Position Statement on Pesticides

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Introduction

In this position statement we set out the Bumblebee Conservation Trust's position on the use of pesticides, informed by the current scientific evidence regarding the effects on bumblebees of the use of insecticides, fungicides and herbicides.

Constructive and practical action is necessary to reduce our reliance on pesticides across all levels of society, from government to private consumers. The use of pesticides must be minimised: any use should be limited, employed only as an option of last resort as guided by the integrated pest management paradigm, where use is proportionate to the probable costs of not using them. We accept there remains some use-case for pesticides within food production and control of some invasive non-native species, but other current uses (particularly domestic and amenity use) should be phased out.

What are pesticides?

'Pesticides' here refers to all biocides: synthetic or natural substances used as treatments against insects (insecticides), plants (herbicides), fungi (fungicides), or against other groups. They may be applied as sprays, seed coatings, soil treatments, or in many other ways across a range of users: food production, forestry, amenity use, and private use are particularly widespread, but there are many others. Pesticides may be topical, where they are applied in a targeted manner, or systemic, where the chemicals are taken up into plant tissues and spread to every part of the plant, including pollen and nectar. They may be broad-spectrum (toxic to a wide range of organisms), or selective (used against a specific target or small group of targets). They break down at different rates, so some may remain toxic for days, others potentially for several years[1,2].

Impacts of pesticides on bumblebees

1. Direct impacts – lethality & sub-lethal effects

Insects are killed when they are exposed to a lethal dose of Insecticides. Exposure to insecticides at a lower level – non-lethal doses – can also have severe sub-lethal effects on bumblebees[3,4]. This has been shown, for example, in neonicotinoid insecticides where sub-lethal exposure had detrimental effects on bumblebees' ability to navigate[5], foraging efficiency[6–9], reproductive success[10–13], and resistance to the negative consequences of other stressors such as food shortages[14–16] and pathogens[14,17]. Crop pollination services provided by bumblebees can also subsequently be impaired[18]. There is also evidence to suggest that bumblebee microbiomes can be harmed by pesticide exposure, leading to negative health outcomes for the bees[19].

2. Indirect effects – habitat loss & degradation

Bees need flowers to survive. Herbicides are widely used to kill flowering plants, particularly volunteer wildflowers ('weeds' such as dandelions, clovers, etc), which removes a food source for bees from the landscape. The widespread loss of flower-rich areas from our landscapes is recognised as the leading driver of pollinator declines in the UK[14,20], and the systematic removal of wildflowers from both the countryside and urban areas puts bumblebees and other flower-feeding species under nutritional stress[21–23].

Pesticide treatments such as systemic insecticides can also persist in the soil and move through the landscape, e.g. in run-off after rain[24]. This means that plants and insects can be affected in years after the treated crop was grown, and beyond the treated area[25,26]. For instance, flowers in field margins may take up systemic insecticides from neighbouring crops[27].

3. The cocktail effect

Bumblebees are exposed to multiple different chemicals throughout their life-cycle, both pesticides and non-pesticides[24,28]. These chemicals can work together in unexpected ways, but are rarely tested together even when likely to be found together in use. This increases the risk to bumblebees. For example, the herbicide active ingredient glyphosate has been found to have no direct detrimental impact on bumblebee health in isolation, but commercially-available glyphosate-based weedkillers such as Roundup cause high levels of bumblebee mortality due to the effects of other chemicals (adjuvants) present within the formulations[29]. Similarly, lethal and sub-lethal toxicity of a fungicide were recently found to be caused exclusively by its co-formulant (alcohol ethoxylates) rather than by the active ingredient itself[30].

Other treatments, including some fungicides, may be relatively harmless to bees in isolation, but magnify the toxic effects of insecticides through synergistic effects when both are present in an environment, for example when used in close proximity to each other[31]. The combined effect of this is that foraging bumblebees are exposed to a wide range of adjuvants and active ingredients, in combinations which have never been tested and which have the potential to be far more harmful than each alone.

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What needs to change?

In municipal and domestic areas, pesticide use is almost entirely superficial and routine use is unwarranted in the face of damage to the health of our environment and our communities. We need action to phase out municipal and domestic use of pesticides entirely.

In order to produce food sustainably, we need to wean ourselves off pesticides, which harm ecosystem services like pollination and natural pest control, and contribute considerable greenhouse gas emissions during both creation and use.

Pesticide regulation

1. Race to the top, not the bottom

Pesticide use regulations within the UK (use authorisations and maximum residue levels) are currently largely synchronised with those of the EU, but Brexit means that these may now diverge – either increasing or decreasing protections for pollinators. The European Food Safety Authority (EFSA) continues to develop guidance to further protect bumblebees and other pollinators[32] and the European Commission will then look to EU Member States to endorse the improved regulations, (although Member States, including Britain, did not enact improved guidance when this was last developed in 2013). It is imperative that Britain's bumblebees should not lose protection because of Brexit. Any advances in protection in the EU should be at least mirrored in the UK. With the proposed 2013 EFSA guidance already available, there exists a short-term opportunity to increase protections ahead of the EU.

