European Food Safety Authority

EFSA Journal 2013;11(7):e11071

Editorial: EFSA calls for integrated and coordinated actions at EU and international levels to address global declines of pollinators

Agnès Rortais, Jane Stout, Jean-Lou Dorne, Tony Hardy[1]

European Food Safety Authority (EFSA), Parma, Italy

The European Food Safety Authority (EFSA) is the keystone of the European Union's food and feed safety risk assessment. Indeed, EFSA provides scientific advice to risks managers for the safety of food in the EU and a high level of protection for food-producing animals, including bees, their ecosystem services, such as crop pollination and honey production. The large bee losses reported worldwide over the last decades have stimulated a lot of research on the monitoring of bees, mainly *Apis* bees (honeybees), and their stressors (e.g. pathological, agrochemicals, environmental, nutritional, etc.), but principally on pathogens. During this process, extensive datasets have been generated and collated on honeybee losses that have been linked to diseases, pests and pathogens in Europe and North America. However, given the importance of all bee pollinators - not only honeybees - and the universally agreed multifactorial origin of bee losses, such an approach seems too limited and may fail in meeting the global protection goals of ensuring bee diversity, crop pollination and honey production.

To better integrate the work and recent progress made in the risk assessment of bee health and to promote the more cohesive protection of bees and their ecosystem services, EFSA organised on 15-16 May 2013 a Scientific Colloquium entitled 'Towards holistic approaches to the risk assessment of multiple stressors in bees'. This initiative emerged from the recommendations made by EFSA's internal and multidisciplinary Bee Task Force, whose mandate is to develop horizontal and integrated approaches to the risk assessment of bee health in order to identify gaps in knowledge and research needs in this area. Overall, EFSA assembled over 100 international scientists specialised on bees from a broad range of disciplines such as ecology, biodiversity conservation, pollination, epidemiology, ecotoxicology and mathematical modelling, from several countries (Europe, the United States and Canada), and from various institutions such as academia, the European Commission, national environmental bodies, industrial and producer groups including beekeeper associations and non-governmental organisations.

Considering the high number of possible bee stressors such as pathogens, pests, diseases, nutrition, pesticides, habitat and climatic changes to only cite the most commonly reported in the scientific literature, and the many potential exposure routes (for example through the environment for all bees and through hive products for honeybees only), bees represent a good model for the development of holistic approaches to the risk assessment of multiple stressors in non-target arthropods, such as

[1] Correspondence: editor-in-chief.efsajournal@efsa.europa.eu

Suggested citation: Rortais A, Stout J, Dorne J-L, Hardy T; Editorial: EFSA calls for integrated and coordinated actions at EU and international levels to address global declines of pollinators. EFSA Journal 2013;11(7):e11071. 3 pp. doi:10.2903/j.efsa.2013.e11071

Available online: www.efsa.europa.eu/efsajournal

pollinators. Although experts at the colloquium could rapidly identify and list such stressors and the existing and available methods and tools to assess them and mitigate their impacts on bees and pollination, they could not prioritise among them. To overcome this shortcoming, experts suggested the application of the Bradford Hill Criteria, necessary to provide adequate evidence of a causal relationship between an incidence and a consequence, which has been used routinely in epidemiology.

In the environment – depending on the time of the year, the location, the weather and many other conditions related to the species habitat and life history – bees are exposed to various stressors, acting separately or in combination, on individuals, colonies and populations. However, the current regulatory tests that assess risks in bees do not consider multiple exposures and combined effects of stressors, whether additive or synergistic. In addition, these tests focus on honeybees, but the use of honeybees as surrogates for other pollinator species is questionable because other bee species have different life cycles, routes of exposure and sensitivity to stressors. To overcome the complexity of the assessment of multiple exposures, some experts suggested the use of predictive mathematical models - for example colony models or physiologically based toxicokinetic models which could be used in the assessment of chemical stressors - while others expressed concerns about the usefulness of such models, because they need to be fine-tuned with more data before they can provide meaningful outcomes. Although such data are usually available but incomplete for honeybees, they are scant for bumblebees and further lacking for solitary bees where basic knowledge of their biology, population ecology and functional genomics is required.

