

HONEYBEES AND RISKS OF GM-PLANTS

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Introduction: Genetic modification is a new technique with novel risks to nature.

In this technique DNA pieces are transferred from organism to another. Typically, a human made transgene is build with DNA from virus, bacteria and plant. Nothing like this has ever existed before. Methods: This review presents scientific findings uncovering the risks of genetic modification of plants to honeybees.

Results: Transgenes are small, virus-like structures, functioning independently. They are transferred to plant cells by shooting or infection. Their copy number, location in the recipient DNA and the effect in the plant is not controllable (Holmberg et al. 1997). Antibiotic resistance genes are spread to nature in thousands of copies in each gm-plant. Gm-technique has produced contaminations and several surprises: new disease and unexpected, poisonous by-products (Jackson et al. 2001, Lolle et al. 2005, Maas et al. 2007, Mayeno & Gleich 1994, Remus et al. 1999, Schellekens 2002, Shepherd et al. 2006, Springael & Top 2004).

Transgenes spread with wind and water (Aono et al. 2006, Friesen et al. 2003), they contaminate human food (Akiyama et al. 2007, Nelkin & Marden 2004, Yoshimura et al. 2006, Weiss 2006) and persist in the nature (Martín-Orúe et al. 2002).

In the ground they pass in the food web like environmental poisons (Hart et al. 2009).

Transgene from a gm-plant can infest soil bacteria, and function in them (Bertolla & Simonet 1999, Gebhard & Smalla 1998, Kay et al. 2002, de Vries et al. 2004).

Transgenes from the feed are found in meat and milk (Agodi et al. 2006, Bakke-McKellep et al. 2007, Chowdhury et al. 2003, Petit et al. 2005).

Feeding experiments report health problems (Ewen & Pusztai 1999).

Farming gm-plants is based on toxins: either gm-plant tolerates RoundUp or produces insecticides. This has not decreased other use of agricultural poisons (Benbrook 2004).

Insecticides are produced every day in every cell of the gm-plant, also in pollen. This poison affects the whole foodweb (Burgio et al. 2007, Castaldini et al. 2005, Douville et al. 2006, Harwood et al. 2005, Hilbeck 2004, Raps et al. 2001, Zwahlen & Andow 2005),

including human (Richard et al. 2005, Yum et al. 2005).

Insect predators do not eat larvae grown on gm-plants (Ferry et al. 2006).

Discussion: Gm-plants affect many insects, but only a few studies have concentrated on bees.

Honey bees consume less pollen from gm-cotton than normal cotton (Han et al. 2010).

The toxin of gm-plants does not harm bumble bees when applied on the skin, but in feeding sugar it was lethal, and weaker solution affected reproduction and food collection (Mommaerts et al. 2010).

Gm-pollen made young bee adults weaker, thus endangering the growth and durability of the hive (Sagili et al. 2005).

Poison of gm-plants disturbs the learning of bees (Ramirez-Romero et al. 2008).
Gm-plants affect the behavior of pollinators (De Maagd 2010).

There are also implications that gm-pollen may increase the risks of disease and parasites in the hive.

Abejas de miel y riesgos relacionados con las plantas modificadas genéticamente

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Introducción: La modificación genética es una técnica reciente que conlleva nuevos riesgos para la naturaleza. Esta técnica consiste en transferir pedazos de ADN de un organismo hacia otro.

Típicamente, un gen creado por el Hombre está construido a partir de ADN de virus, bacterias y plantas.

Nada parecido ha existido anteriormente.

Métodos: esta publicación presenta descubrimientos científicos que destapan los riesgos de las modificaciones genéticas de las plantas hacia las abejas.

Resultados: los genes modificados son pequeñas estructuras parecidas a los virus y que funcionan independientemente. Son transferidos a las células de una planta por inyección, el número de copias y su localización en el ADN huésped no se puede controlar.

En cada planta genéticamente modificada existen miles de copias de genes con resistencia a los antibióticos que se diseminan en la naturaleza.

La técnica de modificación genética ha producido contaminaciones y muchas sorpresas: nuevas enfermedades, productos derivados insospechados y venenosos.

Los genes modificados se diseminan con el viento y el agua y persisten en la naturaleza.

Desde el suelo pasan a la red alimentaria como venenos del medio ambiente.

Los genes modificados de una planta transgénica pueden infestar las bacterias del suelo y funcionar en ellas.

Los transgenes de la alimentación se encuentran en la carne o la leche. Depredadores de insectos no se alimentan de larvas crecidas en plantas transgénicas.

El cultivo de plantas transgénicas esta basado en toxinas: o la planta genéticamente modificada tolera a herbicidas como el RoundUp o produce ella misma insecticidas. Cada día, cada célula de la planta produce insecticidas, incluso en el polen.

Discusión: las plantas transgénicas afectan a muchos insectos, pero sólo unos cuantos estudios se han focalizado en las abejas.

Se sabe que las abejas consumen menos polen de algodón transgénico que de algodón normal.

Las toxinas de las plantas transgénicas no afectan a los abejorros cuando se aplican superficialmente, pero dentro de azúcar utilizada como limento fueron letales.

En cantidad menor, las toxinas afectaron la reproducción y la colecta de alimento.

El polen transgénico debilitó a las abejas jóvenes adultas, poniendo en peligro el crecimiento y la perennidad de la colmena.

Hay también indicaciones que el polen transgénico puede aumentar el riesgo de enfermedades y de parásitos en la colmena.

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