Will banning neonicotinoids save pollinators?

Lynn Dicks provides some background information and references to support her World View article, published this week in Nature.

On 25 February 2013, the European Union (EU)'s Standing Committee on the Food Chain and Animal Health votes on a proposal to ban the use of three widely used agricultural insecticides on crops attractive to bees. They are neonicotinoids - clothianidin, thiamethoxam and imidacloprid. They've been around since the mid-1980s. Often, they're applied as seed treatments and remain in crop plant tissues throughout the plant's life. This means their use is what you might call prophylactic, rather than being in response to pest attack.

The underlying driver for the sudden policy change is the emergence of new evidence showing substantial sublethal effects of neonicotinoids on honey bee Apis mellifera and bumblebee Bombus terrestris colonies at field-realistic doses (1,2,3). These experiments imply particularly serious implications for wild bumblebee colonies, such as an 85% reduction in new queen production, if they are exposed in the wider environment at the levels tested (3).

Such effects are not considered acceptable risks by the European Food Safety Authority (4). Even more importantly, they would not have been picked up by the existing regulatory system in Europe, which focuses entirely on honey bees, although new guidance to be published this spring is expected to extend the risk assessment to cover bumblebees and solitary bees.

We know that where measured, wild flower-visiting insects (bees, hoverflies, butterflies and moths) are declining in diversity and many are declining in abundance (5). We know managed honey bees have suffered serious unexplained health problems leading to substantial colony losses in the US and parts of Europe (5). And there is clear evidence that honey bees are exposed to neonicotinoids at levels similar to those tested, via crop plants, dust from seed planters and even weeds growing near treated fields, which seem to pick up residues from the soil (6).

The key question is, to what extent are the sublethal effects demonstrated in laboratories responsible for observed declines? This is where the scientific evidence flounders. Proving causal links between pesticide use and either bee declines or honey bee health problems is difficult. We still have no data on the actual exposure of wild pollinators to neonicotinoids, or to multiple pesticides including neonicotinoids, in their natural environment. The foraging behaviour and life histories of flower-feeding insects mean that reported levels of pesticide residue in crop plant nectar and pollen do not equate to actual exposure (7). Most flower-feeding insects are generalists and opportunists. They feed on a range of available resources, including wild plants and crop plants. Landscape-scale field trials are needed, with treatment and control plots substantially larger than the standard 1 ha (100 m x 100 m), separated by a greater distance than the foraging range of bee colonies, which can be several kilometres. Such research is starting to happen. I know of at least one study recently commissioned in Sweden, but it will take years to come up with results. And so it should.

Current scientific opinion is that pollinator declines are caused by multiple interacting pressures rather than any single threat (5,8,9,10). Habitat loss, disappearance of floral resources, climate change and disease may all play a part. Pesticides are one of these multiple, interacting pressures. There is no reason to believe that simply removing one group of insecticides, without addressing the other pressures, will solve the problem. It's one step in the right direction.

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