# Impacts of requeening practices on honey bee health

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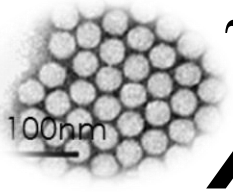
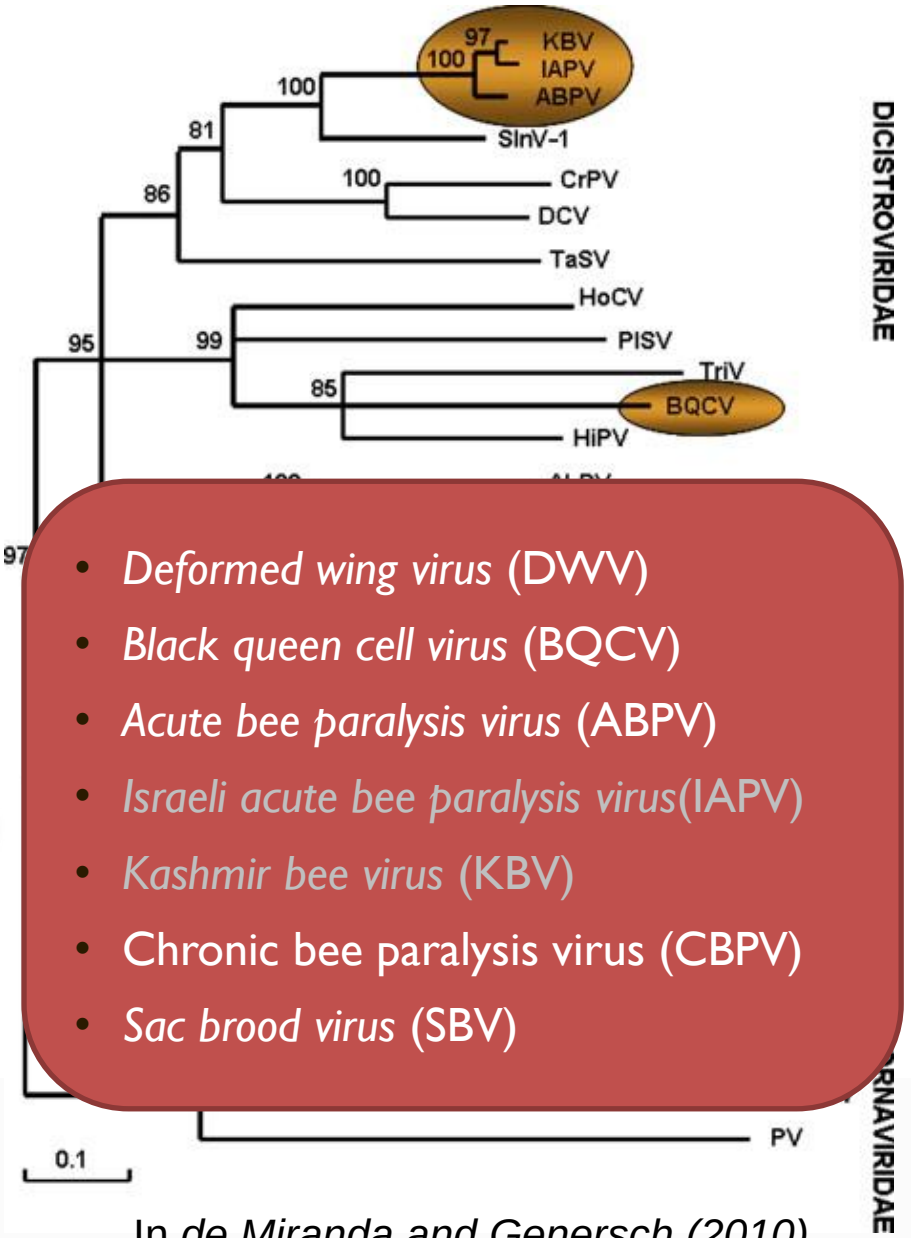
***INSECTES SOCIAUX – Avignon 2019***



