

# **Update to 5G Cell Towers Cause Massive Insect Decline on the Greek Island of Samos**

by Diana Kordas Ed.M, M.A.

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## **Abstract**

Insect declines have continued on Samos since the introduction of 5G. The situation has worsened since 5G became commercially available from July 1, 2022. Not only are insect numbers in general continuing to decline; pollinators including butterflies are declining very rapidly. Insectivore birds are declining also. Soil conditions have worsened as well, with the soil becoming more acidic than previously. There are no visible insects in the soil, and many plants are not growing as well as they should, or growing to full size. Melons and aubergines show signs of DNA damage. Lack of pollinators, poor yields and withered plants are apparent all over the island. The implications for food production generally are frightening: a combination of declining soil quality, declines in pollinator numbers and radiation-damaged plants means that it will be harder to grow food and that food prices will continue to rise. Total crop failures may occur in future.

## **Observational Study Area, May-July 2022**

5G was introduced in July of 2021 on Samos, but only became commercially available at the beginning of July 2022. During the year in which the technology was live but not commercially available, adjustments were being made to the system so that it would operate properly. The 5G wavelengths of 0.7 GHz, 3.5 GHz and 22.5 GHz have been operational from July last year.

## **Insects**

Serious insect declines began with 4G, but the introduction of 5G caused a rapid and massive decline in many types of insects, many of them pollinators. Climate change, which is often given as the reason for insect declines, could not have had this effect within a single growing season. Also, climate change should bring an increase in the number of insects rather than a decline. As mentioned in "5G Cell Towers Cause Massive Insect Decline on the Greek Island of Samos", the area does not have pesticides.

The number of pollinators has visibly dropped since the beginning of this summer (2022). In May we still had some hoverflies, bumblebees, honeybees and white bees. There were a few bee flies and, in general, the situation was much as it had been at the close of last summer. Now virtually all the larger bees and hoverflies are gone. Since July 1, we have seen only 2-3 carpenter bees, two bumblebees,

and no honey bees. There are no drone flies and there are very few hoverflies or wasps. Of the hoverflies, the only two types we see now live in underground burrows—and there are not very many of them left. The same is true of the wasp species we are seeing: the only kinds we have left live underground, with the exception of very tiny wasps (see below). We have seen no red bees at all this year (there are several species which are mostly active in spring and early summer), and no white bees, which used to be the main pollinators of our summer vegetables along with bumblebees.

Crops are still getting pollinated, though we expect yields to be much lower than last year (courgettes are not being pollinated at all, very few melons have been pollinated, and we will definitely have far fewer tomatoes, less than a quarter of what we had last year). The main pollinators are very tiny wild bees, some only 2-3 millimeters long. We are seeing several species of these tiny bees. There are also a few tiny wasps, also 2-3 millimeters long, of a species we have not noticed before. Except for a few burrowing wasps, these are the only wasps we are seeing.

In general, insect numbers have continued to fall since last summer. There are very few grasshoppers, almost no crickets, very few beetles, fewer butterflies and moths, and fewer cicadas. Some species, such as the spoonwing lacewing and indeed most lacewings, have vanished entirely. Until recently, and despite overall insect declines since the introduction of 4G, species that lived or laid eggs underground were more abundant than species that lived or laid eggs above ground. This is mentioned in Lazaro *et. al* (2017) with reference to wild bees, but the same principle applies generally.

Cicadas hatch and develop underground, where they spend the whole of their lives until they emerge for a few weeks to find mates and breed. Until recently, they had not declined noticeably; only last year (2021) did we notice declines in numbers and see signs of DNA damage in some cicadas, in the form of damaged wings. This year, not only are there markedly fewer cicadas, but there are generally fewer insects that breed and live underground. This may be due to both direct and indirect effects of electromagnetic radiation on the soil. Insects like cicadas, which hunt underground in the larval stage, may be finding less to eat. The change in the electromagnetic balance of the soil itself may also be killing them (see the section “Soil Acidification” in “5G Cell Towers Cause Massive Insect Decline on the Greek Island of Samos”).