EFSA has recently published a scientific opinion and guidance document on the risk assessment of plant protection products with respect to bees, including wild bees such as bumblebees and solitary bees (EFSA Panel on Plant Protection Products and their Residues, 2012; EFSA, 2013). From this work, several recommendations and suggestions were made to improve the current regulatory tests for plant protection products, in particular for field tests by increasing their statistical power and ecological relevance by, for example, increasing the number of tested colonies, including proper controls, incorporating significant periods of observation, selecting large plot size, etc. At the EFSA colloquium, bee experts urged the rapid implementation of such protocols, which need to be standardised and validated and should include the assessment of sub-lethal and chronic effects on individual bees, colonies and populations. In terms of monitoring and mitigation, experts explained that actions cannot be confined to agricultural systems and honeybees because bee stressors come from the wider landscape, not just from agriculture, and expose all bees, not only honeybees. However, the question of a link between protection goals and the effects observed at the individual and colony levels, in laboratory and field conditions, remains an important scientific challenge that needs addressing.

Overall it became obvious that more research is required for non-*Apis* bees (bumblebees and solitary bees) compared to *Apis* bees in several scientific fields, from basic knowledge of the biology and ecology to more specific knowledge on the genomics, abundance and distribution of species through wide scale monitoring programmes. Fortunately, such information is usually available for honeybees, although incomplete, which means that little effort would be required to make rapid implementation of the existing monitoring and risk assessment protocols designed for honeybees. Finally, it was clear at the colloquium that effective communication and information flow among scientists, beekeepers, farmers, decision makers and other parties is essential, not only for risk assessment and management purposes, but also to ensure that appropriate research is conducted and communicated. In conclusion, global declines in pollinators require integrated and more tightly coordinated actions at EU and international scales. On the basis of the work of the EFSA Bee Task Force (http://www.efsa.europa.eu/en/topics/topic/beehealth.htm?wtrl=01) to bring together efforts and advances made by involved partners and stakeholders, it is timely for EFSA to strengthen scientific networking and collaborations at EU and other international levels, to avoid duplication of work, to enhance cross-fertilisation across and between disciplines, and to promote horizontal approaches to move towards integrated risk assessment of bee health.

The detailed outcomes of the discussion of the colloquium will be published as a Summary Report on the EFSA website later this year and general information related to this scientific colloquium, including the programme, presentations and briefing notes for the discussion groups are currently available on the EFSA's website (http://www.efsa.europa.eu/en/events/event/130515.htm).

About the Authors

Jean-Lou Dorne, Senior Scientific Officer at the EFSA Scientific Committee and Emerging Risks unit since 2006.

Tony Hardy, Chair of the Scientific Committee since 2012 and Overall Chair of the EFSA Scientific Colloquium XVIII.

Agnès Rortais, Scientific Officer at the EFSA Scientific Committee and Emerging Risks Unit since 2008, coordinator of the EFSA 'Bee Task Force'.

Jane Stout, Senior Lecturer, Research Group leader at the School of Natural Sciences, Trinity College of Dublin, Ireland since 2003 and Overall Rapporteur of the EFSA Scientific Colloquium XVIII.

REFERENCES

EFSA Panel on Plant Protection Products and their Residues (PPR), 2012. Scientific Opinion on the science behind the development of a risk assessment of Plant Protection Products on bees (*Apis mellifera*, *Bombus* spp. and solitary bees). EFSA Journal 2012;10(5):2668, 275 pp. doi:10.2903/j.efsa.2012.2668

EFSA (European Food Safety Authority), 2013. EFSA Guidance Document on the risk assessment of plant protection products on bees (*Apis mellifera*, *Bombus* spp. and solitary bees). EFSA Journal 2013;11(7):3295, 266 pp. doi:10.2903/j.efsa.2013.3295