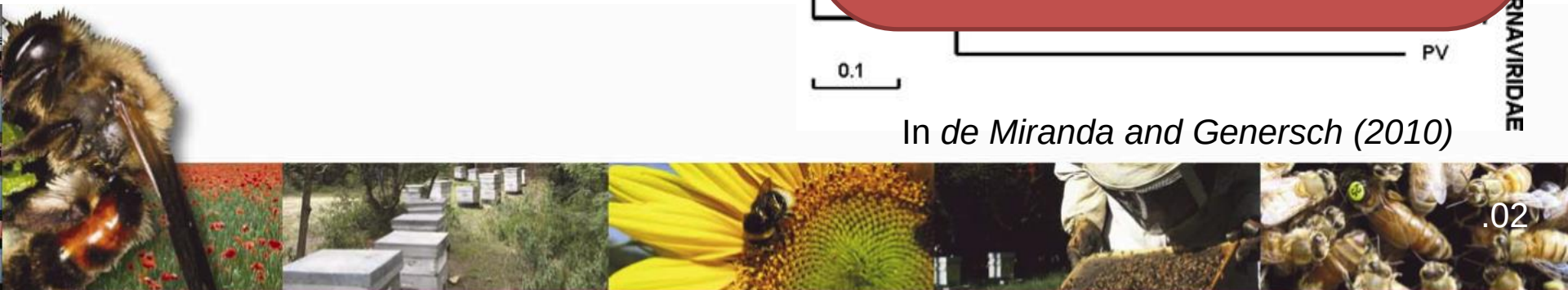

# ~30 viruses in *Apis mellifera*

- 7 major honey bee viruses
- Overt or covert infections
- **Frequent co-infections**




- *Deformed wing virus* (DWV)
- *Black queen cell virus* (BQCV)
- *Acute bee paralysis virus* (ABPV)
- *Israeli acute bee paralysis virus*(IAPV)
- *Kashmir bee virus* (KBV)
- Chronic bee paralysis virus (CBPV)
- *Sac brood virus* (SBV)

