibians (23% of species threatened with extinction in the EU alone, but similar worldwide rates) molluscs (44% freshwater spp. and 20% terrestrial spp. in EU, similar worldwide rates) are never tested.

- Since 2001, an increasing number of reports from Canada, the US and Latin America document positive associations between pesticide use and the development of certain cancers: brain, prostate, kidney, non-Hodgkin's lymphoma, leukaemia, myeloma, breast and testicular cancer, stomach and pancreas. In 2011 in a US Report on farm worker's children and exposure: "An increasing body of research suggests relationships between pesticides and serious illnesses, particularly among children. Birth defects include neural tube defects and male genitourinary malformations from endocrine disrupting herbicides, limb defects, neurobehavioral disorders, ADHD and autism spectrum, chronic respiratory problems and atopic asthma and cancers. These have all been linked by peer-reviewed research to pesticide exposure in children. The childhood cancers include leukemia, lymphoma, brain tumour and Ewing's sarcoma. These can be due to pre- or postnatal, take-home or direct exposure".

All we are saying, is give bees a chance!

References

- [1] Rosemary Mason R., Tennekes H., Sánchez-Bayo F., Jepsen P.U. (in press) Immune Suppression by Neonicotinoid Insecticides at the Root of Global Wildlife Declines
- [2] Claire Thompson for Grist January 12th 2012. <http://www.guardian.co.uk/environment/2012/jan/13/honeybee-problem-critical-point>
- [3] <http://www.efsa.europa.eu/en/efsajournal/pub/3066.htm>
- [4] <http://www.efsa.europa.eu/en/efsajournal/pub/3067.htm>
- [5] <http://www.efsa.europa.eu/en/efsajournal/pub/3068.htm>
- [6] <http://www.plightofthebees.com>
- [7] www.merchantsofdoubt.org
- [8] <http://www.eea.europa.eu/publications/late-lessons-2>, see part B Section 16
- [9] Communication from the Commission to the European Parliament and the Council on Honeybee Health COM(2010) 714 final: http://ec.europa.eu/food/animal/liveanimals/bees/docs/honeybee_health_communication_en.pdf
- [10] http://www.reterurale.it/downloads/APENET_2010_Report_EN%206_11.pdf
- [11] A Common Pesticide Decreases Foraging Success and Survival in Honey Bees. Mickaël Henry et al., <http://www.sciencemag.org/content/early/2012/03/28/science.1215025.full.pdf> Science 1215025. Published online 29 March 2012.
- [12] Neonicotinoid Pesticide Reduces Bumble Bee Colony Growth and Queen. Production. Science, Penelope R. Whitehorn et al., <http://www.sciencemag.org/content/early/2012/03/28/science.1215025.full.pdf>. Science 1215025. Published online 29 March 2012.
- [13] Schneider C. W., Tautz J., Grünewald B., Fuchs S. (2012). RFID tracking of sublethal effects of two neonicotinoid insecticides on the foraging behavior of *Apis mellifera*. PLoS ONE 7, e30023.
- [14] Krupke CH, Hunt GJ, Eitzer BD, et al. Multiple routes of exposure for honey bees living near agricultural fields. PLoS One 2012; 7(1):e29268.
- [15] Ombudsman investigates whether the Commission should do more to combat increased bee mortality. European Ombudsman 2012. <http://www.ombudsman.europa.eu/en/press/release.faces/en/11428/html.bookmark>
- [16] Bonmatin JM, Marchand PA, Cotte JF, Aajoud A, Casabianca H., Goutailler G, Courtiade M (2007). Bees and systemic insecticides (imidacloprid, fipronil) in pollen: subnano-quantification by HPLC/MS/MS and GC/MS. Environmental fate and ecological effects of pesticides, Re, A.A.M.d. et al., editors, 827-834, 978-8-87830-473-4.
- [17] Girolami, V.; Mazzon, L.; Squartini, A.; Mori, N.; Marzaro, M.; Di Bernardo, A.; Greatti, M.; Giorio, C. & Tapparo, A., 2009. Translocation of neonicotinoid insecticides from coated seeds to seedling guttation drops: a novel way of intoxication for bees. Journal of economic entomology. 102(5):1808-15.
- [18] Kimura-Kuroda J, Komuta Y, Kuroda Y, Hayashi M, Kawano H (2012) Nicotine-Like Effects of the Neonicotinoid Insecticides Acetamiprid and Imidacloprid on Cerebellar Neurons from Neonatal Rats. PLoS ONE 7(2): e32432. doi:10.1371/journal.pone.0032432
- [19] Sánchez-Bayo F, Tennekes HA, Goka K (2013) Impact of Systemic Insecticides on Organisms and Ecosystems http://cdn.intechopen.com/pdfs/40497/InTech-Impact_of_systemic_insecticides_on_organisms_and_ecosystems.pdf
- Mullin, C. A., Frazier, M., Frazier, J. L., Ashcraft, S., Simonds, R., D.v, E., & Pettis, J. S. (2010). High levels of miticides and agrochemicals in North American apiaries: implications for honey bee health. PLoS One, 5(3), e9754.
- Held, D. W., & Parker, S. (2011). Efficacy of soil applied neonicotinoid insecticides against the azalea lace bug, *Stephanitis pyrioides*, in the landscape. Florida Entomol., 94(3), 599-607.
- Tapparo A., Giorio C, Marzaro M., Marton D, Solda L, Girolami V (2011) Rapid analysis of neonicotinoid insecticides in guttation drops of corn [maize] seedlings obtained from coated seeds. J. Environ. Monit., 13(6), 1564-1568
- Fischer D, Moriarty T. Pesticide risk assessment for pollinators: executive summary of a setac pellston workshop. Society of Environmental Toxicology and Chemistry, Australia on Sep 15, 2011. http://www.setac.org/sites/default/files/executivesummary_pollinators_20sep2011.pdf

