Fall 11-18-2020

Factors Contributing to the Decline of Bees

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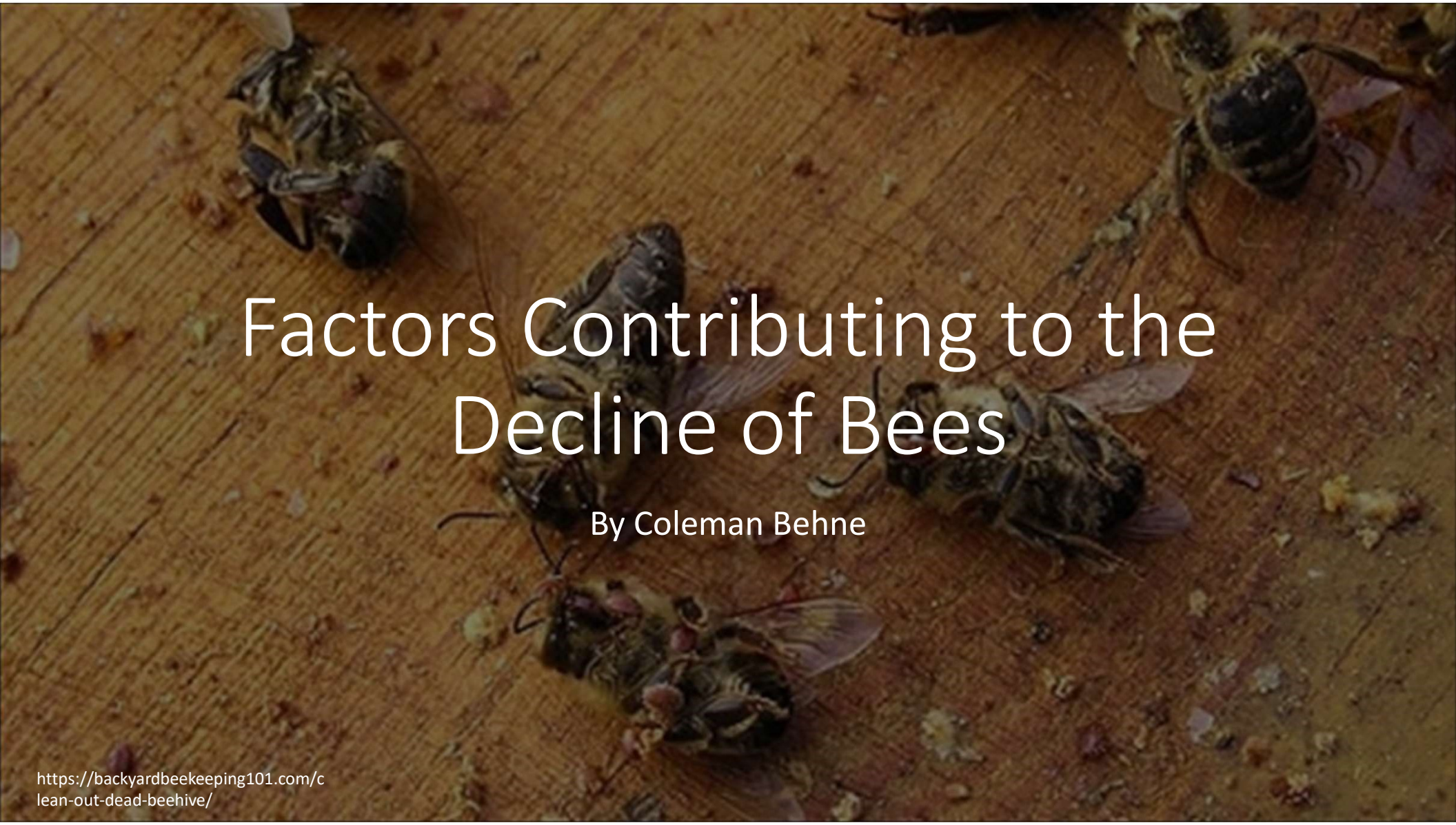


Factors Contributing to the Decline of Bees

By Coleman Behne

https://backyardbeekeeping101.com/clean-out-dead-beehive/

Issue Statement

- Pesticides and parasites contain the four largest drivers of bee population decline.