In *de Miranda and Genersch (2010)*

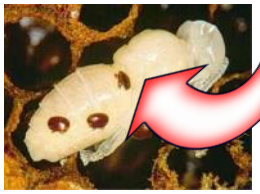


# Virus transmission in A. mellifera

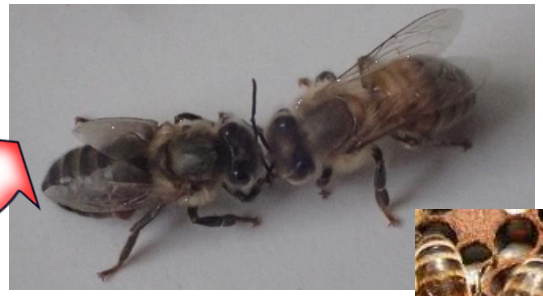
## vertical

## horizontal

- **By the vector (Varroa)**



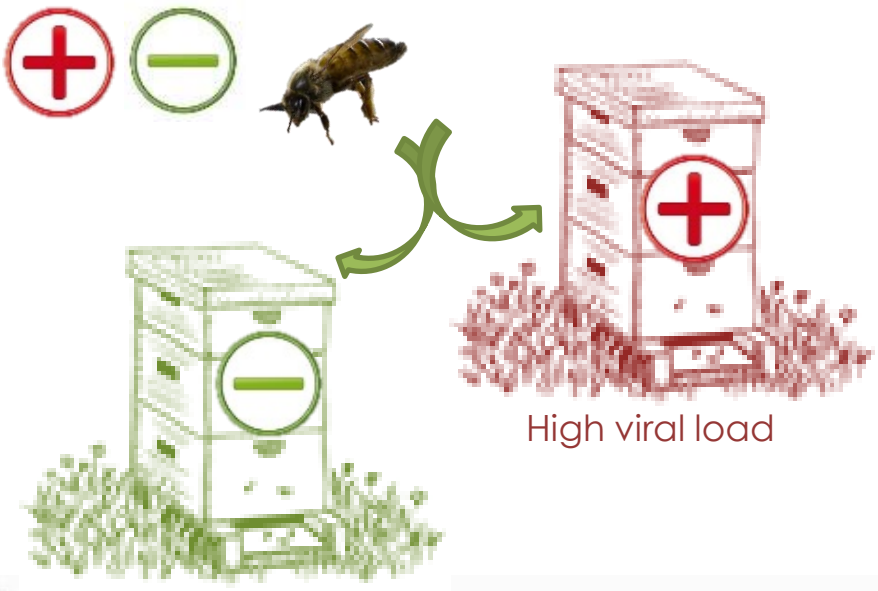
- **Trophic**



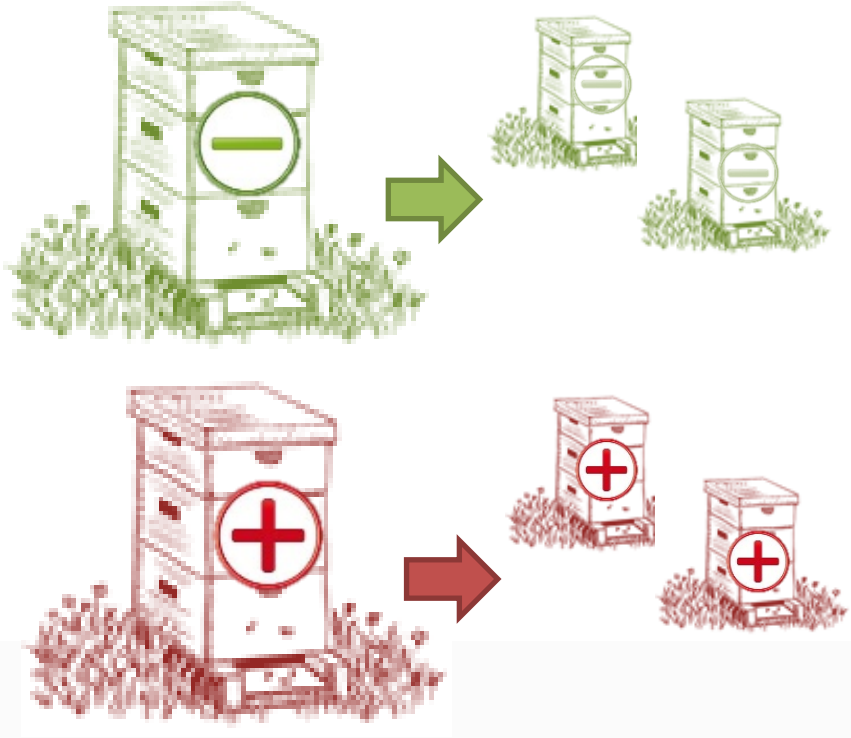
- **Contact**

# Impact of requeening practices

- **Annual requeening**




- **Natural supersedure**



# Experimental design

2016 → 2017 → 2018 → 2019

## Controlled practices

- **Annual requeening**
- **Requeening population:**
  Breeding and artificial mating

