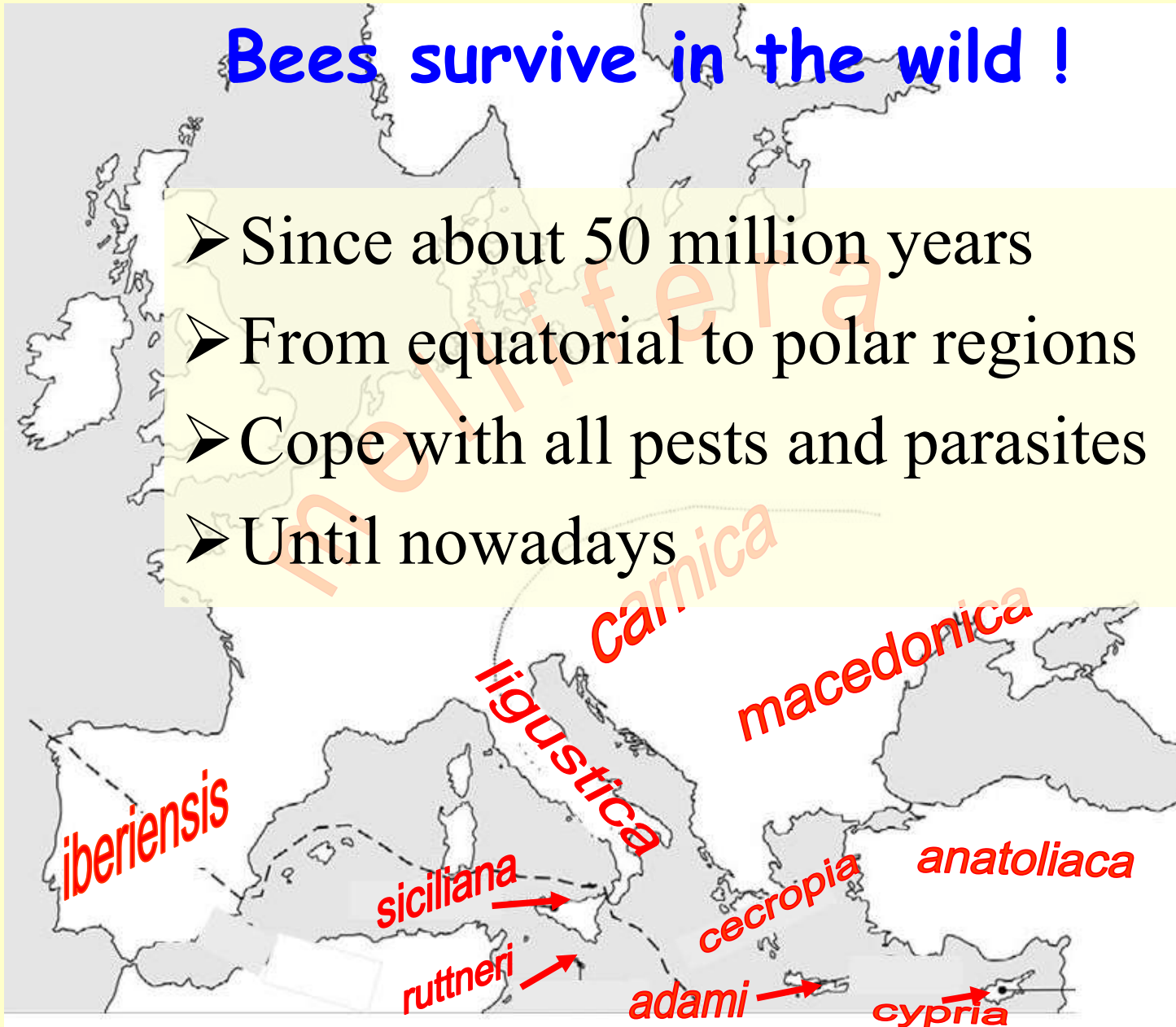


Integrated Varroa control strategy



Bees survive in the wild !

- Since about 50 million years
- From equatorial to polar regions
- Cope with all pests and parasites
- Until nowadays



How do they manage ?



