Cuban Bees selection strategy for Varroa resistance and honey quality

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INTRODUCTION.

- Honey bees are in Cuba for near 250 years.
- They spread over all country as result of the exuberant vegetation and they must fight the widest diversity of predators: ants more than 20 species, frogs 62 species, crabs, birds and mammals. All they eat bees and/or honey or honey bees combs.

- At the beginning climate and predators were first natural selection factors.
- From the 80s last century it was adopted as main selection criteria the principle to select the more productive and bacterial diseases resistant bees. No bee imports is permited.

- After the European market Directive 96/23, it was necessary to introduce changes in selection strategy criteria, drug residues become a quality problem was necessary to eliminate.

- How to avoid residues in honey?

To achieve this goal is necessary a diseases and pests resistant bee.

Are actual bee diseases?

It is necessary to medicate hives?

What is hive treatment origin?

How to have a non drug dependent bee?

BEES SURVIVING.

- In 1996 Varroa was diagnosed in Cuba, it hit very strong beekeeping. First impact area all wild bees disappear for not less than two years. After this, wild population became to recover. Beekeepers remake their hives stock from wild and surviving hives after first Varroa hit, this way was to remake commercial beekeeping.

- It was adopted as general strategy to fight the parasite by selecting tolerant or resistant bees. Solution was not to put more and more chemicals on hive, ignoring long bees natural history, estimated about 100 million years.

Did we have meditated, how much time is this figure compared with human time on the Planet?

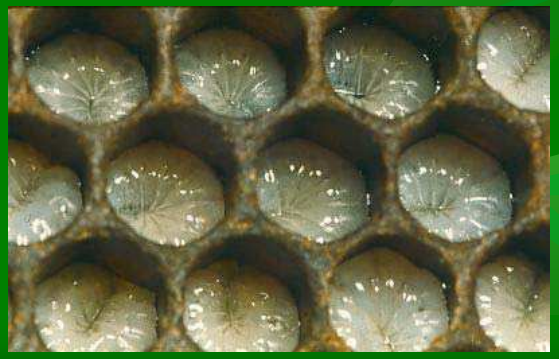
If we do this, by simple deduction it become the conclusion that bees have widest "**genetic experience**" than humankind.

BEES SURVIVING.

Bees resistance and adaptation mechanisms have being “tested” very much largely than any of the synthetic drugs, that we put in hives to “treat” bees diseases or pests spread as men mistakes.

Our “treatments” are older than 50 – 60 years: this time is only the 0,00005 % of the bees natural history.

How is possible to guarantee products safety, testing it on bees after “protocols” designed by who sell it, to make the business from beekeepers fear?



BEES SURVIVING.

- Antibiotics are toxic substances and its action principle is to poison bacteria, if bacteria are at life origin, what conclusion could be made…?
- It is necessary to remember that bees have an immune system and they produce and use natural antibiotics, long time before and with more “experience” time, even more than any antibiotic produced or used by humans.
- In the same way, bees have natural mechanisms to face pests, “tested” a long their evolution, that could be valid face those pests spread by men.
- In any case, chemical fight against Varroa is very expensive and with low efficiency perspectives, after early resistance reports that began to circulate in specialized press.
- Integrated fight was an option early tested against bacterial diseases.

BEES SURVIVING.

- Practice have demonstrated that in bees genome there is in off genetic capacity and plasticity of bees to fight successfully sanitary challenges.

- Negative for bees and beekeeping, is beekeepers willingness “to help” them to solve the problem, in this way they put chemicals in hives, pushing a negative selection which goes into a growing dependence of this products, then damage is double and irreversible.

BEES SURVIVING.

- Drugs mask and reinforce negatively pest effect, is an occasional stop of the crisis; but non resistant individuals became viable and consequently sensitive genes became generalized in population and resistance genes are loosed.

- This is the defy, if we keep our way to fight bees diseases and pests, and we continue to put uncontrolled chemicals in hives, beekeeping is pushed into a vicious descending spiral with no back; price is bees variability loose.

- As was presented in last APIMONDIA Congress in Montpellier, African bees populations are 2 – 4 times bigger, have 50 % higher heterosis and are twice more diverse genetically (Jaffe and cols. 2009).

How was loosed European bees diversity?

BEES SURVIVING.

- All previous arguments show a wrong generalized practice of our biological culture, especially in some essential sights: bees are NOT DOMESTIC ANIMALS, they ARE NOT MAMMALS, BEES ARE INSECTS; and then they didn't react face their biological enemies, like men or superior animals.

