

Review

Electromagnetic radiation (EMR) clashes with honeybees

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Apiculture has developed into an important industry in India as honey and bee-wax have become common products. Besides, honey bees do great environmental service by pollinating flowers. Bee keeping proves worthwhile from a monetary point of view as honey and wax command rewarding profits. In an average colony, there may be between 20000 to 31000 bees consisting normally of a queen and a few hundred drone. 90% of the population is made up of the workers. Recently, a sharp decline in population of honey bees has been observed throughout the Indian subcontinent resulting in devastating loses. For example, Kerala province has seen around 60% plunges in its commercial bee populations. Although the bees are susceptible to diseases and attack by natural enemies like wasps, ants and wax moth, constant vigilance on the part of the bee keepers can overcome these adverse conditions. The present plunge in population was not due to these reasons, it was caused by man.

Key words: Honey bees, bee-wax, population,

INTRODUCTION

Bees and other insects have survived and evolved complex immune system on this planet over a span of millions of years. It is not logical that they would now suddenly die out now due to diseases and natural parasites. This suggests that another factor has been introduced into their environment that disrupts their immune system. This man made factor is the mobile towers and mobile phones.

The public is not being informed of the threat due to deliberate attempts on the part of mobile phone makers to mask the direct causal relationship. Over the past several months, a cadre of scientists, funded by the deep pockets of the mobile phone industry, has suggested that viruses, bacteria, and pesticides are to be blame for the unprecedented honey bee decline. Rather than critically assessing the problem, the industry is dealing with it as a political and public relation problem thus manipulating

perception of the appropriate remedy. Sadly, this deceptive practice is business as usual for the mobile phone industry.

If the reason behind the population decrease were biological or chemical, there would be a pattern of epidemic spread. Observers would be able to trace the spread of bee disappearance from a source similar to the spread of severe acute respiratory syndrome (SARS) a few years ago. This pattern did not occur, however mobile towers and mobile phones meet the criterion.

New experiments suggest a strong correlation between population decline and cellular equipment. In one experiment, a mobile device was placed adjacent to bee hives for 10 min, for a short period of only 5 to 10 days. After few days, the worker bees never returned home.

The massive amount of radiation produced by towers and mobile phones is actually frying the navigational skills of the honey bees and preventing them from returning back to their hives. The thriving hives suddenly left with only queens, eggs and hive bound immature worker bees. Thus, electromagnetic radiation (EMR) exposure pro-vides a better explanation for Colony Collapse Disorder (CCD) than other theories. The path of

Abbreviations: CCD, Colony collapse disorder; BSNL, bharat sanchar nigam ltd; RFR, radio frequency radiation; KMC, Kootenai medical center; EMR, electromagnetic radiation; SARS, severe acute respiratory syndrome; WHO, world health organization.

CCD in India has followed the rapid development of cell phone towers, which cause atmospheric EMR.

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Insects and other small animals would naturally be the first to obviously be affected by this increase in ambient radiation since naturally they have smaller bodies and hence less flesh to be penetrated by exposure to microwaves. The behavioral pattern of bees alters when they are in close proximity to mobile phones and towers. The vanished bees are never found, but thought to die singly far from home. Bee keepers observed that several hives have been abruptly abandoned. If towers and mobile phones increase, the honey bees might be wiped out in ten years. Radiation of 900 MHz is highly bioactive, causing significant alternation in the physiological function of living organisms.

Some countries have sought to limit the proliferation of mobile towers with strict rules. But in India, no such rules have been formulated or implemented. Given the proliferation of mobile phone towers and their vital role in communications, solutions to the problem will not be as simple as eliminating the towers. One possibility is shielding. Experiments confirmed that light aluminium does effectively block microwave radiations from hitting the hive directly. Since wrapping mobile phone and towers in aluminium foil would prevent communication, it would be better for mobile companies to pay bee keepers to protect their bee colonies to some extent from mobile phones and towers radiations with aluminium shielding. While this option could be easily implemented and has low costs, it proves less than optimal because worker bees will still be exposed to radiation as they fly to and from the hive.

Another solution would be granting local communities the ability to control whether or not to install mobile towers. On one hand, community members would be able to exert some control over their environment and determine whether the benefits outweigh the costs and risks. On the other hand, it is highly susceptible to manipulation by powerful influences, especially since the bee keepers have significantly less influence, power and wealth than the mobile phone companies.

However, Indians could risk losing even this right to self determination if the cellular providers can impose a country wide mandate prohibiting regulation against them, similar to the Telecommunications Act of 1996 in the United States. The Act prohibited local governments from making sitting decisions based on the perceived health impacts of wireless facilities. Indian advocates are concerned that such regulations might be upheld in India as they were in the United States in order to "eliminate service gaps in its cellular telephone service area."

In Kerala, there are about 600,000 bee hives, and over 100,000 workers are engaged in apiculture. A single hive may yield 4-5 kg of honey. Moreover, the destruction of bee hives could be a major environmental disaster. Honeybees are responsible for pollinating over 100

commonly eaten fruit and vegetable crops, and without bees, the food system would be in serious trouble. Rural village dependent on locally grown foods would be most

vulnerable. The need of the hour is to check unscientific proliferations of mobile phone towers. More research is essential on how to protect the bee hives from the electromagnetic exposure, but perhaps more to study the impacts on humans.