- Suitable, individual nesting side
- Undisturbed brood nest
- Swarming
- Reproduction
- Radical local selection on viability

GUEST EDITORIAL



Honey bee colony losses in modern beekeeping

Peter Neumann^{1,2,*} and Norman L. Carreck^{3,4}



Fig. 1. The *Varroa destructor* equator of global colony losses. So far, elevated colony losses have recently been reported from Europe

German bee monitoring results

Factor...	...responsible for winter losses
<i>Varroa destructor</i>	yes ***
DWV	yes *
ABPV	yes *
Other viruses	no
<i>Nosema spec.</i>	no
Age of queen	yes *
Colony strength	yes*
Kind of winter feed	no
Hive type	no
Pesticides	no

What is different in modern beekeeping compared to the wild ?



- High colony density
- Increased brood rearing
- Prevention of swarming
- Unilateral selection on productivity
- Preservation of susceptible colonies by the use of drugs

What should we learn ?



- **Careful selection of apiaries**
- **Natural like colony management**
- **Regarding infestation thresholds**
- **Selection for disease resistance**

Suitable apiaries

- Favorable pollen and nectar resources
- Low pesticide and pollution exposure
- Low infection pressure
- Small is beautiful !



Natural like management

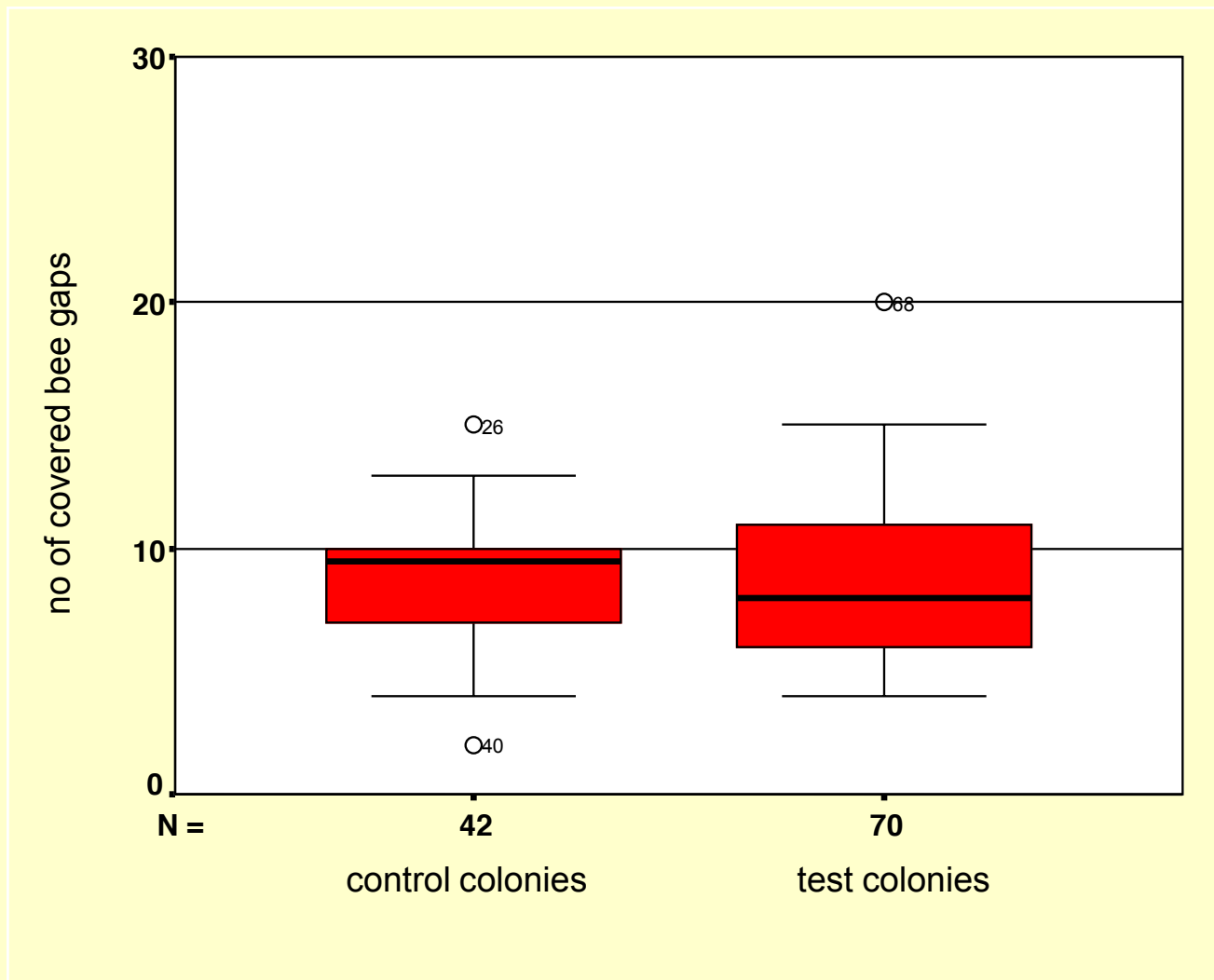
A large, dark, textured mass of bees and brood hanging from a tree branch, surrounded by green leaves. The mass is composed of many small, dark, fuzzy individuals, likely bees and their young, clustered together. The background is filled with green foliage and tree branches.