- Bees had shown an extraordinary capacity of adaptation, linked to an evolution history of about a MILION CENTURIES.

- If we compare both, human and bees "genetic experiences", is possible to conclude that "humans have a very a short experience", we are like kindergarten children. Bee's genetic experience is knowledge, could be considered as "**cumulated genetic experience**".

BEES SURVIVING.

- It is evident that bees handling is a result of traditional anthropocentric thinking and reflects a high ignorance of bee's biological clues.

- Men have ignored cumulated bees genetic "experience", and have decided solutions facing the problem only from his point of view, not considering how nature could solve it.

- If this way of thinking is taken in consideration, then bee's treatment will be avoided and hive products quality and results will be superior.

- Cuban experience, beekeepers practice, researchers and specialist's experience, shows that it is a viable strategy: fight against Varroa, diseases or pests from bee's capabilities to resist, by bees biological strengths.

- The other way is a down spiral: more residues way, honey will be more and more away from natural honey and finally…. bee's extinction by negative selection.

BEES SURVIVING.

- In the last APIMONDIA Congress 2009, was prized an industrial process to clean wax from cumulated chemical residues, which provoked high larvae mortality, as result of repeated treatments against hive pests.
- Every year is spent millions on hive treatments, some other millions for honey and other hive products residues tests. All this is wasted money, -as result of wrong strategy which didn't take in account bee's adaptation strategies-, based on beekeepers fear to lose their hives and jobs.
- To beekeepers fear have contributed papers, journals, and all commercial propaganda, about "safe" products to keep bees better "protected", "feeded" and "cared".
- Today this conceptual base support honey production, granting a supposed "natural product". This misconception supports beekeeping practiced in "developed" countries; there beekeepers income allows paying hives "treatments". In the opposite side poor beekeepers couldn't pay their hives "treatments"; their sensitive hives die and resistant hives survive.
- They have not CCD.

BEES IN CUBA

- After first massive mortality Varroa provoked in 1996, follows wild and commercial population recovery process.
- To “treat” Cuban hives were registered and purchased two products: first Bayvarol® strips (flumetrine) and tree years later ApiLifeVar (essential oils). Was tested CheckMite+® (coumafos), (Demedio et al. 2004).
- Those products were acquired mainly to be used in crisis situations, economical possibilities didn’t allow buying for all hives.
- The strategy to rear new queens from surviving hives reinforced the general strategy to fight pest.

BEES IN CUBA

- Bee's population with infestation rate over 7 % was "wiping treated" with Bayvarol strips and then, queens were changed by sisters reared from surviving hives populations of each province. In this way, chemicals are not today the strategy axis for Varroa control in Cuba; they are a component in the Integrated Pest Management (IPM).

- Chemicals are not free to buy or supplied by vet authorities. Veterinary Medicine Institute recommend IPM to fight any outbreak: bees are "shacked" and queens are changed by new ones reared from resistant hives.

- Good Beekeeping Practices, advice commercial beekeepers to renew every year the queen and at least 50 % of hive nest combs.

BEES IN CUBA

- Every province (14) have their own Bees Selection System, starting from hives survived to Varroa parasitism without any treatment, in the start group are selected the more hygienic and productive hives. From best productive and hygienic hives are reared new queens to change in commercial hives.

- Beekeepers and all personal in charge of bee's selection were educated and is constantly informed about testing tolerant behavior face Varroa to any tolerant or resistant hive.
- Bees selection test is followed systematically every year, for new selected resistant hives; this methodology after four years allows all Cuban hives are absolutely free of chemical treatments against Varroa. In addition to that, officially is forbidden antibiotic use against brood bacterial diseases.

