Response to Buglife report on "The impact of neonicotinoid insecticides on bumblebees, honey bees and other non-target invertebrates"

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It is well recognised that the current pesticide risk assessment systems for honeybees were not established to assess systemic compounds and this is currently being addressed by the ICPBR (International Commission on Plant Bee Relationships Bee Protection Group)(started at the2005 meeting of the ICPBR in York (Pest Management Science **63**(11) (2007)) and EPPO (European Plant Protection Organisation) and will also be submitted to EFSA (European Food Safety Authority)for consideration. These revisions have been based on detailed considerations of the available scientific evidence and the need to concentrate efforts on identifying compounds which may result in impacts in the field environment. The progress in revising the guidelines is well known particularly to attendees of the 2008 ICPBR meeting in Bucharest, such as Janine Kievits (Inter-Environment Wallonie), the honeybee expert acknowledged in the report, so it is not clear why this is not mentioned.

Although these EPPO guidelines are under revision the principles underlying them have been widely applied by regulators both nationally and at the EU level for many years in assessing the risks posed by systemic pesticides. For example, PSD (now CRD) has commissioned a number of research studies into the potential risks posed to bees by systemic seed treatments (available on the Defra website) to ensure their risk assessment procedures are appropriate. The opinions of the French pesticide regulator, AFSSA, on Cruiser (thiamethoxam) and honeybees which included multi-year studies on 3 sites including overwintering have been published (December 2007) and AFSSA is also evaluating longer term monitoring following approval of thiamethoxam to confirm the absence of effects under a wider range of environmental conditions. Similar field studies are ongoing in France for other neonicotinoids (see the AFSSA opinion on Poncho-Mais). There is also a published AFSSA opinion (2009) on "Weakening collapse and mortality of bee colonies" the potential causes of collapse etc are identified and discussed including the role of varroa in over winter mortality and the fact that it is not possible currently to confirm or refute the role played by pesticides alongside pathogens. A longer- term monitoring programme in Germany has also shown absence of significant overwinter losses since monitoring began (well before the use of neonicotinoid seed dressings was withdrawn) suggesting that pesticides may not be playing a significant role (apart from the issues over dusts from seed treatments). The withdrawal of the seed dressing in Germany was related to the poor coating of seed (failure to include the sticker) leading to dust generation during sowing not due to the systemic properties of the pesticides.

The Buglife report relies heavily on data from imidacloprid but neonicotinoids vary widely in their properties. Imidacloprid, thiacloprid, acetamiprid, and nitenpyram are first-generation chloropyridinyl compounds whereas more recent developments have provided the second-generation chlorothiazolyl derivatives such as thiamethoxam and clothianidin. It is also important to be clear when the discussions are about spray application versus seed treatments due to the wide variations in resulting levels of exposure.

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The report contains a number of mis-conceptions. It makes regular reference to the lack of independent research - much of the work reported in the DAR (Draft assessment Report) will have been undertaken by independent laboratories and not directly conducted by the agrochemicals company. All the primary data used in risk assessment is required to be conducted to GLP (Good Laboratory Practice), an OECD independently monitored quality assurance system (which in the UK is a legal statutory instrument) that is required for the generation of all safety data. The report also states that there are only EPPO standards for tier 1 studies- this is not true for honeybees where there are guidelines for semi-field, field and brood higher tier studies. These guidelines include sublethal effects through assessments of adult bee foraging, behaviour at the hive and colony assessments of levels of bees, stores and brood (which would identify the population declines referred to). The French CEB230 guidelines for assessing pesticide effects on honeybees also include examples of the types of effects on foraging behaviour which should be assessed. The recent revisions proposed by ICPBR to update the EPPO honeybee risk assessment take into account the properties of systemic compounds and the need for longer- term exposure to demonstrate presence or absence of effects at the field scale. The most robust data is generated by well designed field experiments rather than a plethora of laboratory studies which are undertaken at predicted environmental levels or greater rather than under real exposure scenarios.

The report quotes residue levels of systemic pesticides “predicted to be present in the UK countryside” but does not provide the information underlying this statement. The residue levels quoted in the review are primarily from other EU member states which may register higher rates (due to different pest pressures) . Certainly the rates used on seed should be quoted alongside the actual levels in pollen and nectar to assess their representativeness to UK conditions as without this extrapolation is difficult.

The issues surrounding dusts from seed dressing were discussed at the ICPBR in relation to incidents in France and Germany. EFSA has also raised awareness of the issues at national levels. Both France and Germany are addressing this through minimising dust in air, improved seed coating requirements and venting of systems into the soil. It is generally considered more appropriate to minimise dust and thus environmental exposure in all compartments rather than develop a detailed risk assessment for it.

