



Farmers might be able to vaccinate their plants soon



Photo credit: Amber Shadow

Unlike animals, plants have no circulating immune system and their cells must respond independently. Plant cells can express special receptors to recognize pathogens and trigger various defense responses, including cell wall thickening, antimicrobial compounds, warning signals to other cells, and programmed cell death. The ability of the plant cells to recognize different pathogens is not acquired but preserved in their genes. A research group from University of Helsinki and the French National Centre for Scientific Research (CNRS) has developed an environmentally-friendly double-stranded RNA (dsRNA) vaccine that protect plants from pathogen

The produced vaccine activates the RNA interference (RNAi) mechanism, which is a biological defense method in eukaryotic organisms against pathogens. RNAi inhibits gene expression or translation for the gene of the targeted pathogen. The vaccine can be designed to target the gene of specific pathogens only without affecting the expression of the genes in the protected plants. The research team has demonstrated the efficacy of RNA-based vaccines produced using the new method against plant virus infections. This new method will enable the effective production of RNA-based vaccines and promote the development and adoption of RNA-based plant protection methods. The vaccines can be sprayed directly on the plant leaves and reduce the hazardous effects of the chemical pesticides to human health, beneficial organisms, and the environment.

Source

University of Helsinki. (2018, April 5). *A vaccine for edible plants? A new plant protection method on the horizon*. *ScienceDaily*. Retrieved April 14, 2018 from www.sciencedaily.com/releases/2018/04/180405100141.htm

Homemade food limits our exposure to phthalates



Photo credit: SteFou

Phthalates are a group of chemicals that are widely used to increase flexibility, transparency, and durability of plastic. They are commonly found in food packages, takeaway boxes, gloves, food processing equipment, and other materials used to produce fast food meals. Many researches linked high levels of phthalates to a long list of serious health issues, including hormone disturbance, fertility problems, pregnancy complications, and birth defects.

A new study at the George Washington University, Washington, USA, found higher levels of phthalate in people who frequently consume shop-bought meals to those who consume homemade food. The research team used the cumulative phthalate exposure method, which is an innovative



method to assess the real exposure to multiple phthalates, to collect and analyze the data from more than 10250 participants between 2005-2014. Significant association was underlined between phthalates exposure and consuming shop-bought food with higher magnitudes for teenagers. Phthalates levels were approximately 35% higher in the people who consume their meals in restaurants, fast-food shops, and cafeteria compared to the people who cook their own meals. Moreover, the consumed sandwiches at fast-food shops were associated with 30% higher phthalates levels in all ages. The study also revealed that adolescents, who consume or buy their food outside, had 55% higher levels of phthalates compared to those who consume food at home. Children, pregnant woman, and teenagers were reported to be more vulnerable to the phthalates' toxicity, thus future research should focus on finding the best practice to remove phthalates from the food supply. Furthermore, the phthalates problem should be addressed by politicians and policymakers to ban its usage and utilize other alternatives.

Source

George Washington University. (2018, March 29). Dining out associated with increased exposure to harmful chemicals: New study finds burgers and other foods consumed at restaurants, fast food outlets or cafeterias, associated with higher levels of phthalates. *ScienceDaily*. Retrieved April 14, 2018 from www.sciencedaily.com/releases/2018/03/180329095722.htm

Is the climate change interfering between the rare spider orchid and its special pollinators?

The right temperature and precise timing are essential for the relationship between the rare orchid and Buffish Mining-bee to be successful. Climate change is manipulating this relationship badly through the current rise in temperatures. A study being conducted at Sussex University is monitoring the rise in temperature since the mid-17th century, and its devastating impact on the relationship between the Buffish Mining-bees' pollination with spider orchid. Professor Hutchings, a Professor of Ecology and the research leader at Sussex University, revealed that spider orchid is endangered and can be explained by the increase in average temperatures. The new, accelerated temperature levels are affecting the orchid and other species, making them not able to respond effectively to the pollination mechanism. Thus, those species are declining and may face the threat of extinction. Moreover, he demonstrates that the climate change has a devastating impact not only on the spider orchid and Buffish Mining-bees, but it is also damaging interdependent relationships for many other species. Hutchings declares that this research is considered the best in documenting this effect of the induced climate change on specific species life cycles. But how is the climate change upsetting the vital interdependent relationships between spider orchid and Buffish Mining-bees?

Pseudocopulation is the tricky mechanism that orchid deceives the male bees to undertake pollination. Spider orchid is fooling the males bees by releasing a scent that is similar the female bees' scent. This special smell fools the males and provokes them for mating. During pseudocopulation, the males catch pollen masses from the flower and transports them to other flowers during the next attempts for pseudocopulation.



Photo credit: IrartStudio

The secret behind the success of pseudocopulation is that males must emerge first, then orchid must flower and tempt the males before the emergence of the female bees. Unfortunately, high temperatures have manipulated this natural sequence of events that are needed for a successful pollination. This rise in temperatures has been noticed since the early mid-seventeenth century. A 1 °C rise in temperature during spring has caused the three important sequence of events (male emergence, orchid flowering and female) to occur earlier by 9.2, 6.4 and 15.6 days, respectively. Thus, and due to the fact that the intervals between the emergence of males and females has reduced significantly, the females are now reaching peak flying before orchid flowering by more than one week. Between 1659 and



1710, the peak flying of the female bees occurred 40% more often before the orchid flowering peak. However, this percentage has raised to 80% between 1961 to 2014. As a result, male bees are mating with the female bees rather than pseudocopulas with orchid, simply due to the fact that natural mating can be done with the already-emerged females. Therefore, orchid pollination is failing almost every year, or it is happening only when temperatures are low.

Since 1930, 60% of the orchids have declined in UK due to the climate change and other factors, such as intensive graze and inefficient pollination. Professor Hutchings is dragging attention to the fact that unless the orchid starts to flower earlier, it is likely that flowering will continue to occur always after the female bees emerge. Thus, the pseudocopulation will then never happen and the rare spider orchid will become extinct. However, a hand pollination program may be the best and only solution to ensure that the spider orchid remains.

Source

University of Sussex. (2018, April 6). Climate change is wreaking havoc on delicate relationship between orchids and bees: The first definitive demonstration of climate change upsetting the vital interdependent relationships between species has been revealed. *ScienceDaily*. Retrieved April 13, 2018 from www.sciencedaily.com/releases/2018/04/180406085510.htm

Prof. Tengiz (Gizo) Urushadze awarded with the honorary membership of the International Society of Soils



Photo credit: soil.ge

The 21st World Congress of Soil Science took place in Rio de Janeiro, Brazil, on the 16th of August 2018. During the Gala Dinner on Thursday, August 16th, the Award Ceremony was held in which the IUSS award winners 2018 and the new IUSS Honorary members were acknowledged. Academician Tengiz (Gizo) Urushadze, Professor of the Agricultural University of Georgia and Director of Michail Sabashvili Institute of Soil Science, Agrochemistry and Melioration, was selected as an Honorary Member of the International Union of Soil Scientists – a unprecedented case in the history of Georgian Soil Science. The congress was attended by more than 7000 delegates from 145 countries from all over the world. The honor of being a selected honorary member was awarded to only 92 scientists since 1924.