

**Message from Professor J. Woyke
Agricultural University, Bee Division, Warsaw, Poland:**

**THE BACKGROUND AND HISTORY
OF APICULTURAL SCIENTIFIC ACTIVITIES IN VIETNAM**

Today, opening ceremony of an important international scientific apicultural conference takes place in Vietnam. The president of the Asian Apicultural Association Dr. M. Matsuka asked me to present some background and the history of apicultural scientific activities in Vietnam.

Several papers describing recent achievements of apicultural scientific activities in Vietnam, were published (Ha 1992, Ha and Lap 1992 and Dung 1995). Therefore, I would like not to repeat those descriptions, but to concentrate myself on facts which were not published and which concern rather the beginning of apicultural scientific activities in Vietnam, in which I was involved.

Background

Apis cerana is the native cavity nesting honey bee of Asia. This bee was domesticated in China already 4000 years ago. In Vietnam, a paper of Pham Le described already 1200 years ago, in the 8th century, some biological characters of that bee, types of log hives used, and bee management techniques.

A. mellifera was introduced repeatedly into all Asian countries over the past several centuries. This succeeded in temperate zones, like in Japan and China. However, the introductions into sub-tropical or tropical Asia were successful for one or two years, after which the colonies died out. *A. mellifera* colonies were introduced into Vietnam in 1947. However, they also did not survive. Two main reasons were responsible for the failure: 1. The bees were introduced into improper regions, like into Bangkok regions. The rice fields around Bangkok did not supply sufficient nectar sources for *A. mellifera*. 2. Parasitic bee mites *Varroa jacobsoni* and *Tropilaelaps clareae* harmless for the native bees, killed the introduced exotic *A. mellifera* colonies.

However, in 1960-80th successful introduction of *A. mellifera* was recorded in several countries: like in Northern India, Northern Thailand, Burma, Indonesia, Afghanistan, and others. This bee was also successfully introduced into Vietnam in 1960 from Hong kong, and again in 1965 from Taiwan. *A. mellifera* produced in India 3 - 4 times more honey than *A. cerana* (Verma 1984). I found, that *A. cerana* produced in Afghanistan up to 7 kg of honey per year while *A. mellifera* up to 70 kg. In Vietnam *A. cerana* produced up to 15 kg, while *A. mellifera* up to 150 kg of honey per year. In all those countries *A. mellifera* suffered very much from the parasitic mites. In some countries like Afghanistan beekeeping with *A. mellifera* was again almost to collapse due to *T. clareae* parasitism.

Many peoples were against the introduction of *A. mellifera* into tropical or sub-tropical Asia. However, the pressure and demand of introduction of *A. mellifera* into that

area was very great. Some international discussion on this problem by experts from different countries was necessary. There was no Asian Apicultural Association. Thus, FAO took the initiative and organized in 1984 in Bangkok an Expert Consultation on Beekeeping with *A. mellifera* in Tropical and Sub-tropical Asia. The potentials of increasing honey production by introduction of *A. mellifera* was shown. At the same time warning was expressed of the danger of parasitic bee mites. Woyke (1984a) presented at this conference for the first time, that *T. clareae* is not able to survive a winter brood rearing break, and thus, it can be combated by brood interruption. However, the shortest period of brood absence in honey bee colony to combat that mite was not known. Resolution No 1 of this Conference was, that studies on the parasitic mites both on their natural native host and on the introduced *A. mellifera* should be conducted and supported.

Several authors pointed already out that *T. clareae* is more dangerous for *A. mellifera* than *V. jacobsoni* is. Woyke (1984a, 1984b) presented data according to which *A. mellifera* colonies infested by *T. clareae* in Afghanistan were dying, while those free of mites were flourishing. Out of 3000 *A. mellifera* bee colonies in the Ministry of Agriculture in Afghanistan, only 150 (5%) survived three years after invasion of *T. clareae*.

The most urgent demand to save *A. mellifera* in Asia was to work out a method to control *T. clareae* mites. The biology of *T. clareae* was almost unknown. However, it was claimed to be similar to the biology of *V. jacobsoni* and similar control methods were recommended.