- ❖ Strong reproduction
- ❖ Detachment of bees and brood
- ❖ Comb hygiene

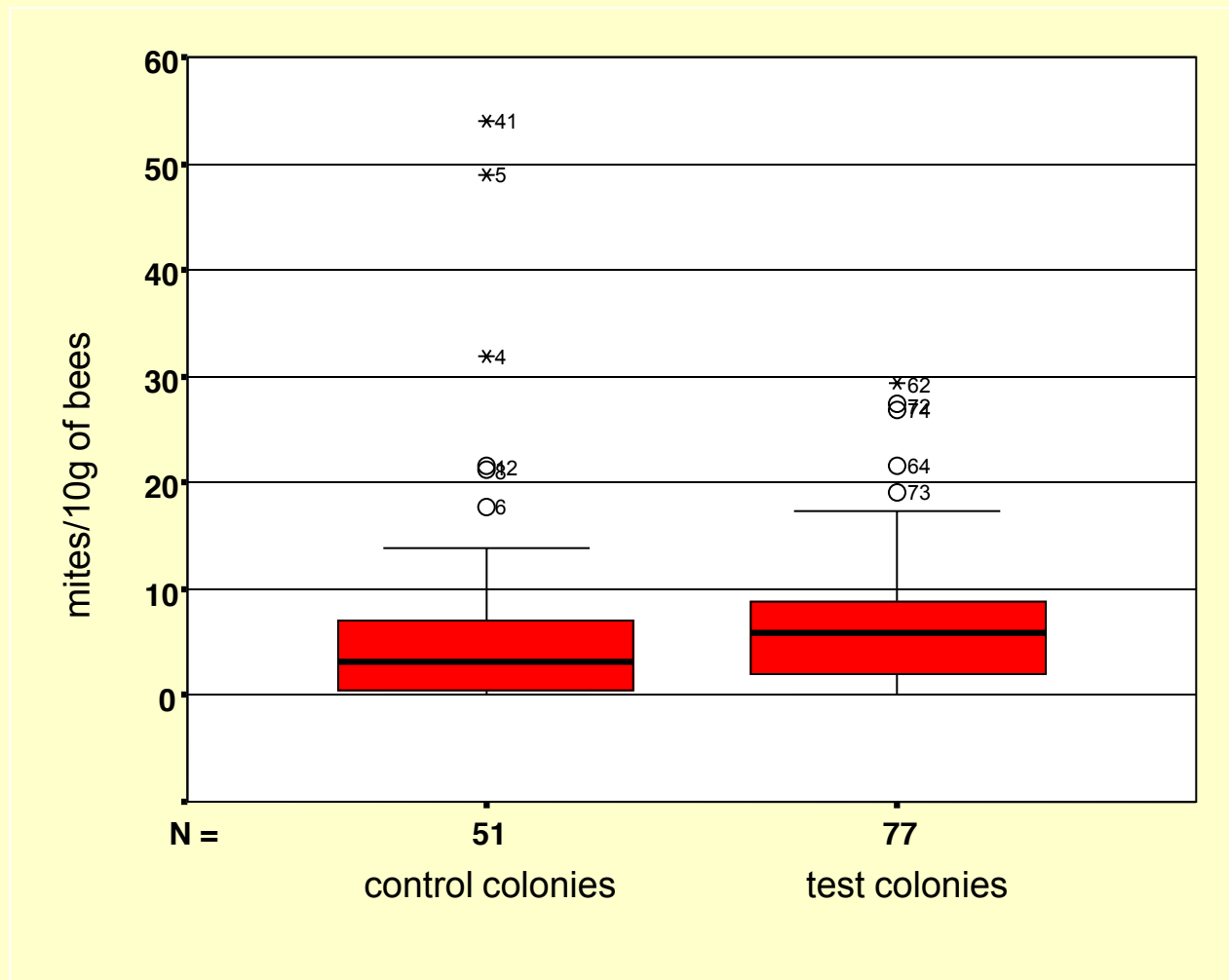
Detachment of bees and brood once a season, adapted to modern beekeeping practice