Pesticide regulations should also form part of trade negotiations to avoid the risk of the UK government making new trade deals with countries with less stringent pesticide regulations. This would prevent the undercutting of more sustainable farming in the UK by exporting harm to ecosystems abroad.

2. Ensure testing is representative of wild bee communities

Currently, testing of new pesticide products on bumblebees is limited to lethal dose testing from acute oral and contact exposure in Buff-tail bumblebee (Bombus terrestris) workers[33]. More extensive testing is carried out on honeybees (Apis mellifera) including tests on brood and field experiments[34], the results of which are then extrapolated to represent risks to all wild bees. This is despite the fact that the honeybee has a very atypical life-history strategy. The proposed 2013 EFSA guidance added higher-tier testing for the Buff-tailed bumblebee and Red Mason bee (Osmia bicornis) to new pesticide testing schedules for the first time, which would be a great step forward. However, even these species are not necessarily representative of the wild bee community as a whole: in particular, ground-nesting solitary species are not represented, despite potentially having a much larger risk of exposure to chemicals in the soil. Species used as proxies during safety testing must be demonstrably appropriate and adequate for this use.

Testing must also be representative of the real-world usage of pesticides. For social species such as bumblebees, this should include whole-colony, whole-cycle tests rather than microcolonies or part-grown nests, which miss some impacts.

For all species, this should include examination of the cocktail effect, especially with likely adjuvants of the final product.

3. Show pesticides the yellow card

The medical industry operate a 'yellow card' system, whereby all harms suffered after medical interventions are logged for investigation as potential side-effects of the treatment, or interactions between the treatment and other causes (https://yellowcard.mhra.gov.uk/). Extending this approach into the use of pesticide treatments would allow concerning findings (such as bee die-offs) to be noted and investigated in a transparent manner. It would allow detection of the long-term, real-world impacts of the type almost impossible to find with pre-authorisation testing alone, and thus permit focusing of the testing regime on potentially harmful chemicals and combinations of chemicals.

4. Reduce pesticide use through nature-based solutions and integrated pest management

Building natural resilience into the farmed environment (including agriculture, horticulture, & forestry) is key to reducing our need for pesticides[35–37]. By improving floral diversity within field margins, reducing field sizes, and establishing hedgerows and wild areas, farms can increase the number and diversity of natural pest-control species which protect crops and improve yields by preventing the build-up of pest species to harmful levels [37,38]. When treatment is warranted, the least harmful method should be used, for example mechanically removing weeds, before scaling up to other methods if monitoring of pest thresholds indicates further action is required. Only when all other methods have been exhausted should a pesticide be considered, and their use should be as limited and targeted as possible. This is the core of the Integrated Pest Management (IPM) approach.

At the UK level, applying the principles of IPM has been a requirement for farmers since 2014. Despite this, pesticide applications have continued to increase in frequency, over more extensive areas[39]. Governments must develop effective ways of incentivising a meaningful shift towards IPM principles and away from pesticide use as a first resort, including committing to an ambitious pesticide-use reduction target. The EU have proposed a 50% pesticide-use reduction target by 2030[40].

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5.End pesticide use in domestic and urban settings

The use of pesticides in gardens, playing fields, parks, and elsewhere across the unfarmed landscape is unsustainable and poses an unnecessary risk to bumblebees and other pollinators as well as the health of ecosystems and people (Baldock, 2020; Md Meftaul et al., 2020). Many towns and cities have already opted to go pesticide-free and have shown that successful alternative weed control methods can be implemented to maintain public places so that they feel cared for, welcoming and safe[41,42]. From the cities of Paris and Ghent, to Bristol, Lewes, and the London Borough of Hammersmith and Fulham, there are good examples of local administrations moving away from herbicide use, trialling and implementing alternative methods such as hot foam, hot water, electrifying, steel brushing, hoeing, mulching and more (www.pan-uk.org/pesticide-free-towns-success-stories/). Retailers such as B&Q, Dobbies, and Morrisons have already stopped the sale of some pesticide products such as glyphosate.

From a bumblebee perspective, the best approach is to increase understanding and tolerance towards "weed" species and to allow more wildflowers to grow within the urban environment. We are calling for governments of all scales, retailers and individuals to phase out these uses of pesticides entirely and seek sustainable alternatives.

Where plants are sold as pollinator-friendly, this must apply to the specific plants as well as to the species overall: they should not contain harmful levels of pesticide residues. Pollinator-friendly plants should not risk exposing pollinators to harmful chemicals.

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