

# Bt-plants as a potential contributing Factor to Colony Collapse Disorder (CCD)

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## What is CCD??

- **Colony Collapse Disorder (or CCD)** is the name of the phenomenon that describes the massive die-off affecting an entire **beehive** or bee colony
- **US (24 states; mainly professional beekeepers);**  
**Europe – to a smaller degree: Poland, Spain, Switzerland, Germany**
- **Characteristics:**
  - Complete absence of adult bees in colonies,
  - Presence of **capped brood** in colonies.
  - Presence of food stores, both **honey** and **bee pollen**
- **Possible causes** – besides environmental change-related stresses:
  - 1 Poor nutrition or malnutrition
  - 2 **Pesticides**
  - 3 **Pathogens and immunodeficiency**
  - 4 Poisonous plants
  - 5 **Genetically modified crops (GMO)** (We should not rule out!)
  - 6 **Viruses carried by mites**
  - 7 Bee rentals
  - 8 Electromagnetic radiation



## CCD (according to CCD Working Group):

- Factors in common
  - migratory
  - cumulative dead-out rate of >30%
  - continuously “split” to increase numbers
  - experienced “stress” 2 months before die-off
- Factors not in common
  - Antibiotic use
  - Miticide used
  - Source of queens
  - Supplemental feed
- Possible Remedies:
  - Fumagillan (antibiotic – inhibits Nosema)
  - Irradiation of comb
  - Consistent mite control
  - Supplemental feeding



## Findings of Kaatz on Bt maize pollen ([http://www.gmo-safety.eu/en/safety\\_science/68.docu.html](http://www.gmo-safety.eu/en/safety_science/68.docu.html)):

- *“In the first year the bee colonies happened to be infested with parasites (microsporidia).”*
- *“This infestation led to a reduction in the number of bees and subsequently to reduced broods in the Bt-fed colonies as well as in the colonies fed on Bt-toxin-free pollen. The trial was therefore discontinued at an early stage.”*
- *“This effect was significantly more marked in the Bt-fed colonies. (The significant differences indicate an interaction of toxin and pathogen on the epithelial cells of the honeybee intestine. The underlying mechanism which causes this effect is unknown.)”*

### Comparison with CCD –FINDINGS – there are coincidences

- *“All PA samples were found to have nosema spores in their rectal contents. The sting gland of many examined bees were obviously scarred with distinct black “marks” (Figure 6). This type of pin-point melanization or darkening is indicative of an immune response to some sort of pathogen.”* (- But non of the GA samples did)



## Supporting factors for the GMO theory (1)

### ➤ **Bt-plants in the US (2005):**

\*\*\* **Bt-maize: 35% (10.64 million ha) of total US maize plantings**

\*\*\* **Bt-cotton: 52% (2.8 million ha) of total cotton plantings**

– cotton is highly subject to bee visitation

### ➤ **David Hackenberg: (former president of the American Beekeeping Federation)**

\*\*\* **„corn is an excellent source of pollen when in tassel,“**

(pollen is an important part of **bee bread**, which is also food for adult bees )

\*\*\* **"beekeepers that have been most affected so far have been close to corn, cotton, soybeans, canola, sunflowers, apples, vine crops and pumpkins“**

### ➤ **Many commercial beekeeping operations are mobile, transporting hives over large geographic distances over the course of a season, potentially exposing the colonies to different pollen and nectar donors at each location. (- it is the same with pesticides)**



## Supporting factors for the GMO theory (2)

### ➤ **The bees themselves place pollen and honey into long-term storage, effectively, meaning that there may be a delay of anywhere from days to months before contaminated provisions are fed to the colony. (- it is the same with pesticides)**

### ➤ **Polinator decline is a common trend in the US since many year and it correlates to some extent in the last years with the expansion of GM-crops:** In 2006 the "Committee on Status and Trends of Pollinators" of the [United States National Research Council](#) published a report on the "Status of Pollinators in North America. It states that GMO, besides other factors, might contribute to honey bee decline because, according to one scientific review of *"the small literature on this topic,...in some cases, there are negative but sublethal effects attributable to consumption of transgenic pollens."*

### ➤ **The science behind the effects of Bt-plants (Bt-pollen) on honeybees and the literature is very small. The studies for EPA-authorisations are not in the public domain – and nearly nobody knows how they were made. (Nearly no published experimental data has been made public - especially concerning adult honey bees)**



### Supporting factors for the GMO theory (3)

➤ There are indications, that „foraging activity of bees fed with CRY1Ab decline continuously...” (Ramire-Romero et al. 2005)

➤ There seems to be a connection to Nosema:

Tentative recommendations of CCD working group in case of CCD:  
„If you feed your bees sugar syrup, use *Fumagillan*” (antibiotic agent against Nosema)

➤ **CONCLUSION:**

**THERE ARE GOOD REASONS  
THAT GMOs (Bt crops) CANNOT BE RULED OUT  
AS A CONTRIBUTING FACTOR TO CCD.**