### Table of Pollinators in the Study Area, 2012-July 2022

List of Abbreviations: NA= Not Applicable; AY= All Year

5 = 100% is given as a baseline for 2012 and does not reflect insect prevalence of earlier years.

4 = 80%-61%, 3 = 60%-41%, 2 = 40%-21%, 1 = 20%-1%, 0 = none seen

Bees	2012	2017	Apr-June 2021	July-Dec 2021	July 2022
Honey bees (wild) (Apr-Nov)	5	4	3	1	0
Bumblebees (AY)	5	5	5	1	1 (only 2 bees)
Carpenter bees (May-Oct)	5	3	2	1	1 (3 bees)
White wild bees (Apr-Nov)	5	5	5	3	0
Red wild bees (Apr-Oct)	5	5	4	0	0
Flower bees (Mar-July)	5	5	4	NA	0
Tiny wild bees (Apr-Nov)	5	5	4	2	2 (declining)

### Wasps

Common wasps (Apr-Nov)	5	4	2	1	0
Paper wasps (Apr-Nov)	5	2	0	0	0
Potter wasps (Apr-Nov)	5	3	1	0	0
Digger wasps (Apr-Oct)	5	5	4	2	1 (declining)
Ruby-tailed wasps (Apr-Oct)	5	3	0	0	0
Other wasps	5	4	1	1	0

### Pollinating Flies

Hoverflies (April-Oct)	5	4	4	3	1 (declining)
Drone flies (Apr-Nov)	5	5	4	4	0

**Butterflies** We have only five species of butterfly left in this area. Scarce swallowtails and painted ladies are the most common. There are a very few swallowtails, cabbage whites and tree graylings. We did not get any of the usual spring butterflies at all, though we had a few red admirals in winter.

### Birds

Birds are also being seriously affected by 5G. There are many fewer birds around than there were several years ago; bird populations have fallen all over the island and finches of all species seem to be virtually extinct, as do kingfishers. On our land, sardinian warblers, orphean warblers, great tits, blackbirds and jays all nested, but we have seen no juvenile birds except young great tits. We seem to have lost our wrens and song thrushes. Warblers are insectivores and with declining insect populations, their future is not assured. Other birds have also not bred successfully. Chukars, a common island subspecies of partridge, have had very few young this year; some pairs have not bred and of the few with young we have seen, there are fewer chicks than usual. We had a pair of tawny owls, but they do not seem to have bred and these days we only hear one owl. Since rodents have seriously declined, the decline in owls may be due to lack of food.

In our local wetlands, flamingos have failed to breed for the first time that we have seen. The lagoon there functions as a sort of creche for baby flamingos, and generally there are 30-40 first-winter and second-winter birds. This year there were only two first-winter flamingos and three second-winter ones. In addition, seven pairs of ruddy shelduck failed to breed at all. The lagoon used to have numerous little egrets; now there are none.

There were very few migrating birds this year. The bee-eaters arrived in early May, but not so many of them as usual. Barn swallows, house martins, common swifts and alpine swifts also arrived, but numbers are very small and red-rumped swallows have not arrived. These birds generally hunt insects on and above our land throughout May, and did so this year, but—and this was the first time we have ever seen this—they were relentlessly attacked by the yellow-legged gulls, who tore swallows and martins literally to pieces over our heads, and captured bee-eaters in their beaks and killed them. This went on day after day, and was sickening to watch.

Gulls are not raptors; they are mostly scavengers although they may steal eggs and young from other birds' nests. However, the gulls may be starving as there is nothing in the sea at all: no urchins, starfish, shells, cuttlefish and other sea life that usually wash up on beaches where the gulls scavenge.

We have seen nothing washed up on beaches for several years except rubbish, driftwood and ribbonweed. There are also very few fish. Clearly the taking of smaller birds in flight was a new method of getting food for these gulls; they became more adept at catching other birds as the days passed.

