It’s not uncommon to find dead bees. Here’s why

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Oregonians care about their bees, both unmanaged wild bees, like bumblebees, and those we manage, which include mason bees, alkali bees, alfalfa leafcutter bees, and the European honeybee. High profile bee kills resulting from pesticide applications in 2013 and 2014 have heightened the public's bee awareness, resulting in more frequent reporting of incidents and concern when numerous dead bees are found in a single location. However, dead bees can be found near or under plants for a variety of reasons, and determining the true cause often requires some detective work. When large numbers of dead bees are found within a small area, the following have historically been the usual suspects: natural causes, such as old age and predation; toxic plant metabolites; pesticides; chemical deception; and starvation. Some recent scientific studies are helping shed light on the variety of reasons large numbers of dead bees may be found.

Possible causes of death

Old Age & Predation. When bees congregate in large numbers on bee-attractive plants, such as linden trees, it is expected that bees who have died of old age will be found within a small area. Also, despite warning colorations and the possibility of the bees having stingers, large congregations of bees are likely to attract bee predators. If the dead bees you encounter look ragged or look like they’ve been gnawed on, it is possible that they died of old age or were killed by other animals. However, some researchers have documented that only a small portion of dead bees found under bee-attractive plants likely died of these causes. It is also possible that bees were chewed on after they died of some other cause.

Toxic Plant Metabolites: In linden trees, it had been thought that the presence of mannose in the nectar can lead to detrimental effects in bees. However, earlier methods used to detect whether mannose was present in linden tree nectar did not provide definitive evidence, while more recent studies using more precise detection methods did not find mannose in the nectar analyzed from several different linden species. It is possible that other plants do produce bee-toxic metabolites that can affect large numbers of bees; but based on current evidence, this is not likely to be the case with linden trees.

Pesticides. Of all suspects, large bee kills caused by pesticides, insecticides specifically, are the most straightforward to confirm because laboratory testing can detect whether pesticide residues are present. The largest documented bee kills within the last decade have been linked to insecticide applications – specifically, neonicotinoid insecticides. On the other hand, there are many instances in which large numbers of dead bees have been found, with no link to pesticide exposure.

Chemical Deception: Bee-plant relationships are commonly viewed as symbiotic — a mutually beneficial relationship, where bees get food from the plant in exchange for pollination services. However, there are instances in which one party in the relationship does not fulfill its end of the

bargain. For example, some plants are able to produce chemical compounds that are “cheaper” to produce than nectar, but that fool bees into continuing to visit those flowers. Compounds such as caffeine or other volatiles that mimic bee pheromones may continue to attract bees to flowers that actually have little to no nectar available to them, potentially leading to starvation, even when other plants in the surrounding area are still be in bloom. More studies are needed to better understand how often and with which plants this may happen.

Starvation: Linden trees seem to be implicated in bee kills more often than other plants. This has sparked several studies exploring the possible causes outlined above, and the indication is that several of those factors may contribute and ultimately lead to starvation.

Bees, being cold blooded and relatively small, are susceptible to changes in the surrounding air temperature. In order to maintain a high enough body temperature on cold days, bees need to keep flying – their muscles produce the heat they need to stay warm, and all that flying requires a lot of energy. Some plants and trees associated with bee kills have dense inflorescences, with flowers being so close to each other that bees end up walking from flower to flower, rather than flying. On warm days when there is still plenty of nectar to go around, this does not pose a problem to bees. However, when nectar production is low and the temperature is cool, bees end up falling to the ground. With the low temperatures and depleted energy reserves, the fallen bees are unable to fly to other resources and crawl on the ground and starve. This may happen even if there are other options for bees to forage on, due to the chemical deception that keeps bees loyal to a resource, even though nectar production has decreased. Bees in this situation will appear lethargic – crawling and moving slowly on the ground.