

Box tree moth control unlikely to cause higher great tit mortality Researchers identify pet treatments as unexpected pesticide source

It is unlikely that pesticides used against the caterpillars of the box tree moth have caused higher great tit mortality in Dutch cities, according to a study carried out by CLM Research & Advice and the Netherlands Institute of Ecology (NIOO-KNAW). The researchers did find traces of 26 different pesticides in samples taken from dead great tit nestlings. Surprisingly, a number of these could be traced back to flea and tick treatments for pets.

Earlier research had found that mortality of great tit nestlings is higher in Dutch cities than it is in nature areas. This in itself would be cause for concern, but reports from the public over the past few years hinted at a possible further rise. Many people checked the nest boxes in their own gardens, and would regularly find dead great tit nestlings.

Roughly coinciding with these reports was the rise of the box tree moth, an invasive species in Europe that causes severe damage to boxwood. However, fears that chemical pesticides used to control the moth's caterpillars could be to blame for higher great tit mortality now turn out to be unfounded.

No significant rise

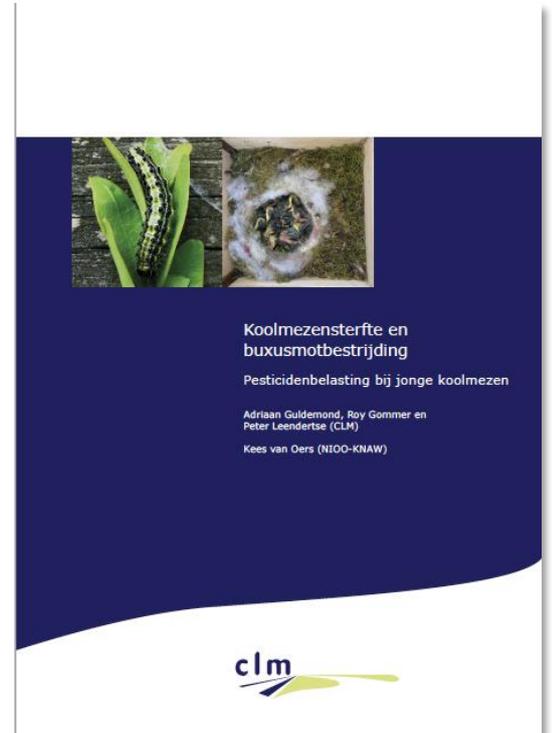
The study by CLM and NIOO-KNAW first of all finds that when observations are compared over a longer period, there has in fact been no significant rise in mortality since 2017, the year when boxwood moth numbers rose sharply in the Netherlands. The researchers also conclude that pesticide levels in dead great tit nestlings were not high enough in most cases to have caused their death.

The study is based on a nationwide call by CLM last spring for people to collect samples of dead great tit nestlings from their gardens and report them. The call yielded 411 samples from across the country, 31 of which were selected for further analysis along with 10 samples taken in nature areas.

In cases where the original reporter was able to establish which pesticides had been sprayed against the box tree moth, the researchers specifically looked for traces of those pesticides in the samples. But they didn't find any during the analysis.

Hairs of cats & dogs

What the researchers did find was a wide range of pesticides. "We identified 26 different ones", says Adriaan Guldemond from CLM. "They include fipronil and imidacloprid, both of which are highly toxic to birds. In two cases, the concentrations of these substances were high enough to have killed the great tit nestlings."



Fipronil and imidacloprid were also among the pesticides the researchers identified when they analysed dog and cat hairs used by great tits to insulate their nests. The toxic substances would have ended up in or on the hairs as a result of treatments against fleas and ticks. Bald nestlings would absorb them through their skin: a surprising contamination route never described before.

"In up to 97% of the instances where we found legally permitted insecticides in the samples", says Guldemond, "they were substances that could be used in pet treatments, and contamination could have taken place through dog or cat hairs. Insecticides that are used for plant protection, and that enter the birds' bodies through their food, only account for 58% at most." This suggests that the newly discovered 'hair route' may well be the most common source of pesticide contamination in young great tits.

Cocktail of chemicals

In one exceptional sample from a single dead bird found in a nature area, there were traces of 20 different pesticides. Overall, pesticides were found 84 times in the 41 samples. Insecticides were the most prevalent (64%), but weed killers and fungicides were also found:

- *Insecticides (9)*: cypermethrin, DDT, fipronil, fluralaner, imidacloprid, permethrin, piperonyl butoxide, propoxur, pyriproxyfen
- *Herbicides (7)*: chlorpropham, fluroxypyr-1-methylheptyl ester, oxadiazon, pendimethalin, phenmedipham, propyzamide, prosulfocarb
- *Fungicides (6)*: difenoconazole, dimethomorph, folpet, iprodione, pencycuron, tebuconazole
- *Biocides (2)*: 2-phenylphenol, DEET
- *Industrial chemicals (1)*: difenyl
- *Intermediates (1)*: anthraquinone

Spray with caution

The study's findings don't explain why mortality of great tit nestlings is higher in cities. "It is likely a combination of factors", offers Kees van Oers, animal ecologist at NIOO-KNAW. "There are fewer insects for them to feed on in the city, food quality is lower and there's a higher risk of the parents dying. Most significantly, insect biodiversity in urban areas is generally lower. So it's advisable to plant and maintain your garden in ways that promote biodiversity."

That includes avoiding the use of pesticides in and around the house: better if you want to have a species-rich garden...and also for the welfare of young great tits.

Full report available from the CLM website, in Dutch with summary in English: ['Koolmezensterfte en buxusmotbestrijding'](#) (Great tit mortality and box tree moth control).

Dead great tit nestlings were reported from all Dutch provinces. The highest numbers from Gelderland, South Holland and North Holland, the lowest from Drenthe, Flevoland and Friesland. 41 samples were analysed: 17 from locations where box tree moth control with pesticides is known or assumed to have taken place, 14 from locations where box tree moth control is assumed not to have taken place and 10 from nature areas where it is also assumed not to have taken place.