## Extensive practices

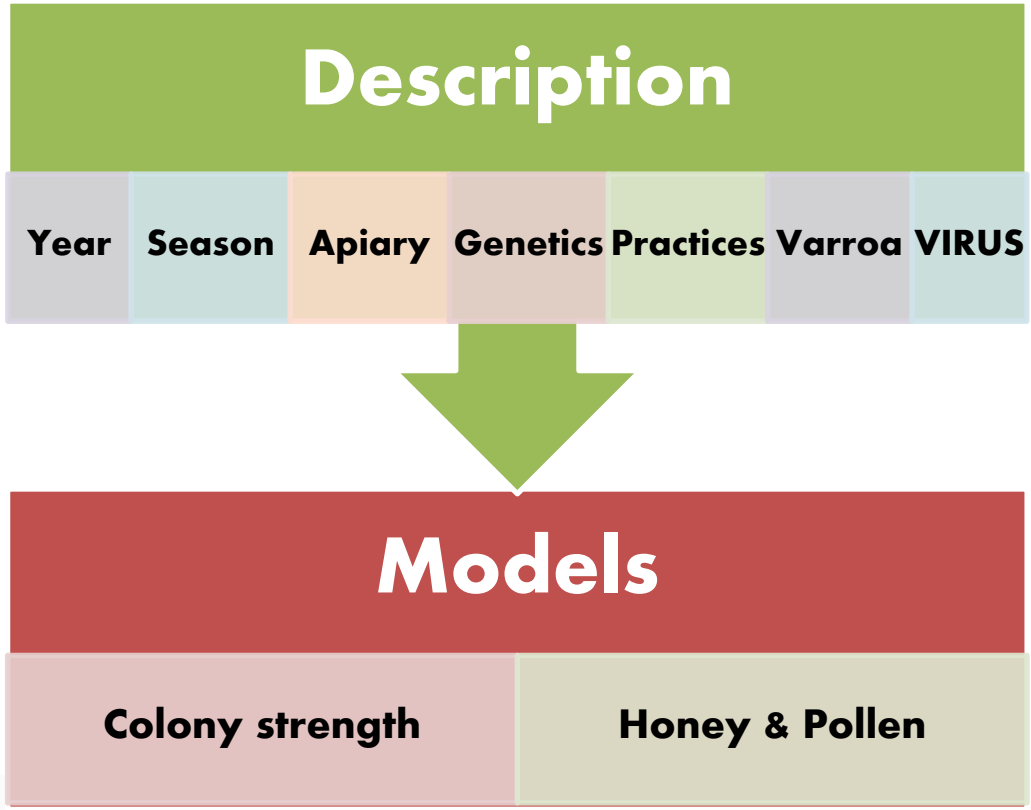
- **Natural supersedure**
- **Natural replacement population:**
  Breeding on honey production and natural mating