BEES IN CUBA

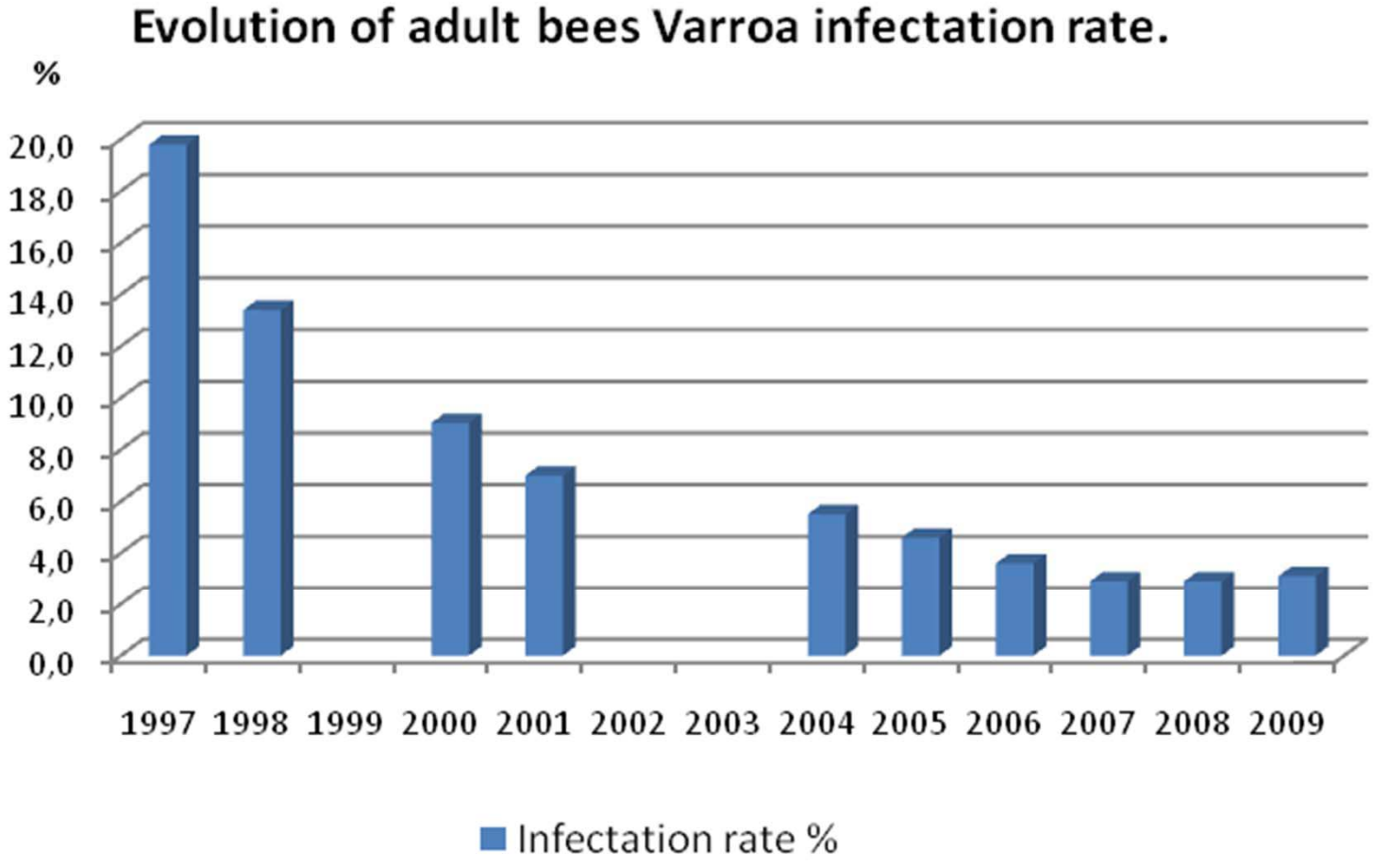
- Selected hives must have a very high hygienic behavior, removing all dead brood in 24 hours. It was observed a high grooming behavior and a low Varroa rate reproduction in male cells (SMR).
- The most important selection factor is hive high average honey yield. This inherited character pulls all the positive resistance characters.
- Free mating facilitates gene flow of resistance, from wild population into commercial stock and inbreeding is avoided.

When beekeepers demand chemicals to “treat” their hives they must face a question: Who treat wild bees?

BEES IN CUBA

- In selection apiaries tested it was observed 92 to 92,5 % of Varroa injured by bees (Sanabria, 2004).
- All selection actors: beekeepers, climate, predators and finally Varroa, resulted that Cuban hybrid bee, have today a productivity potential of more than 100 Kg/ hive/year.

BEES IN CUBA


Evolution of adult bees Varroa infectation rate.
%
20,0
18,0
16,0
14,0
12,0
10,0
8,0
6,0
4,0
2,0
0,0
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009
Infectation rate %

BEES IN CUBA

- In the last 5 years, hives in general had maintained average infestation rates under minimal risk limit.

- It is possible to explain because beehives shows natural defense mechanisms over the average rate (Sanabria, 2007).

CONCLUSIONS

- Under Cuban conditions the strategy adopted to select resistant bees, from the surviving hives after Varoa attack, was right and today is an important strength of Cuban beekeeping.

- It is possible select Varroa resistant bees starting immediately after predator first diagnose.

THANKS A LOT !