Background Information

- 40.7% decline of the commercial bee population
  - 37.7% of the decline occurred from October to April

Season	Total Loss	Average loss %
Summer	4,875	52.6
Winter	5,725	93.2

(Jacobo, J. 2019; Kulhanek, K. *et al.* 2017)

https://blog.pqsystems.com/2019/05/14/data-in-everyday-life-are-honey-bees-on-the-decline/

Background Information

- Main Contributors to bee decline
  - Varroa mites
  - Nosema
  - Chlorpyrifos
  - Neonicotinoids

Cause of Death	Total Loss	Average Loss %
Queen Failure	933	47.3
Starvation	766	53.4
Varroa	1181	55.9
Weak in Fall	1210	52.1
Poor Winter	603	65.7

(Kulhanek, K. *et al*. 2017)

Kulhanek, K. *et al.* 2017

Varroa Mites

- Cause injury to drones during their pre adult phase
- Weaken and shorten the life span of adult bees
- Cause deformities in emerging bee broods
- Vector for many bee viruses

https://en.wikipedia.org/wiki/Varroa_destructor

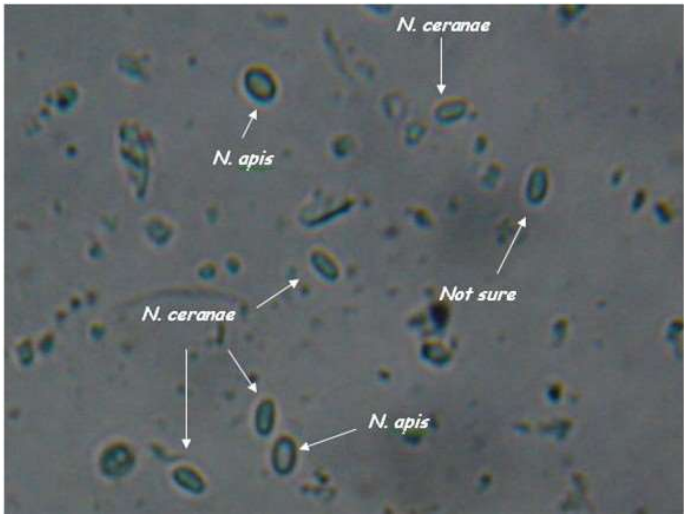
https://txbeeinspection.tamu.edu/deformed-wing-virus/

(Kalayci, G. *et al*. 2020; Keszthelyi, S. *et al*. 2020)

Nosema

- Unicellular fungal parasite
- More prevalent during Winter months
- Disrupts the relative abundance of healthy gut microbes
- Cause problems with digestion
- Reduce brood production

https://bee-health.extension.org/effects-of-nosema-on-honey-bee-behavior-and-physiology/



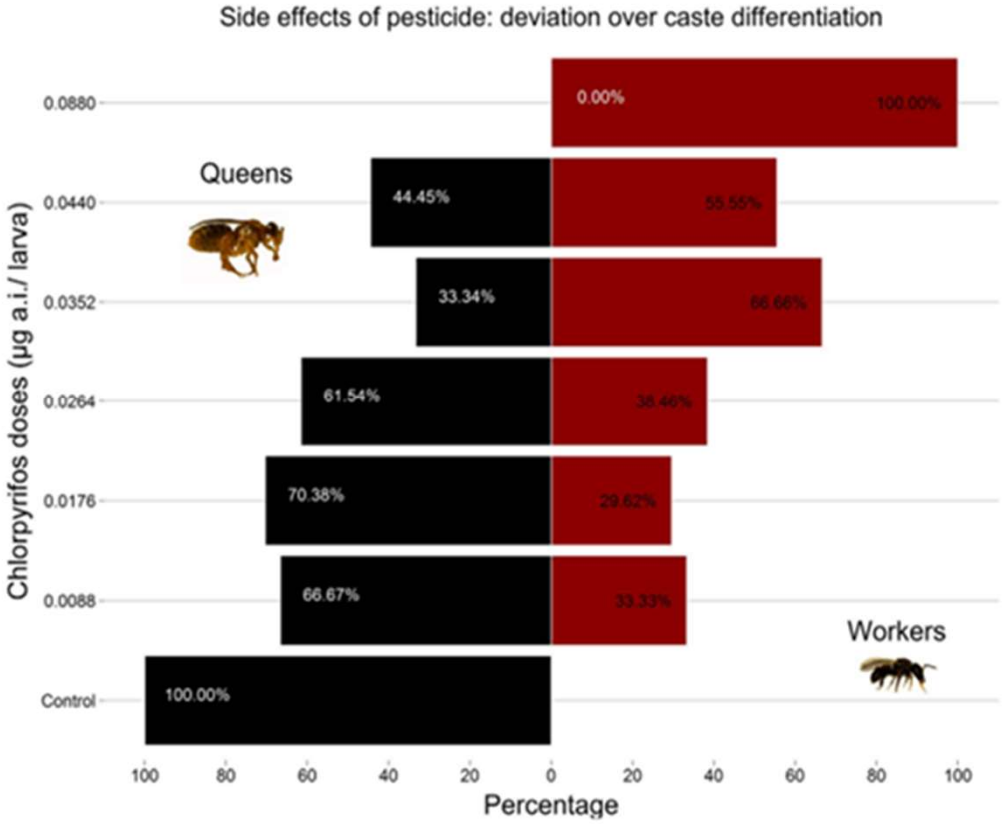
http://scientificbeekeeping.com/the-nosema-twins-part-1-2/