**2 WINTER APIARIES X 2 HARVESTS**

*15 colonies / treatment / apiary ⇔ 120 colonies*

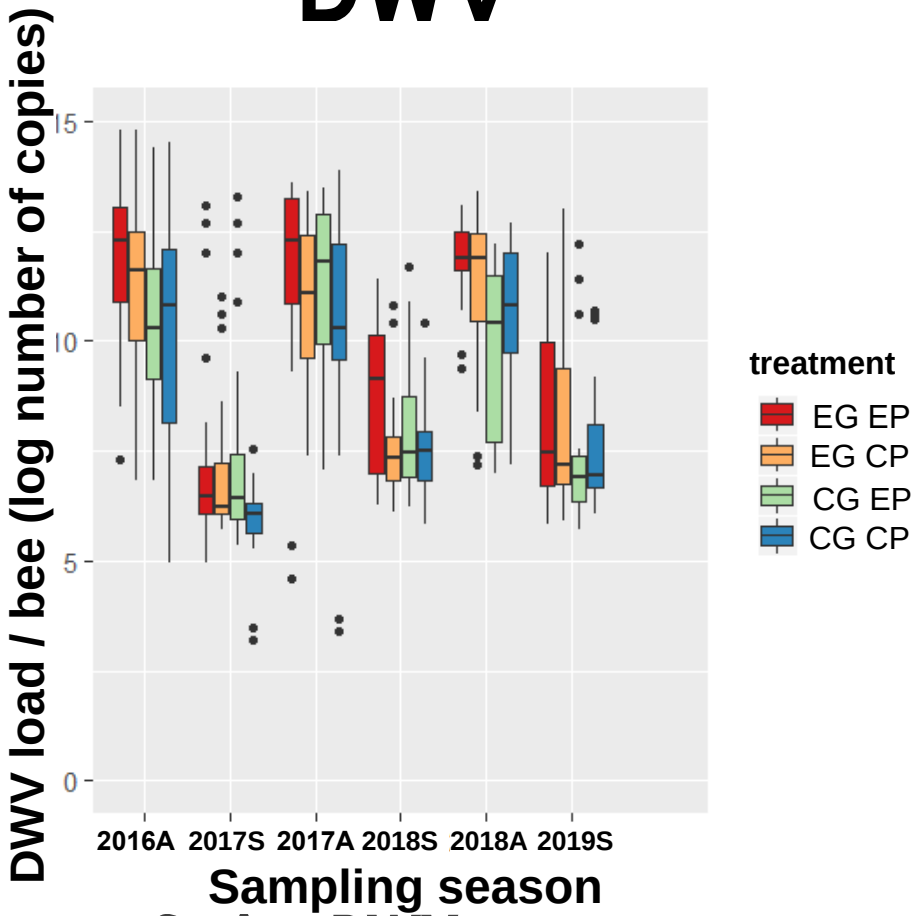
# Impact on virus loads

- **Factors impacting colony viral loads:**
  - Environnement (apiary+year+season)
  - Varroa pressure
  - Requeening practices
  - Genetics
- **Impact on colony strength & production**