Recently, the Bharat Sanchar Nigam Ltd. (BSNL) has suggested that the mobile phone towers that have been erected across the Kerala State do not cause health problems. Although the BSNL contends that it is safe, yet the government agencies involved in regulating radio frequency radiations have yet to prove that the towers were harmless. Keeping on these as the focal point, a field study has been undertaken by the Kerala Environmental Researchers Association (KERA) in Kollam Taluk areas. The study was conducted in more than 2000 houses situated within a kilometer of the towers in Kollam Taluk. In Kollam Taluk alone, there were more than 80 towers. In many places, more than three of them were present within half a kilometer radius. This unprecedented proliferation and construction of several towers across the state has raised the question of potential adverse health effects of microwave radiations emitted from these towers. The study showed that more than 40% of the people living in the vicinity of the towers, especially those of the middle age group and children, complained of eye problems, oblivion, sleep disorders, headache, etc. The people said that this predicament has emerged two years after the installation of the towers.

All mobile phone towers emit microwave radiations, which is in the radio frequency radiation (RFR), part of the spectrum of electromagnetic waves. Though RFR like ultra-violet (UV) and infra-red light, is a source of non-ionizing radiation, these radiations, together with ionizing EMR such as X-rays and gamma rays make up the electromagnetic spectrum. Radio frequency of the electromagnetic waves ranged from 100 kilo hertz (KHz) to 300 Giga hertz (GHz). RFR is a source of thermal energy and in adequate doses, has all the known effects of heating on biological systems, including burns and cataracts in the eyes. Human and animal studies in America indicate that radio frequency fields can cause harmful effects because of excessive heating of internal tissues. For most of the range of RFR, the skin does not easily detect the heating caused by these fields. The heating effect of RFR can become a problem in individuals with metallic implants such as rods in bones and electromagnetic interference can interact with cardiac pace makers. Acute high dose exposure to RFR may cause injury to the eyes. The cornea and lens are particularly susceptible to frequency of the 1- 300 GHz range, and formation of lesions in the retina is also possible. Long-term exposure to low level RFR has induced a variety of effects in the nervous system and

components of the immune system of small animals. However, significance of these in humans is still not clear. A research study in Britain has suggested that RFR may act as a cancer promoter in animals. International

they have their schools and play grounds irradiated by nearby transmitters, they are getting a double whammy.”

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organizations such as the world health organization (WHO) recognized the biological effects from exposure in the RF range that may affect health. In the Freiburger report, over 3000 German doctors have linked wireless phones and cell tower radiation to dramatic increase in disorders of learning, concentration and behavior among their patients.

Dr. Henry Lai, a leading radiation and biomedical researcher working at the University of Washington, stated that numerous medical studies show serious health effects can occur at irradiation levels far below current exposure standards. Anderson points to a December 2006 article in *Coeur d'Alene Magazine* which disclosed that the Kootenai Medical Center (KMC), serving as a magnet hospital for the five northern Idaho countries, is now inundated with cancer conditions of all types. The article reported that an average of 210 patients are cared for daily at KMC's North Idaho Cancer Center, and that more than 100 new cancer patients join the ranks of the "Big C" club every month.

According to the article, crushing is the cancer case load in North Idaho, that other cancer centers are being rapidly expanded in post falls and sand point. "One hospital worker told us that experienced medical personnel talk among themselves as having never before seen so much cancer among young people," Anderson said. "Our city has been increasingly saturated with microwave radiations from wireless tower and roof top transmitters since about the mid 1990s. Scientists say cancers can have a latency period of around 10 years, which computes with our area's growing cancer epidemic, she observed.

Dr. Lai's research group reported findings that microwave radiations can actually be physically addictive. The cell phone "high" is triggered by endorphins released into the brain when microwaves enter through the ear. Wireless industry adds, and promotions continually prod kids to buy new glitzy wireless hardware for watching TV, downloading music and texting. Kids know nothing about wireless health hazards because the industry is not required to warn them that at least 17 epidemiological studies show cell phone usage greatly increases their risk of developing brain cancer. "It's a real problem," said Anderson. "The more kids get hooked on wireless toys, the more towers are needed to service those toys, and if,

CONCLUSION

Despite a growing number of warnings from scientists, the Government has done nothing to protect people and the environment. Steps must be taken to control the near thickly populated areas, educational institutions, hospitals, etc. Sharing of towers by different companies should be encouraged, if not mandated. To prevent overlapping high radiations fields, new towers should not be permitted within a radius of one kilometer of existing towers.

More must also be done to compensate individuals and communities who are put at risk. Insurance covering diseases related to towers, such as cancer, should be provided for free to people living in 1 km radius around the tower. Independent monitoring of radiation levels and overall health of the community and nature surrounding towers is necessary to identify hazards early. Communities need to be given the opportunity to reject cell towers, and national governments need to consider ways of growing their cellular networks without constantly exposing people to radiation.

Perhaps most importantly, bee keepers and humans have an inherent right to live without being exposed to radiation that affects their natural behavior and increases their risks of developing biological deformities, like cancer.

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