### **Soil Conditions and Soil Insects; DNA Damage in Plants**

The soil is becoming much more acidic. In April we dug a new vegetable bed, on virgin soil: the land has not been used since before World War II. We found absolutely no insects in the soil, not even a single earthworm. There should have been large numbers of earthworms, grubs, small centipedes and various beetles. In order to grow our summer crops we have had to add calcium to soil three times, and even so our peppers are showing signs of calcium deficiency, with black spots and areas of thin walls appearing near the tips of the fruits. The peppers themselves are thinner-walled than they should be, and cook down to nothing. Were we market gardeners, these would be unsaleable. Some tomatoes are also showing damage due to lack of calcium: weak spots like scars in the skins of the fruits and, in the plum tomatoes, some fruits where the lower half has turned black and rotted. A number of tomatoes and peppers rot entirely before ripening; this is not due to insect damage.

In last year's summer bed, we attempted to grow peas and beans in the early spring. Nothing sprouted. We were not the only people whose beans did not grow. The same thing happened to several of our neighbours and friends, who all grow broad beans every winter. This year, their beans did not grow.

We used the other half of the same bed to plant potatoes, which like acidic soil. These grew, but yields were low, with some plants producing no potatoes at all. Despite the fact that the soil was kept moist, when we dug the potatoes out we found, once again, no insects at all, not even a single earthworm.

We planted courgettes and melons in the half of the bed where the peas and beans had failed to grow. They sprouted, but no courgettes and few melons have been pollinated, and the plants have not grown to normal size; they have remained very small despite fertilization (we use both goat and chicken manure, the one dug into the soil and the other watered in as the plants are growing).

Melons, zinnias and some aubergines are showing signs of DNA damage. Almost all the melons are very small, about the size of tennis balls, and many are misshapen, with obvious weak spots in the rind. Many of the seeds inside them are also misshapen. Some aubergines are also misshapen, with folds and odd fingers of flesh. DNA damage is also evident in some zinnias, which have developed huge protruding centers, sometimes with a miniature second flower on top. Our neighbours are having the same problems with melons as we are. Theirs were purchased as seedlings, whereas we grew ours from our own seed. Their aubergines, unlike ours, have produced only tiny fruits which are inedible.

## **Other Areas of Samos**

During the winter and spring, we took long walks in different parts of the island. It was alarming to note that certain plants which should draw large numbers of pollinators were not doing so, no matter where we went. Rosemary, savory and thyme grow in profusion here, but none of these plants had many bees of any sort at any time. The former should have attracted large numbers of bumblebees; the thyme should have been covered with honey bees. Gorse and Spanish broom, which also tend to attract huge numbers of bees of all sorts, had almost none. In one area we examined over 100 gorse bushes in full bloom and found only one honeybee and one bumblebee among all those plants. A beekeeper who lives in that area found all his bees dead in their hives at around the same time. The cell tower which serves the area is about two kilometers away, and has had 5G panels since July 2021.

Our summer crops are not doing nearly as well as last year's, but at least we are growing something. Other people we know have dug up their summer beds because the plants were not thriving despite the addition of calcium and fertilizers. Some people we know have given up trying to grow things altogether, both because of the lack of pollinators and because plants fail to thrive.

Everyone is complaining about poor crops this year. Everywhere we go, plants in the fields look withered and yields are very small. This is not due to the weather; unlike last year, the summer has not been very hot and there have been no heat waves. This is not a water problem, either. All the market gardens are situated near the wetlands on the south side of the island, where water is abundant—and free. Commercial fertilizers should ensure that the plants grow tall and strong. Instead, the plants in the fields are smaller than they should be, and look as if they had not been watered for a week; they seem to be unable to absorb the water that is being expended on them.\* There are virtually no insects, and it is clear from the number of withered flowers on plants that they have not been pollinated.

In Samos town, where a vast 5G array sits on the OTE/Cosmote building in the center of town, there are no insects or birds at all, not even any flies. There are no butterflies or other insects in the public gardens.

\*See Balmori's "The Effects of Microwaves on the Trees and Other Plants". In this study, he discusses the work of Karl Vokrodt and others who have found that microwave radiation causes soil acidification as well as inhibits plants from absorbing water from the soil.