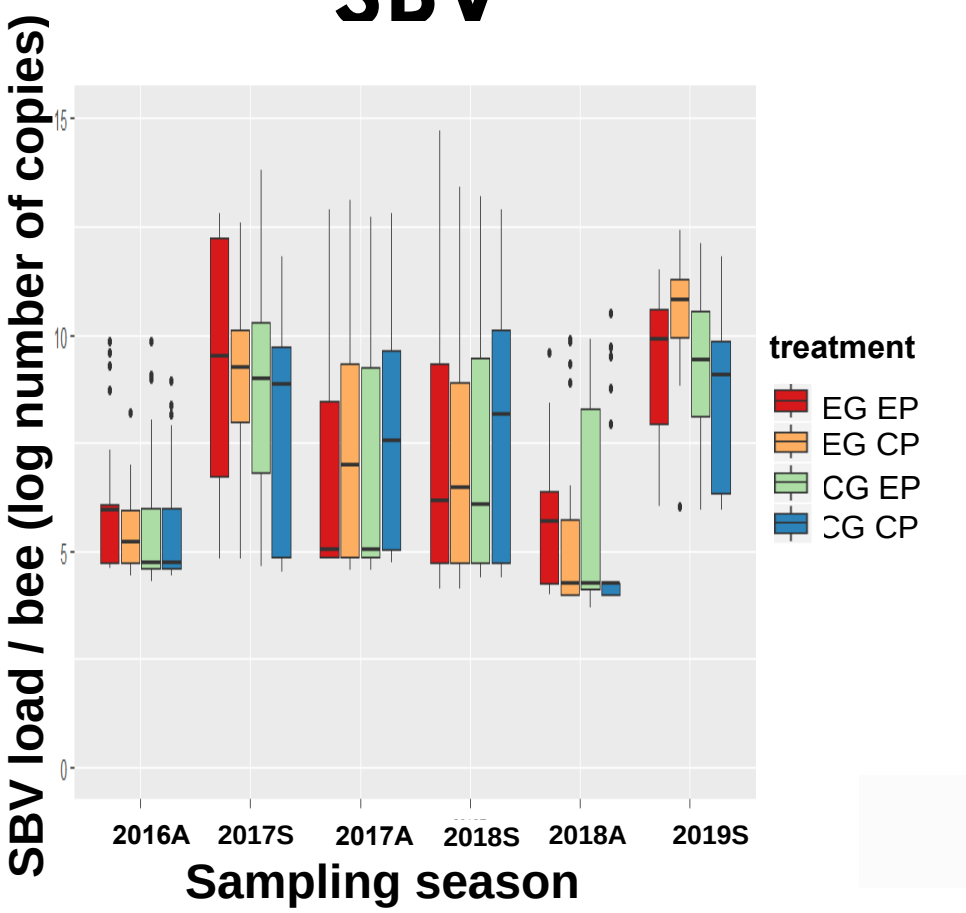

# Seasonal variations

## DWV




- Spring DWV << autumn DWV
- Related to varroa loads

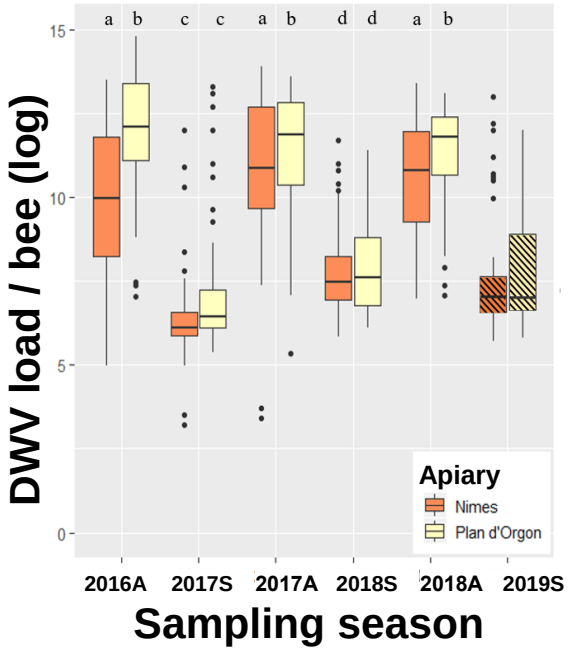
## SBV



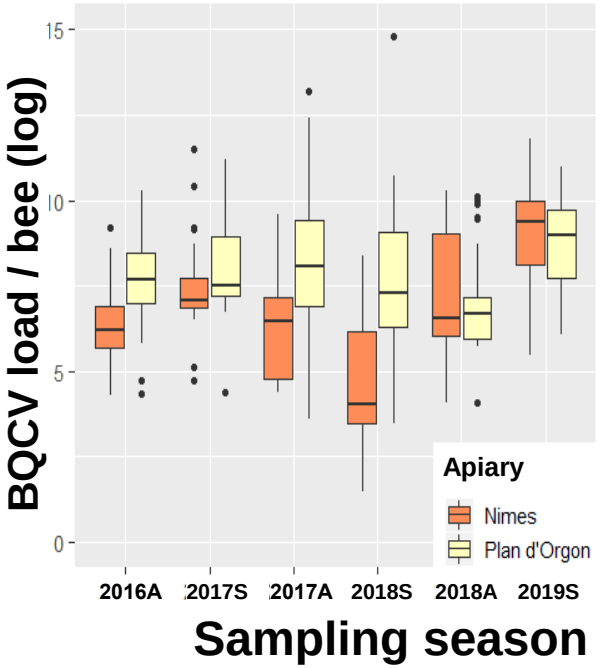

- Spring SBV > autumn SBV
- Related to brood

# Environnement

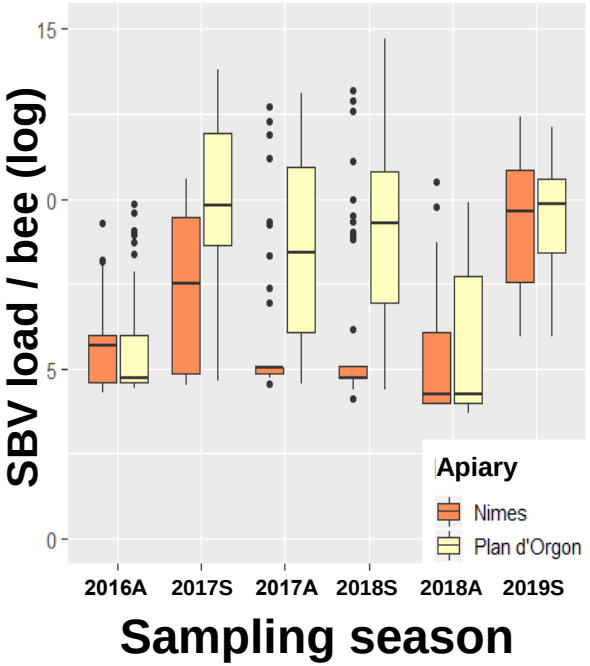
## DWV




## BQCV




## SBV




- Viral loads Plan d'Orgon winter apiary >> Nîmes
  - Ressources availability?
  - Pesticide exposure?