On the demand of the government of Afghanistan, FAO send me as a consultant to that country in 1984. I found at first, that *T. clareae* can not survive the winter interruption of brood rearing (Woyke 1984a). Later, I found that *T. clareae* reproduces in capped brood cells. However, contrary to *V. jacobsoni* most *T. clareae* survive on adult *A. mellifera* worker for 1 - 2 days only. Some (10%) survived 60 hrs. The short survival period on adult *A. mellifera* and some Asian honeybees was later confirmed by Koeniger and Muzaffar (1988), Ha *et al.*, (1993) Huan *et al.* (1993) and Rinderer *et al.* (1994). On this basis control method without the use of any drugs was elaborated (Woyke 1984b, 1985a).

Vietnam

Vietnam has a natural area of 332,000 km² including 8.5 million hectares of forest land and 7 million hectares of agricultural land. It is estimated that 1 million of bee colonies can be kept in Vietnam for a production of about some 10,000 tons of honey every year (Ha 1992). To achieve this goal, scientific support was necessary. The government of Vietnam recognized the significance of beekeeping for the peoples and the economy of the country, and supported the development of research activities.

1. Creation of Vietnam Bee Research Center

In 1983 the Government of Vietnam requested FAO assistance to apiculture development. FAO Headquarter in Rome approved in March 1984 a project

TCP/VIE/4401 - Preparatory Mission for Creation of Apiculture Centre. Dr C. Zmarlicki, came as a FAO consultant in beekeeping for one month in April and May 1994. In 1984, Vietnam Bee Research Centre (VBRC) was established. It was based on the acceptance and improvement of the Central Bee Research Station (1967 - 1984).

The FAO Director General, E. Saouma informed the Vice-Minister of Agriculture in Hanoi, Mr Nguyen Dang, in letter dated Sept. 07 1984, that he approved a project TCP/VIE/4405 - Assistance to Apiculture Development, and allocated up to US\$ 172,000 from TCP resources to finance it. FAO appointed me as a beekeeping consultant. I was working in this project during two missions: 06.01 - 07.03 and 16.09 - 04.12, 1985. Laboratory equipment, books as well as a Toyota land cruiser were purchased by FAO, for the Bee Research Centre.

2. Parasitic bee mites

Control of the parasitic bee mites was the most urgent task. Therefore, infestation rate of *A. mellifera* colonies by both parasitic mites *V. jacobsoni* and *T. clareae* was investigated. The results showed, that almost all bee colonies were infested. *Varroa* infested in the North 0 - 34% and on the aver 4% of brood cells. *T. clareae* infested 0 - 50%, aver 10%. In South Vietnam the situation was more grave. Infestation by *V. jacobsoni* was similar 0 - 7% aver 4.9%. However, *T. clareae* infested 21 - 62% and on the average as many as 46.2% of brood cells. (Woyke 1985a, 1987a) No doubt, infestation of bee colonies by *T. clareae* was the major obstacle in development of beekeeping and increase of honey production in Vietnam.

Chemical treatment of both mites was examined. Amitraz was more effective than phenotiazin against both mite species, killing 95.7% of *V. jacobsoni* and 79.2% of *T. clareae* mites, whereas phenothiazine killed only 57.7% of *V. jacobsoni* and 56% of *T. clareae* (Woyke 1987a). However, these chemicals did not killed mites inside brood cells. Till that time, it was recommended, to apply similar methods to control both mite species. However, weekly treatments with chlorbenzilat (Folbex) applied during 12 weeks by Laigo and Morse (1969) in the Philippines or during 6 weeks by Atwal and Goyal (1971) in India were reported to be ineffective against *T. clareae*, although they controlled *V. jacobsoni*.

Investigation were undertaken to explain the different results of combating those mites. Both mites reproduce in sealed brood cells. They come out of the cells together with the emerging bees. *Varroa* remains outside the cells for 1 - 2 weeks before it enters a new cell with bee brood. The period during which *T. clareae* remains outside the bee brood cells was not known. Therefore this question was investigated in Vietnam. It was found that *T. clareae* remains outside the brood cells for up to 2.5 days only, before it enters a new one (Woyke 1987b). This was the most important finding, which explained the failure of combating *T. clareae* by the above mentioned methods. It was shown, that any weekly treatment can not be effective, because *T. clareae* females enter in the meantime new brood cells before the next treatment is applied.