The report states that there is greater ecological risk from long- term exposure from systemic treatments than direct exposure. However the report contains no data to support this- the only relevant data would be those showing long term field exposure to systemics has caused effects. On the contrary, available data for imidacloprid, clothianidin and thiamethoxam show no such effects’ including a number of field and semi-field tests identified in the report to assess the side effects of imidacloprid seed treatment. The paper by Cutler and Scott-Dupree on clothianidin is mis-cited – it was actually a 3 week exposure period during canola flowering (400 g ai/100 kg seed; max residue in nectar 2.24 ug/kg, in pollen 2.59 ug/kg)) followed by a longer term assessment over winter within an apiary site. There were 4 treated and 4 control fields with 4 colonies per field (i.e 16 treated and 16 control colonies) Bee mortality and longevity and brood levels were assessed for 130 days after exposure. The conclusion of the paper is “the results show that honeybee colonies will, in the long-term, be unaffected by exposure to clothianidin seed-treated canola”.

The report criticises the test methods used to assess the effects of pesticides. These studies are not assessed in isolation but as part of a data package used for risk assessment. Examples cited include:

- The use of the colonies with 500 bees to assess egg laying capacity. This study should not be dismissed out of hand without seeing the detailed protocol. If the protocol was designed with a positive and negative control and the results are statistically analysed then the results are likely to be valid. In addition the study is would have formed one element of a larger data package, e.g. the DAR, rather than the sole information on which the assessment was made.

- The amount of nectar used to generate the TER. This is the lab acute LD50 study (OECD) in which the bees are exposed to treated sucrose and then fed ad lib untreated sucrose for the remainder of the study. The test is standardised to generate an acute LD50 (48hrs) with validation criteria (control and dimethoate) and is internationally recognised.

- Tunnel tests are not designed to assessed "direction learning" but to assess acute effects on foraging activity- effects on the ability of foragers to return to the hive from greater distances are assessed in field studies in monitoring the strength of colonies (which according to the DAR showed no risk)

- The author states that there is wide variation in the susceptibility of honeybee colonies - this is at odds with the validation data used for dimethoate in the OECD guidelines. It is well recognised that winter bees vary in susceptibility compared with summer bees and parasite and disease pressures may affect sensitivity, as may the use of other substances in the hives (varroacides, antibiotics) by beekeepers.

The discussion on imidacloprid in the report refers to many laboratory studies but does not take into account the number of field studies which have shown no adverse impacts on honeybee colonies when studies are conducted under realistic conditions and take account of all routes of exposure (including flowering weeds) plus sub-lethal and chronic effects. The report suggests that imidacloprid inhibits the ability of the queen to lay down fat reserves and reduce survival but there are no data to support this assertion. The relevance of guttation as a route of exposure is currently being discussed by experts and an opinion (currently only available in French) has been published by AFSSA which suggests it is not a significant route of exposure, a more recent Swiss report also demonstrates no effects following exposure of bees in the field in which guttation was occurring in maize grown from treated seed.

The clothianidin discussion excludes the field study by Cutler and Scott-Dupree (2007) suggesting there are no significant effects and relies on the considerations of an unspecified "honeybee expert". For many sublethal effects identified in the laboratory there is no robust linkage to effects in the field or at the colony level (e.g. proboscis extension).

The French CST report is cited as a basis of good risk assessment however, it misused the TGD approach for PEC/PNEC in that it used an assessment factor for uncertainty intended to include inter-species extrapolation and acute to chronic whilst using chronic toxicity data for honeybees. The report reviewed tunnel studies involving flowering crops and field studies and validated these against criteria developed by the CST rather than internationally agreed guidelines (against which

the studies would be planned), e.g. the recommendations of EPPO[2] are that tunnels should be at least 40m^2, plot size for field risk assessment should be at least 1500 m^2. The CST did not find any of the field studies valid based on their criteria and therefore considered the laboratory and semi-field data in detail to predict field level effects which is contrary to all recognised risk assessment approaches.

In summary the report states no assessment has been made of the methodology used in the papers cited in the report and for several the author has only obtained the abstract. This may have resulted in misinterpretation e.g. Cutler and Scott-Dupree (2007) (see above). The report to PSD (PN0944) on sublethal effects in honeybees concluded that the best method for assessing pesticide effects is not a multitude of detailed laboratory studies but realistic exposure scenarios and full assessment of exposed colonies to determine impacts (this was also published in Pest Management Science 63 11 (2007)). The author of the report appears to have misunderstood the tiered approach to honeybee risk assessment in the EU in which higher tier, more realistic, studies are undertaken when there are concerns raised by lower tier studies and such studies are designed, using EPPO guidelines as appropriate, to directly assess the concerns raised. Thus, detailed field studies have been conducted for the neonicotinoid seed treatments using realistic scenarios (crops/treatments rates) and endpoints, e.g. colony level assessment of effects, foraging activity during the registration process and adverse effects have not been observed. The EPPO guidelines are in the process of being updated to take into account recent issues and this is seen as a continual process by the ICPBR Bee Protection Group.

[2] EPPO (European Plant Protection Organisation) Guidelines for the efficacy of plant protection products – Side effects on honeybees PP1/170 (3) revised 09/2000