# Impact of requeening practices on viral loads

## Virus (log copies/bee)

(Colony)

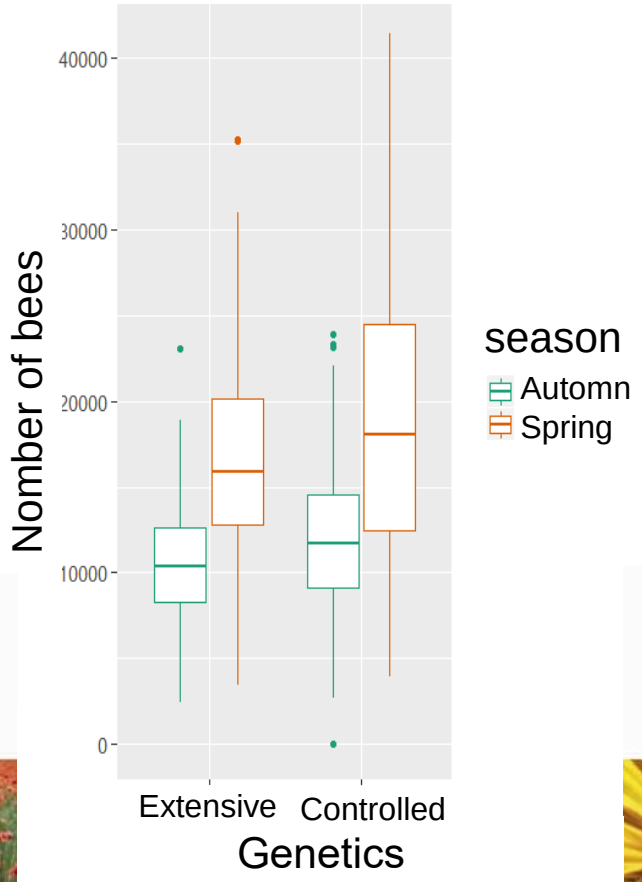
Year Season Genetics Practices Apiary + interactions

| Factors | | Varroa | DWV | BQCV | CBPV | ABPV | SBV |
|---|---|---|---|---|---|---|---|
| Intercept | | / | + | - | - | / | + |
| Apiary | (Plan d'Orgon/Nimes) | + | + | + | / | + | / |
| Season | (Spring/Autumn) | - | - | - | / | / | + |
| Year | (2016/2017) | + | / | / | + | / | + |
| | (2016/2018) | + | / | / | + | - | / |
| Genetics | (Controlled/Extensive) | - | - | / | / | / | / |
| Practices | (Controlled/Extensive) | / | - | / | / | / | / |
| Varroa | Correlation | / | + | + | / | + | / |
| Interaction Season*Year | Spring 2017 | - | + | + | / | + | - |
| Interaction Apiary*Year | Plan d'orgon 2017 | / | + | / | - | - | + |
| | Plan d'orgon 2018 | - | + | / | - | - | + |
| Interaction Season*Apiary | Spring*Plan d'orgon | / | / | + | + | - | + |

