

# Researchers identify natural plant compounds that work against insects

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Each year millions of deaths result from diseases transmitted by insects. Insects are also responsible for major economic losses, worth billions of dollars annually, by damaging crops and stored agricultural products.

Many currently available insecticides present environmental and health risks. Further, insects develop resistance to existing insecticides, complicating pest-control strategies. The need to develop novel effective insecticides is therefore urgent.

Enter "insect-specific growth regulators," which, as their name suggests, are compounds that regulate the growth of insects. They represent attractive pest-control agents because they pose no health risk to humans and are also environmentally safe.

One hormone in insects, called juvenile hormone, is a particularly attractive target for insect [growth regulators](#) because this hormone exists only in [insects](#). Juvenile hormone plays key roles in insect development, reproduction and other physiological functions.

An international team of scientists, including an entomologist at the University of California, Riverside, has investigated in detail how juvenile hormone acts and has devised a method to prevent its working.

The researchers, led in the United States by Alexander Raikhel, a distinguished professor of entomology at UC Riverside, discovered potent compounds in plants that counteract the action of juvenile

hormone. These compounds, called [juvenile hormone](#) antagonists (JHANs), make up plants' innate resistance mechanism against insect herbivores.

In collaboration with Korean scientists, Raikhel's lab screened 1,651 plant species and chose active JHANs from these plants. They then identified five JHANs from two plants that are effective in causing mortality of yellow fever mosquito larvae, specifically by retarding the development of ovaries.

"Our experiments showed that these five JHANs are effective against yellow fever mosquitoes," Raikhel said. "Our Korean collaborators, led by Sang Woon Shin at Seoul National University, are testing the effect of these five molecules on other agricultural pests. These newly discovered natural molecules could lead to the development of a new class of safe and effective pesticides to control mosquitoes and, we expect, other agricultural pests."

Study results appear online this week in the *Proceedings of the National Academy of Sciences*.

**More information:** *Proceedings of the National Academy of Sciences*, [www.pnas.org/content/early/2015/01/14/24386112.abstract](http://www.pnas.org/content/early/2015/01/14/24386112.abstract)

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