(Huang, Q., & Evans, J. D. 2020; Kalayci, G. *et al*. 2020)

Chlorpyrifos

- Most applied insecticide worldwide
- Cause queen larvae to become drones instead
- 0.0880µg is enough to cause a full shift

http://www.darboucosa.net/j25/index.php/en/products/insecticides/chlorpyrifos-48-ec-detail



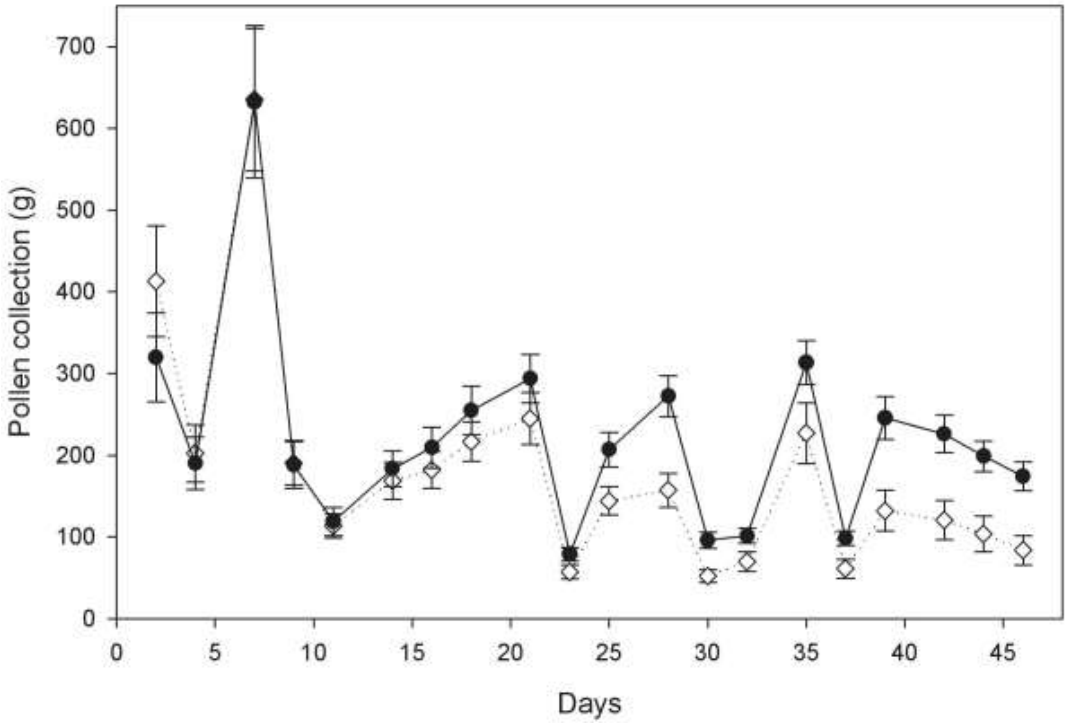
Santos, C. F. *et al.* 2016

(Fent, K. *et al.* 2020;
Santos, C. F. *et al.* 2016)

Neonicotinoids

- Impacts bees with higher nutritional stress
- Short-term exposure
  - Negatively impact the cognitive abilities of bees
- Long term exposure
  - Lowers the rate of colony growth

http://www.ecosystemgardening.com/whats-all-the-fuss-about-neonicotinoids.html



Sandrock, C. *et al*. 2014

(Sandrock, C. *et al*. 2014; Tosi, S. *et al*. 2017)