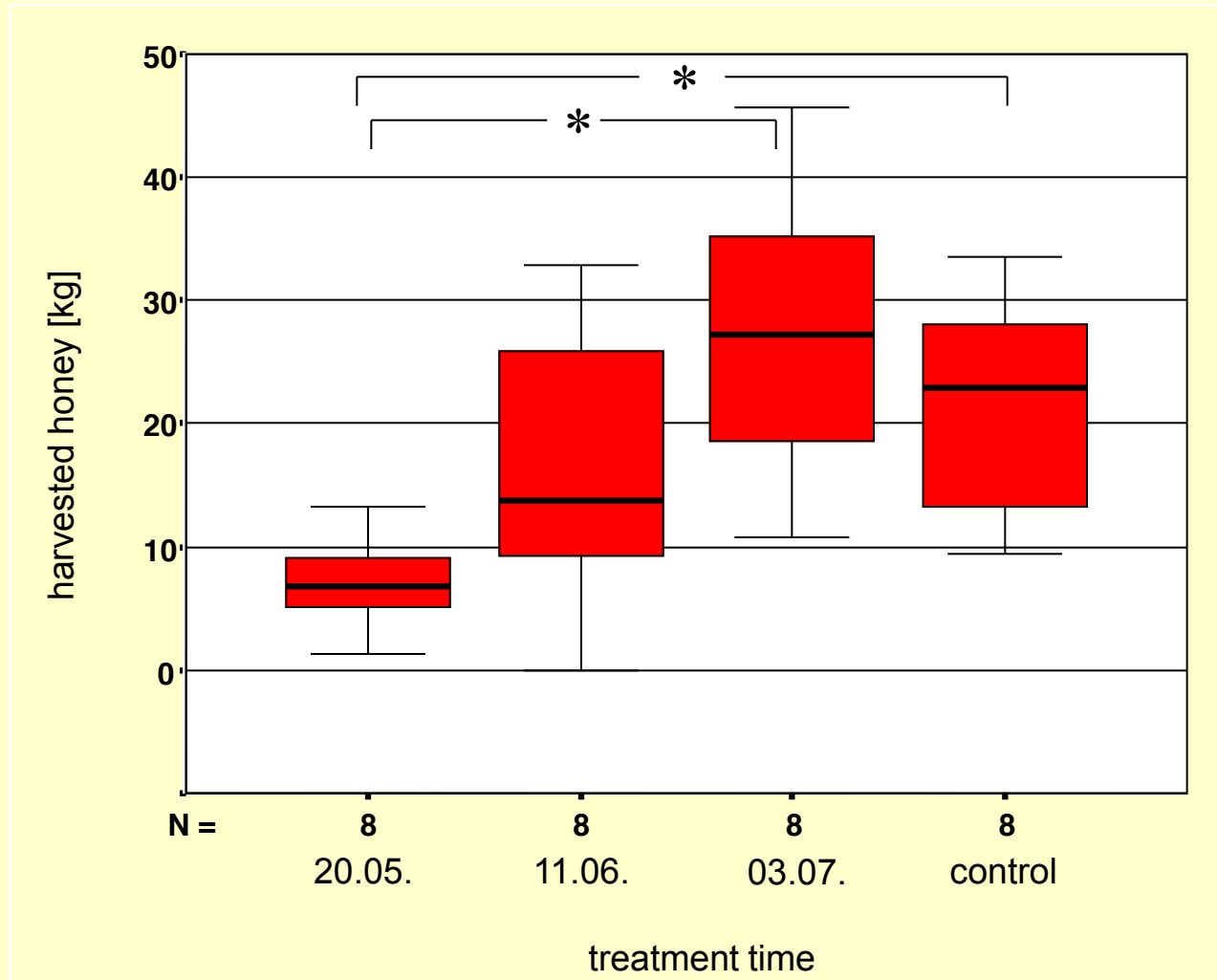
Effect of brood withdrawal on colony strength for wintering



Effect of brood withdrawal on Varroa infestation in autumn



Effect on honey productivity



Positive effects of brood removal

- Effective reduction of Varroa infestation
- Excellent comb hygiene
- Improvement of the general health status
- Increase in honey productivity



Selection for disease resistance

Pre-selection in large population

- Uniform and simple test criteria including:
 - Productivity, gentleness, low swarming
 - **mite infestation development**
 - **hygienic behavior** (pin test)
- Estimation of breeding values

