# EU sustainable bee breeding locally, as it should be



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•Lector Bee Health

•Hogeschool Van Hall Larenstein (Leeuwarden, the Netherlands)

•Hogeschool Inholland (Amsterdam, the Netherlands)

•Beekeeper

#### •Frens Pries, March 31<sup>th</sup> 2021

• "Osservatorio del miele" (https://www.informamiele.it/, Castel San Pietro

### 'Sustainable control of the varroa mite in Dutch beekeeping'



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**Goal:** Easy **breeding** of Varroa resistent honeybees

bejo zaden"

- Limit use of commercial breeds
   Loss of adaptation possibilities
   Prevent spreading of diseases
- Adapt your bees to climate change







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### **Commercial strains**

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 Dependency
 Drone hive problems
 Races are not good by themselves in every situation
 Heterosis: hybrids are more defensive, swarming, ....

To your help you have the bees themselves. Brother Adam often gave the advice: Let the bees tell you!



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- Adapt your bees to climate change







### Local breeding of honeybees

Distribution of honeybee races in the Netherlands

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#### During last ice age: no honey bees north of the alps



Mari van Iersel. Maandblad voor imkers oktober 2006 op basis van Ruttner , 1992

#### After ice age: new honey bee lineages

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#### **Black bee**

Apis mellifera mellifera Cold humid climate nd

#### **Italian bee**

*Apis mellifera ligustica* Warm stable climate

#### **Grey bee**

Apis mellifera carnica Unstable climate with cold and warm periods

#### After 1600: transhumance of honeybees

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#### **Black bee**

Late development Quick weather adaptation Defensive behavior

no

#### **Italian bee**

Large colonies Long periods of brood Kind behavior Slow in swarming

#### **Grey bee**

Early development Kind behavior Comb steady

### Loss of adaptation possibilities

- Genetic diversity : not directly a problem
- Phenotypic plasticity : loss is a threat to resilience of honeybees
  - against:

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- Diseases
- Climate change
- Pesticides

SCIENTIFIC REPORTS

natureresearch

Check for updates

#### OPEN Declining genetic diversity of European honeybees along the twentieth century

Gonçalo Espregueira Themudo<sup>®1,2,3</sup>, Alba Rey-Iglesia<sup>®1,4,8</sup>, Lucía Robles Tascón<sup>5,8</sup>, Annette Bruun Jensen<sup>®6</sup>, Rute R. da Fonseca<sup>®5,7</sup> & Paula F. Campos<sup>®1,4⊠</sup> (a) Individual defence

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#### 1. Physical barrier

Cuticle

#### 2. Immune response

CellularHumoralPhagocytosisAntimicrobial peptides (AMPs)EncapsulationReactive oxygen intermediatesNodulationMelanisation

Foragers

(b) Collective behaviour

3. Hygienic behaviour

Nurse bees

4. Fever response

1. Spatial segregation

Middle-aged bees

5. Social exclusion

2. Resin collection





### Defense mechanisms of the honeybee



- Smelling odor
- Odor receptor molecules



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6. Self-removal

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**Spreading diseases** 



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Varroa
(Small hive beetle)
virus strains
America Foul Brood (AFB, EFB)

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## Adaptation to changing climate



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- Different local flowers
- Local climate => local weather
- not climate, but EU policies: changing habitats
  - EU green deal
  - National biodiversity programs

How local breeding?



Awareness of advantages of local breeding
 Conservation programs for local races, subraces
 Development and sharing of breeding knowledge : EU supported
 Development of national and subnational breeding

programs (and not: carnica, etc ...)

Implementation in local beekeeper communities

### **Breeding knowledge factors**

• Development and implementation of selection criteria to consider the honey bee colony as a whole organism with its vitality and needs.

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- Development of selection methods
- Observing, comparing and propagating local honey bees in different locations.
- increasing attractiveness of local honey bees



Hand



## Conclusions

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## Why local breeding?

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- Loss of adaptation possibilities
- Prevent spreading of diseases
- Adapt your bees to climate change