Stakeholders

Beekeepers

- Commercial bees annually produce $150 million in honey
- Are facing huge losses in their bee populations

http://irjci.blogspot.com/2012/02/researchers-link-insecticide-to-bee.html

https://www.elcaminohealth.org/stay-healthy/blog/health-benefits-of-honey-and-bee-pollen

(Rupp, R. 2015; National Resource Defense Council 2011)

Farmers

- $15 billion of US crops rely on bee pollination
- Loss of bees results in lower crop yields

https://www.wsj.com/articles/coronavirus-forces-farmers-to-destroy-their-crops-11587909600

https://southburnett.com.au/news2/2018/10/05/saboteur-causes-1m-crop-damage/

(Rupp, R. 2015; National Resource Defense Council 2011)

Consumers

- Lower crop yields result in higher prices of fruits and vegetables
- Without bees, products like salsa and wine would not exist

https://www.intuitiveaccountant.com/payroll-merchant-services/intuit-increasing-price-for-payroll-products/#.X6r44mhKiUl

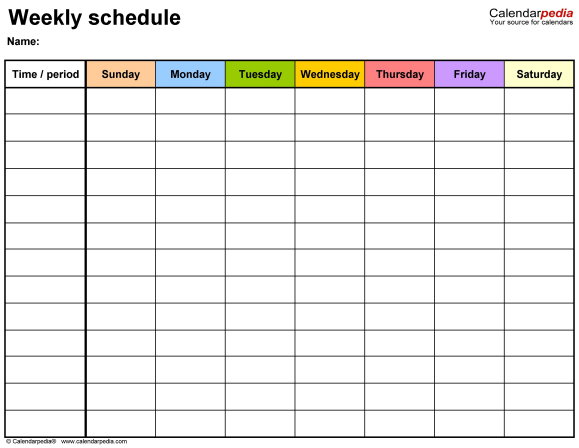
https://www.oliviascuisine.com/fluffiest-brioche-buns/

(Rupp, R. 2015; National Resource Defense Council 2011)


Solutions

Pesticide Schedules

- Schedule what times farmers will be using pesticides
- Spray pesticides during times when bees are less active
- Include pollinator meadows



Weekly schedule

Calendarpedia
Your source for calendars

Name:

Time / period	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

© Calendarpedia® www.calendarpedia.com

https://www.calendarpedia.com/weekly-schedule-word-templates.html

http://rightofway.erc.uic.edu/wp-content/uploads/2018/05/1B6-Establishing-pollinator-meadows-from-seed.pdf

(Murphy, R. 2015; National Resource Defense Council 2011)

Organic Farming

- Use resistant crop species
- Using pest's natural predators
- Make the habitat less suitable for the pests
- Monitoring pest abundance
- Limited use of nonchemically synthesized pesticides

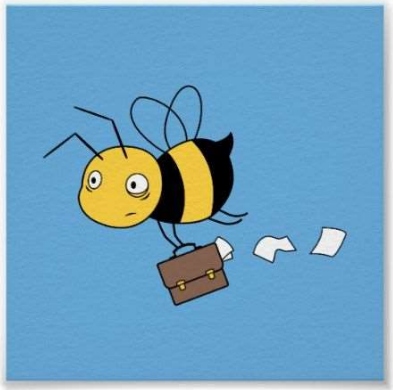
https://www.expressnews.com/lifestyle/article/S-A-s-Common-Critters-Nothing-big-or-bad-15423455.php

https://www.ecowatch.com/pesticides-organic-farming-2292594453.html

(Merot, A. 2020; National Resource Defense Council 2011; Web Solutions 2020)

Manage Bee Stress

- Ensure bees are getting proper nutrition
- Using younger queen bees
- Rotating combs every 3-4 years
  - Not during winter



https://www.pinterest.com/pin/722616702705223041/?autologin=true

https://www.perennia.ca/wp-content/uploads/2018/04/11-comb-rotation-eng.pdf

(Tosi, S. 2017; National Resource Defense Council 2011)

Chemical Mite Controls

- Guardstar
  - Used around the hive
- Checkmite+
  - Used under the cardboard in the hive

https://www.ebay.com/p/1700813043

https://www.mannlakeltd.com/checkmite-trade-10-pack

(Bessin, R. 2016; National Resource Defense Council 2011)

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