ARC • LNR
Excellence in Research and Development

# Biosecurity & honey bees in a globalized world – where are we headed?

Mike Allsopp
ARC-PPRI, Stellenbosch

## What to talk about?

- Really struggled with this talk
- Biosecurity and honey bees – in the country in the world most famous for its Border Security
- And the only place without the varroa mite


ARC • LNR
Excellence in Research and Development

## Likely threats

- Asian wasps
- Asian mites
- Asian honey bees
- African bee pirates
- Additional species of small hive beetle

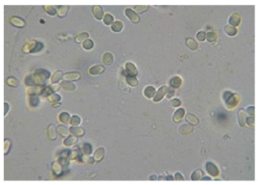




ARC • LNR
Excellence in Research and Development

## Possible threats

- Large Hive Beetles
- New nosema species
- Viruses
- European wasps


ARC • LNR
Excellence in Research and Development

# Make-believe threats

- Bee louse
- Pseudoscorpions
- Death's Head Hawk Moth

ARC • LNR
Excellence in Research and Development

# Fake threats

- Honey badgers
- Baboons

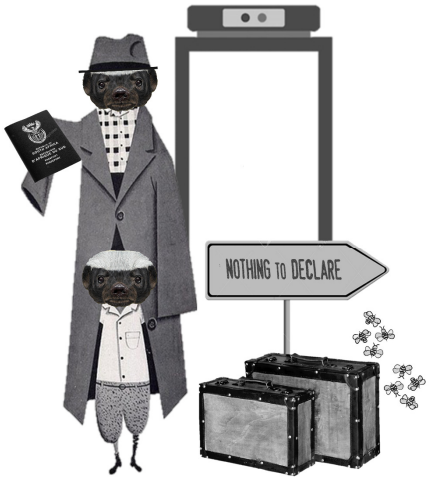
ARC • LNR
Excellence in Research and Development

# Fake threats

Dictates how we do our beekeeping

ARC • LNR
Excellence in Research and Development

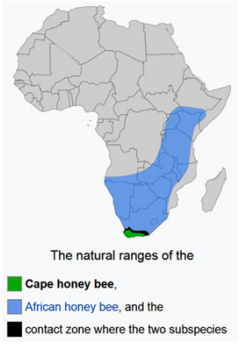
# Fake threats




ARC • LNR
Excellence in Research and Development

# Very real threat

- Cape honey bees
- Parasitic of other bee subspecies
- Some day, some where, some one is going to introduce Cape bees . .




ARC • LNR
Excellence in Research and Development

# Biosecurity will adapt

- Confident that Australian biosecurity will adapt and manage all these threats and more
- Perhaps become more restrictive?

ARC • LNR
Excellence in Research and Development

# It's complicated . .

- Would rather like to consider an alternative and more complicated scenario
- Is more biosecurity <u>always</u> a good thing for bees, beekeepers, growers?


ARC • LNR
Excellence in Research and Development

# It's complicated . .

- And is this situation likely to change as global trade becomes ever more pervasive?
- And as agriculture becomes ever more intensive?
- And as bees for commercial pollination become ever more important?

ARC • LNR
Excellence in Research and Development

# It's complicated . .

Can more biosecurity become a disadvantage and a threat in a globalized, industrial-scale agriculture, pollination-dependent world?


ARC • LNR
Excellence in Research and Development

# Biosecurity & Honey

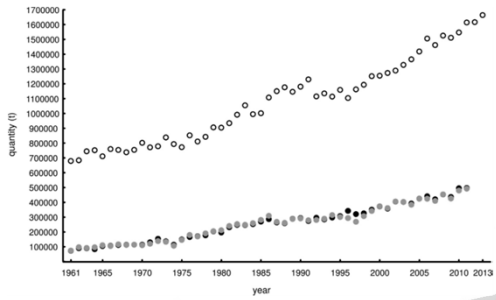
- Major motivation for biosecurity measures has been the protection of local honey production
- All good and sensible

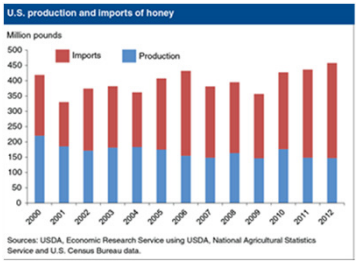



ARC • LNR
Excellence in Research and Development

# Biosecurity & Honey

- Honey trade continuing to grow
- About 10% exported in 1960 and about 40% now (FAO; Moritz & Erler 2016)




ARC • LNR
Excellence in Research and Development

# Biosecurity & Honey

- Numerous countries (South Africa as a example) that import far more honey than they produce
- Local production is increasingly uncompetitive
- Why should it have special biosecurity protection? Is it worth protecting?

