

## SCIENCE

# Bee Deaths May Stem From Virus, Study Says

By MICHAEL WINES    JAN. 21, 2014

The mysterious mass die-offs of honeybees that have wiped out roughly a third of commercial colonies each year since 2006 may be linked to a rapidly mutating virus that jumped from tobacco plants to soy plants to bees, according to a new study.

The research, reported Tuesday in the online version of the academic journal *mBio*, found that the increase in honeybee deaths that generally starts in autumn and peaks in winter was correlated with increasing infections by a variant of the tobacco ringspot virus.

The virus is found in pollen that bees pick up while foraging, and it may be spread as the bees mix saliva and nectar with pollen to make “bee bread” for larvae to eat. Mites that feed on the bees may also be involved in transmitting the virus, the researchers said.

Among the study’s authors are leading researchers investigating the bee deaths at the Agriculture Department’s laboratories in Beltsville, Md., as well as experts at American universities and at the Chinese Academy of Agricultural Sciences in Beijing.

Their research offers one explanation for the phenomenon known as colony collapse disorder, in which bees have died at more than twice the usual rate since it was identified seven years ago. But most researchers, including the study’s authors, suspect that a host of viruses, parasites and, perhaps, other factors like pesticides are working in combination to weaken colonies and increase the death rate.

Honeybees are crucial to the production of crops that make up a quarter of Americans’ diet, the Agriculture Department says, and pollination adds about \$15 billion to the crops’ value each year.

The infection of bees by the tobacco ringspot virus, spotted by chance during a screening of bees and pollen for rare viruses, is the first known instance in which a virus jumped from pollen to bees. About one in 20 plant viruses is found in pollen, the researchers wrote, suggesting that pollen should be monitored as a potentially significant source of host-jumping infections.

The tobacco virus is an RNA virus: usually a single strand of genetic material that mutates faster than other pathogens and so is adept at devising workarounds to its hosts' defenses. In humans, diseases caused by RNA viruses include AIDS, influenza and some strains of hepatitis.

That rapid mutation rate also allows RNA viruses to switch hosts more rapidly than conventional pathogens, with the tobacco virus jumping to bees just as influenza has leapt to humans from pigs and chickens.

The tobacco virus is believed to attack honeybees' nervous systems. Monitoring 10 colonies kept at the Agriculture Department's Maryland laboratories, researchers found that the share of bees infected with the virus rose to 22.5 percent in winter from 7 percent in the spring.

In weak colonies — those heavily infected with tobacco ringspot or other viruses — deaths began rising sharply in late autumn. Researchers said the strong colonies that survived the winter showed no trace of either the tobacco virus or a second one, Israeli acute paralysis virus, that may also play a role in colony collapse disorder.

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