[20] Gallai, N.; Salles, J.; Settele, J. & Vaissiere, B., 2009. Economic valuation of the vulnerability of world agriculture confronted with pollination decline. *Ecological Economics*. 68: 810-821.

[21] European Biodiversity Strategy -
<http://ec.europa.eu/environment/nature/info/pubs/docs/brochures/2020%20Biod%20brochure20final%20lowres.pdf>

[22] Garibaldi, L.A., Marcelo, A.A., Klein, A.M., Cunningham, S.A., & Harder, L.D. (2011). Global growth and stability of agricultural yield decrease with pollinator dependence. *Proceedings of the National Academy of Sciences*. 108(4):5909-5914.

[23] PAN-Europe opinion on the Humboldt report on "The value of Neonicotinoids seed treatment in the European Union".
www.pan-europa.info

[24] Bonmatin JM, Marchand PA, Charvet R, Moineau I, Bengsch ER, Colin ME (2005) Quantification of Imidacloprid Uptake in Maize Crops, *J. Agric. Food Chem.* 2005, 53, 5336-5341 - www.researchgate.net/publication/.../9fcfd50636a6a27482.pdf

[25] [Sgolastra F.](#), [Renzi T.](#), [Draghetti S.](#), [Medrzycki P.](#), [Lodesani M.](#), [Maini S.](#), [Porrini C.](#) (2012) Effects of neonicotinoid dust from maize seed-dressing on honey bees. *Bulletin of Insectology* (65), pp. 273-280

[26] Krupke CH, Hunt GJ, Eitzer BD, Andino G, Given K (2012) Multiple Routes of Pesticide Exposure for Honey Bees Living Near Agricultural Fields. *PLoS ONE* 7(1): e29268. doi:10.1371/journal.pone.0029268

[27] Sánchez-Bayo F, Tennekes HA, Goka K (2013) Impact of Systemic Insecticides on Organisms and Ecosystems
http://cdn.intechopen.com/pdfs/40497/InTech-Impact_of_systemic_insecticides_on_organisms_and_ecosystems.pdf

[28] Jinguji H., Thuyet D.Q., Uéda T., Watanabe H. (2013) Effect of imidacloprid and fipronil pesticide application on *Sympetrum infuscatum* (Libellulidae: Odonata) larvae and adults. *Paddy and Water Environment* January 2013, Volume 11, Issue 1-4, pp 277-284

Van Dijk T. (2010) Effects of neonicotinoid pesticide pollution of Dutch surface water on non-target species abundance. MSc Thesis

[29] <http://edepot.wur.nl/15512>