ARC • LNR
Excellence in Research and Development

# Biosecurity & Honey

- Horror of horrors!
- Could synthetic honey ever become acceptable?
- If it can happen to meat . . . ?
- What happens then?



ARC • LNR
Excellence in Research and Development

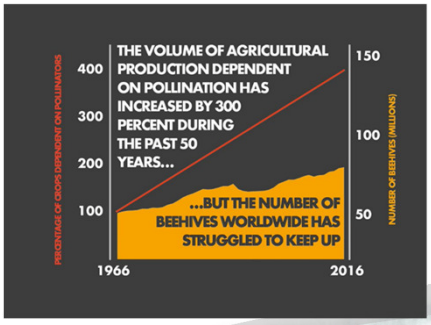
# Biosecurity & Pollination

- Often said that you can import honey but not pollination
- Clearly not really true


ARC • LNR
Excellence in Research and Development

# Biosecurity & Pollination

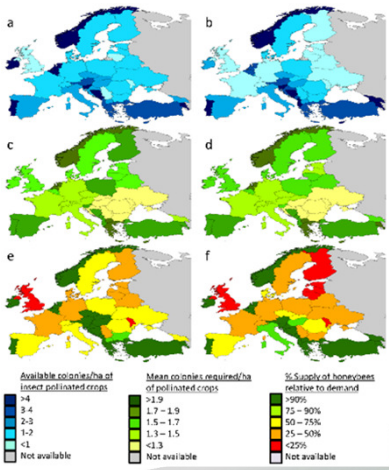
- And as the value of commercial pollination continues to grow
- Increasingly dwarf the value of honey




ARC • LNR
Excellence in Research and Development

# Biosecurity & Pollination

- Increasingly get countries and regions (Western Cape in South Africa; Tasmania?) that do not have enough colonies to service agricultural needs?
- Breeze et al 2014




ARC • LNR
Excellence in Research and Development

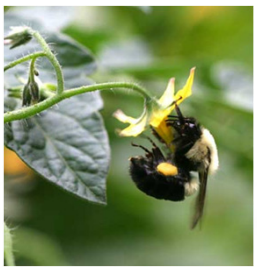
# Biosecurity & Pollination

- And not enough forage to change that
- Import or feed or find alternative pollinators?
- Or import short-term pollination from places that do have the forage, and can supply the pollinators?
- How does biosecurity balance crop production demands with honey production demands?

ARC • LNR
Excellence in Research and Development

# Biosecurity & Pollination

- What about special cases such as bumblebees and greenhouse pollination?
- If the crop production value becomes greater than the honey value, should it be allowed?



ARC • LNR
Excellence in Research and Development

# Biosecurity & Pollination

- Maybe bee breeding will be able to deliver bees superior at blueberry pollination, or macadamia pollination?
- Or bees happy to live in tunnels?
- Will the viability and value of such crop production industries override honey production concerns?

ARC • LNR
Excellence in Research and Development

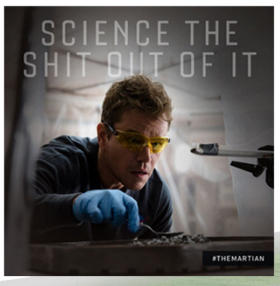
# Biosecurity & Pollination

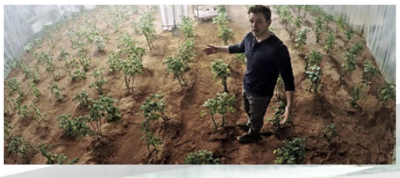
- Might not neonicotinoid-tolerant bees be developed, that don't get lost . . ?
- Might not growers need these to compete?
- If we are going to have robo-bees, why not pesticide tolerant bees?


ARC • LNR
Excellence in Research and Development

# Biosecurity & Pollination

- Or perhaps it will all go the other way?
- Faced with the spectre of increasing insect pollination needs, and limited forage, and limited ability to provide those pollinators
- Maybe growers and breeders and horticulturalists will by-pass the problem
- In the words of Matt Damon in The Martian



ARC • LNR
Excellence in Research and Development

# Biosecurity & Pollination

- Reduce the insect dependence
- Vegetative production, tissue culture, parthenocarpy, self-fertile
- And bees can go back to making honey?

ARC • LNR
Excellence in Research and Development

# Biosecurity & Bees

- Is more biosecurity better for the bee population?
- Does it work in the long-term?
- Is it sustainable?