Viability test of pre-selected colonies

Viability test of pre-selected colonies

- No prophylactic treatments
- Regular controls of colony strength & Varroa infestation
- Selective treatment of colonies regarding infestation threshold values
- Selection of breeder colonies among untreated survivors:
 - Infestation increase
 - Overwintering index
 - spec. resistance characters (e.g. VSH)



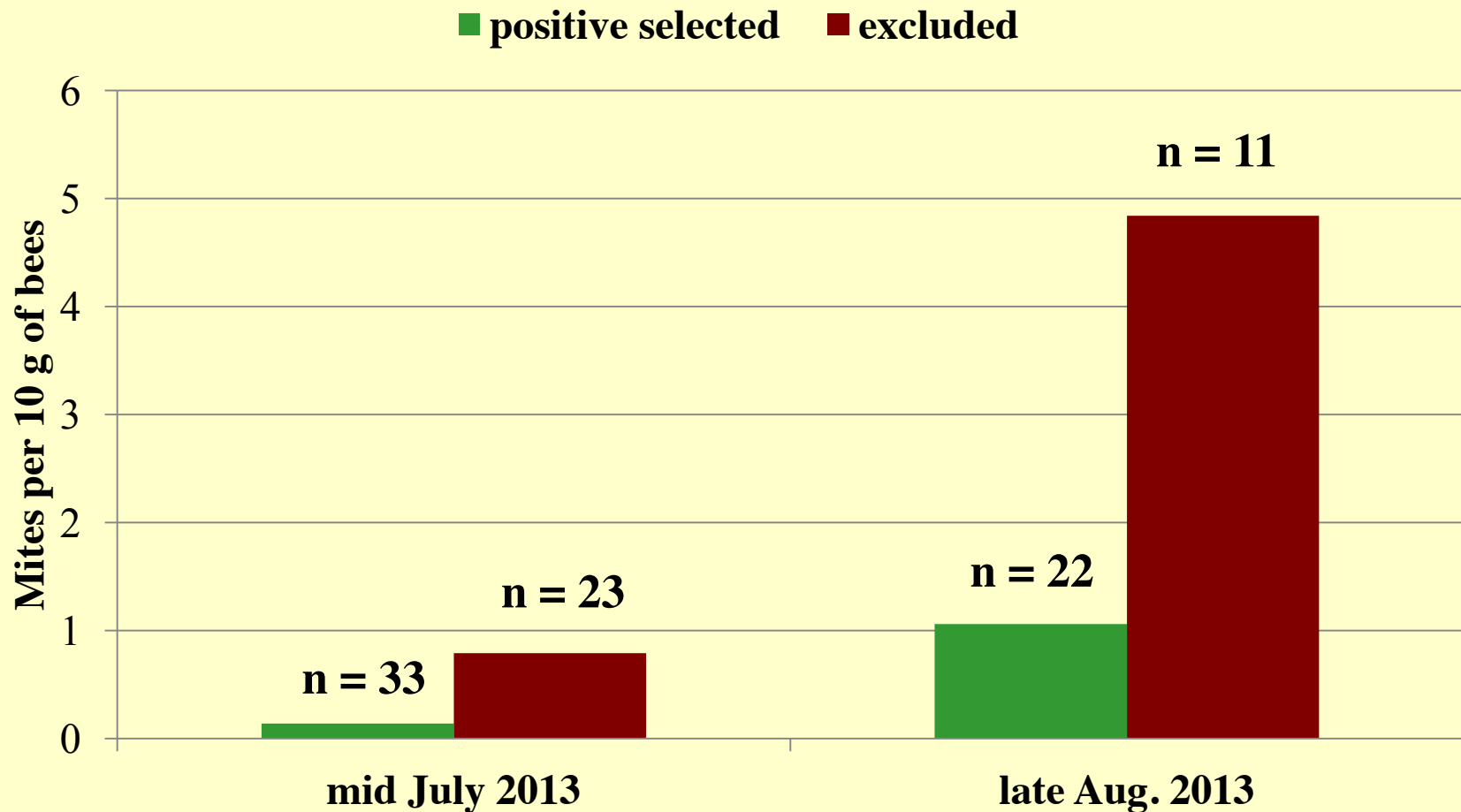
Infestation control of bee samples



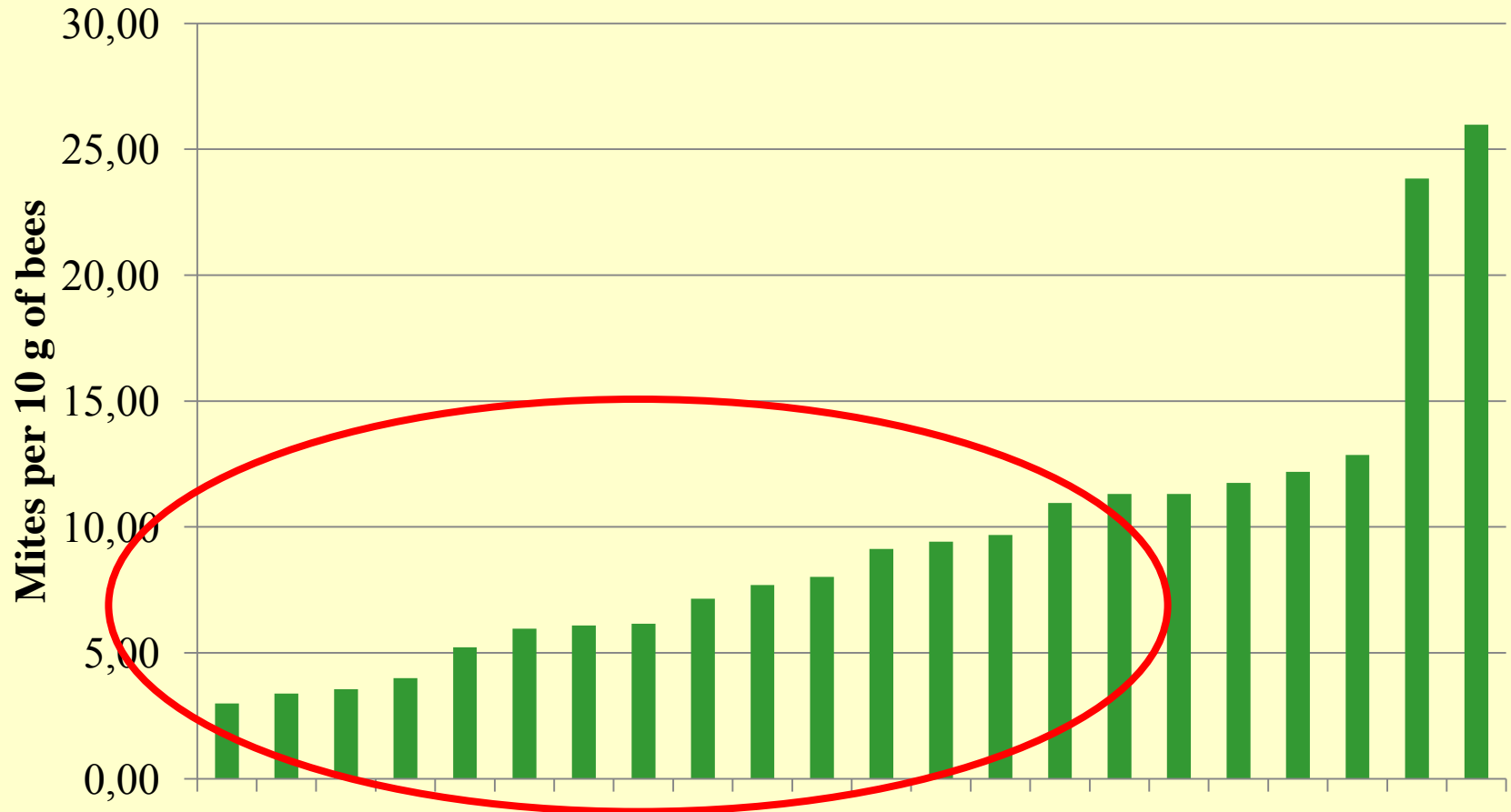
Varroa-threshold for vitality tests (mites/10g bees)

Rating	Week 32 early Aug.	Week 35 late Aug.	Week 38 mid Sept.	Week 41 Oct.
Colony not yet endangered	< 2	< 3	< 4	< 5
Careful observation	2 - 4	3 - 6	4 - 8	5 - 10
Treat or liquidate	> 4	> 6	> 8	> 10

Threshold based selection in practice (60 colonies started in 2012)



Varroa infestation of untreated test colonies at the end of September 2013



Move on towards an Integrated Varroa control !



- Carefully select suitable apiaries
- Favorite biological and biotechnical methods (natural like colony management!)
- Monitor mite infestation development
- Use drugs according to thresholds
- Requeen susceptible hives with well selected local breeding stock