# Impact of requeening practices on colony strength & production

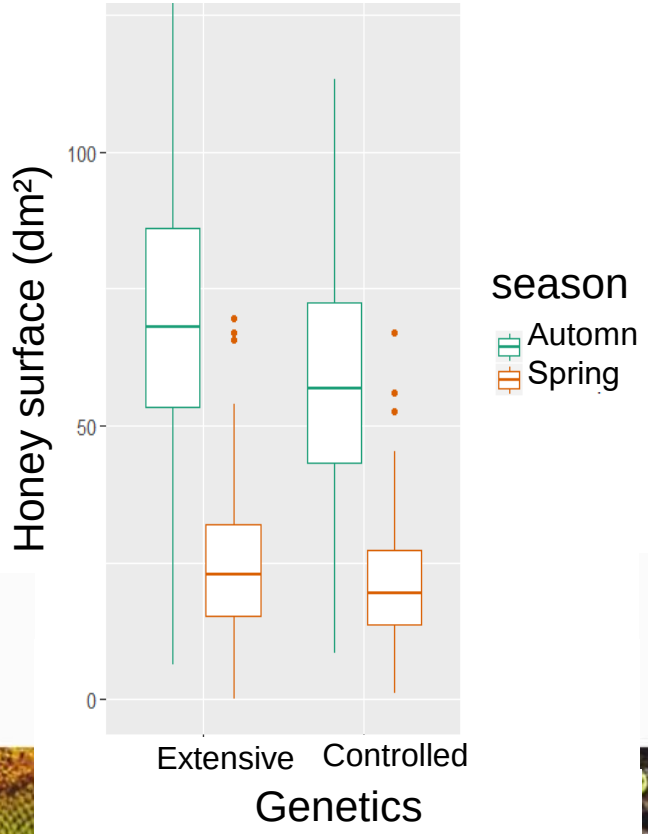
## Number of bees

- Controlled source produces more bees




## Honey production (surface)

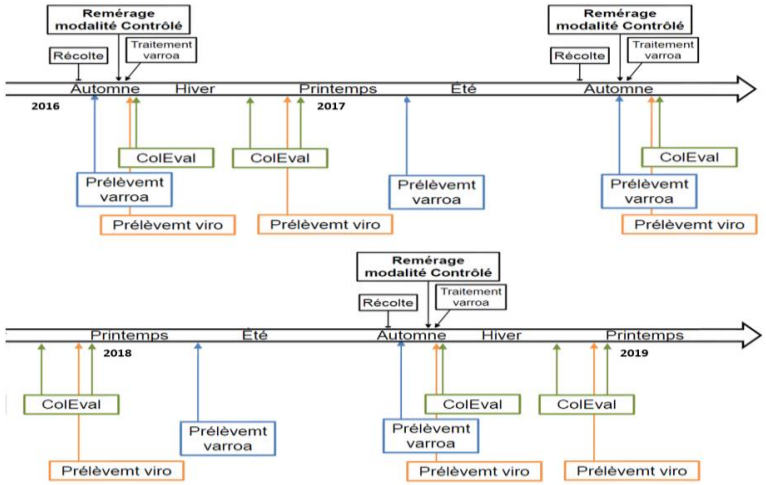
- Extensive source stores more honey




# Perspectives

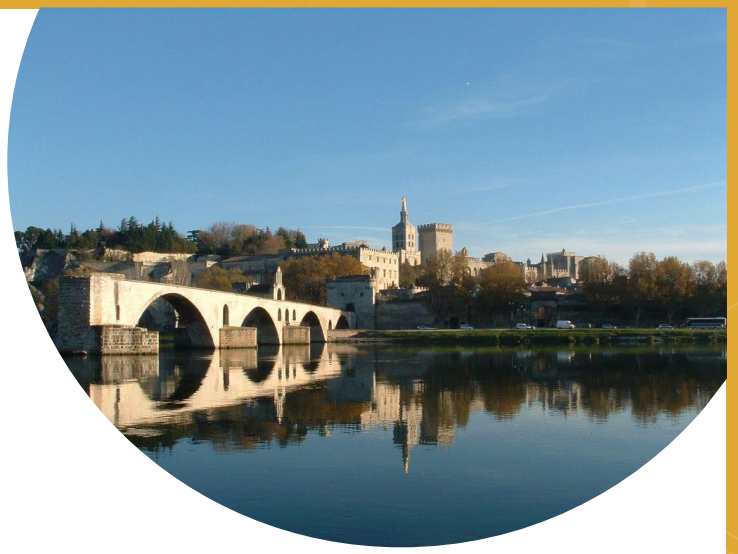
**September 2019: last samplings**

- Vertical /horizontal transmission
  - Varroa loads
  - Viral loads Queens /colonies
  - Evolution of viral strains
- Correlation physiological markers / virus
- Evolution over time
  - Factors explaining viral loads
  - Environment effect (apiaries)
  - Renewal pratice effect
  - Genetics/source effect




Factors explaining system performances

# Thank you



# Merci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