NATIONAL BEE BIOSECURITY PROGRAM

ARC • LNR
Excellence in Research and Development

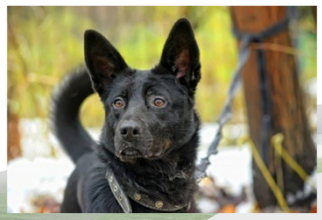
# Biosecurity & Bees

- Countries with minimal biosecurity often seem to vibrant and healthy wild or feral bee populations
- It is certainly the case in Africa
- Huge wild population of bees with great natural variation

ARC • LNR
Excellence in Research and Development

# Biosecurity & Bees

- And we have most of the pests & diseases
- Varroa
- Tracheal mites
- Nosema
- Asian bees
- AFB & EFB
- Seemingly very little impact
- Mongrel bees and allowing susceptible bees to die



ARC • LNR
Excellence in Research and Development

# Biosecurity & Bees

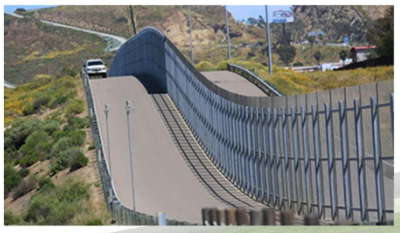
- Not sure what the situation is in Asia
- Do they still have the huge natural populations that they once had?

ARC • LNR
Excellence in Research and Development

# Biosecurity & Bees

- But Europe seems to have largely lost their wild bee populations
- Better biosecurity seems not to have benefitted their bees
- Management of pests & diseases has made turned mongrels to poodles and resulted in the loss of the wild population

Where are all the bees?



ARC • LNR
Excellence in Research and Development

# Biosecurity & Bees

- Politics is politics but . . .
- Loss of bees in Europe caused more by the beekeepers than the chemical companies
- Explosion of 'live-and-let die' breeding programmes all over Europe is testimony to the reality of this situation


ARC • LNR
Excellence in Research and Development

## Is that good?

- Is it a good thing to lose the wild bees?
- Maybe better for the beekeepers?
- Able to direct selection and breeding better
- How well is that working?
- Less competition for honey production
- Growers dependent on managed bees
- Maybe not so good for the growers!

ARC • LNR
Excellence in Research and Development

## Is that good?

- How about losing the wild honey bees from a biodiversity / conservation perspective?
- Very good in countries where honey bees are exotic.
- Very bad where honey bees are indigenous


ARC • LNR
Excellence in Research and Development

# Biosecurity & Bees

Really is an odd situation where the countries most serious about biosecurity and honey bees are those where honey bees are exotic and alien and invasive


A Third Insight on the Introduction of European Honeybees into Australia and New Zealand

ARC • LNR
Excellence in Research and Development

# Does biosecurity & bees work?

- Does it work in the long-term?
- Or will everything eventually be everywhere?
- Varroa & Asian wasps and hive beetles
- Hive beetle incursions (Neumann et al 2016)


ARC • LNR
Excellence in Research and Development

# Does biosecurity & bees work?

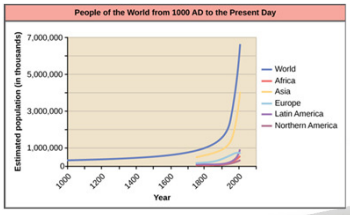
- If there bee populations everywhere in the world that are tolerant to every bee pest and every bee disease in the world – do biosecurity restrictions for bees really make sense?
- Would growers agree?



ARC • LNR
Excellence in Research and Development

# Does biosecurity & bees work?

- What does this tell us?
- Open global movement has not collapsed the human population, despite the odd scare
- Maybe small hive beetles and varroa are the Spanish flu and smallpox equivalent in a global bee population?




ARC • LNR
Excellence in Research and Development

# Conclusions

- Who knows?
- It's complicated
- Maybe even vexed



ARC • LNR
Excellence in Research and Development

# Conclusions

- I certainly think you can present arguments where biosecurity measures could become a threat and cost
- To countries, to growers, to bee populations, and even to beekeepers

ARC • LNR
Excellence in Research and Development

# Conclusions

- Strange bed-fellows
- Beekeepers and growers and conservationists will increasingly be on opposite sides of this issue

ARC • LNR
Excellence in Research and Development

# Conclusions

- And it is only going to get more complicated



ARC • LNR
Excellence in Research and Development

# Thanks


- To the organizers for the invitation
- And to Ben Oldroyd, Jaco Wolfaardt, Marius Bothma, Nanike Esterhuizen and David Sindle for the use of photographs


ARC • LNR
Excellence in Research and Development