## **Discussion**

5G is affecting soil conditions and killing pollinators. Without pollinators, nothing will grow in the first place. Poor soil conditions mean that, even if you could introduce artificial pollinators such as pollinating drones, nothing that is planted will thrive. Yields will be poor and the quality of the fruits and vegetables will be unsatisfactory; the dietary value of the produce will be reduced.

We have a food crisis, with rapidly rising food prices everywhere. This is being caused to some extent by the war in Ukraine, by droughts in some places, and by other conditions. However, poor crop yields and crop failures may also be being caused by the proliferation of wireless (and especially 5G

millimeter-wave) technology all over the world, although this is not being officially recognized. There will be places where weather conditions and supply-line problems are clearly not to blame for poor crop yields and crop failures, where the weather is good but the soil is becoming impoverished for no apparent reason. And, of course, as the pollinators continue to decline—as insects are known to be declining rapidly worldwide—it will soon become evident that this is not being caused by the weather, or by pesticide use (farming is a business and farmers are not fools; they won't spray for nonexistent pests).

There will come a point where people will be forced to recognize that what is killing the insects and the land is not climate or weather or agrochemicals but the cell towers that are visible every way we turn. Wireless technology—being able to talk to people and access the internet from anywhere—will seem a lot less attractive when we have nothing to eat. And we are rapidly reaching that point.

We cannot use 5G technology to solve the problems that 5G and previous generations of wireless technology have caused. Drones cannot replace bees and other pollinators. And nothing can replace essential soil microbes and soil-dwelling insects. Placing cell towers all over every country on this earth has already caused immense damage to our ecosystems. To proliferate the damage already caused by wireless radiation with the addition of ever more spectrum and small cells on every available lamp-post and streetlight is to ensure that the most essential and vulnerable parts of our ecosystem—the insects—will go extinct. If we have no insects, if we damage the very earth in which our food grows, we will in turn go extinct. We are rapidly approaching a tipping-point from which we will not recover. We do not need to go there. We must not go there.

## References

2022, Upudhaya, C. *et al.*, “Attributes of non-ionizing radiation of 1800 MHz frequency on plant health and antioxidant content of Tomato (*Solanum Lycopersicum*) plants”

<https://www.sciencedirect.com/science/article/pii/S168785072200125X>

I include this study because it shows how tomatoes are affected by cell tower radiation: they lack the vitamin content and antioxidant properties they should have, have thinner skins and do not keep as well as they should. Like the plants described in the study, our tomatoes have curling leaves and a yellowish tinge. Our neighbours' tomatoes, before they pulled them up, had gone entirely yellow. What is affecting our tomatoes is also affecting our peppers, which are not growing as fast or as well as they should, whose leaves tend to wither early in the day, and whose fruits are thin-walled.

2022, Nyirenda, V.R. *et al.*, “Effects of phone mast-generated electromagnetic radiation gradient on the distribution of terrestrial birds and insects in a savanna protected area”

<https://link.springer.com/article/10.1007/s11756-022-01113-8>

I include this study because it mirrors what we are seeing on Samos. Near cell towers, there are hardly any birds or insects. There are many more birds and insects the farther one gets from the cell towers and other sources of electromagnetic radiation (EMR) as on our land. However, nowhere on Samos is it possible to get as far as 12 kilometers from all cell towers. Both insects and birds are declining everywhere: faster as one nears sources of EMR (near cell towers, in town and villages) and

somewhat more slowly as one gets farther away from these sources. The overall trend is rapid decline of all species, especially since the introduction of 5G. This can only end in the extinction of many species.

2003, Balmori, A. "The Effects of Microwaves on the Trees and Other Plants"

<http://www.next-up.org/pdf/>

[AlfonsoBalmoriTheEffectsOfMicrowavesOnTheTreesAndOtherPlantsUk.pdf](http://www.next-up.org/pdf/AlfonsoBalmoriTheEffectsOfMicrowavesOnTheTreesAndOtherPlantsUk.pdf)

This paper explains how microwaves cause soil acidity to occur and why plants become unable to take up water from the soil. It can easily be seen how these mechanisms can help lead to crop failures.