Till that time, biological control of *T. clareae* was applied in Vietnam in the way of trapping the mites to drone brood, like it is parasitized in Europe to control *Varroa* mite. Investigation conducted in Vietnam showed, that *Varroa* indeed infested 5 times more drone than worker brood, but on the contrary, *T. clareae*, infested 1.5 - 2 times more worker, than drone brood (Woyke 1987d, Huan *et al.* 1993). Thus, the method of trapping the mites into drone brood can not be effective against *T. clareae*.

Control method without the use of chemicals, developed by me in Afghanistan (Woyke 1984b, 1985a) was applied and modified. The basis of this method is the finding that *T. clareae* can not survive on adult bees longer than 2 - 3 days. Therefore, the queen should be caged for 21 days, or all the brood should be taken out of the colony. The brood should not be destroyed, but together with the covering worker bees put into another hive. Colonies deprived of brood are free of *T. clareae* 3 days later. Colonies with brood will be free of that mite 3 days after last bees emerge from comb cells (Woyke 1993).

Since in Vietnam both mites *T. clareae* and *V. jacobsoni* are present, this method was modified to control both mite species, without the use of any drugs. After bee colonies are free of brood (deprived or emerged) and most *T. clareae* mites died, *V. jacobsoni* mites are trapped into unsealed brood. For this purpose, the queen is released on empty comb in a queen excluder isolator, or young worker and even better drone brood is added. When *V. jacobsoni* enter into brood cells, and the cells are sealed, the comb is removed out of the hive (Woyke 1985b, 1985c). This method was later constructively modified by Vietnamese scientists (Dung *et al.* 1992, Ha *et al.* 1993), and was widely applied in the practice. As a result the infestation of bee brood by *V. jacobsoni* dropped in the South from 4.9% to 3.1, 2.2 and 1.8% in the years 1989, 90 and 91 respectively, and by *T. clareae* from 46.2% (Woyke 1987a) to 9.2, 9.9 and 4.1% in the same years respectively (Huan *et al.* 1993).

3. Apiary management, multiplication of bee colonies and queen rearing

During the FAO consultancy, proper apiary management, multiplication of bee colonies and queen rearing, was taught on several beekeeping courses, and advises were given during visits to the apiaries. Two beekeeping officers of the Bee Research Centre were sent to Mr. Rice in Australia, for training in queen rearing and selection of bees.

As a result, the number of *A. mellifera* colonies increased from 20,000 in 1985 to 35,000 in 1990. Thus, 1.75 times increase occurred during the next 5 years. At the same time, honey production increased from 860 to 1200 tons, it means, that honey production increased 1.4 times during 5 years (Ha 1992).

4. Processing of honey and other bee products

The honey was of poor quality. Two reasons were responsible for that: 1. honey was extracted together with bee brood. Honey containing bee larvae was appreciated by the local market. 2. Due to high air humidity, the honey contained high percentage of water. Such honey could not be exported. Therefore, the basis of processing of honey and other bee products were explained by the FAO consultant, on some beekeeping courses.

FAO sent three officers to the XXX International Apimondia Congress in Nagoya, Japan in 1985. In the post-congress study tour, the officers got acquainted with different types of processing of honey and other bee products in Japan. Presidents of some processing plants were very interested in importation of honey and royal jelly from Vietnam. Two other beekeeping officers were sent to New Zealand for training in processing of honey. FAO supplied honey strainers, refractometers and a honey dehumidifier. As a result, 50 tons of honey were exported in 1985 for the first time from Vietnam. Five years later (1990) 10 times more honey was exported, and today (1996) tons are exported.

5. Establishing of beekeeping industry

Local industry for the production of bee equipment and comb foundations was established. For that purpose FAO bought (1985) four different woodworking machines, and a big, costly automatic machine for production of comb foundations.

6. Extension

Different courses were organized, and advises were given during visits in different apiaries. The following 9 field documents were written by the FAO consultant in 1985:

1. The biology of honey bees in the tropics. Min. Agricult., Bee Company, and FAO. Hanoi 1985.
2. Bee diseases and their control. Min. Agricult., Bee Company, and FAO. Hanoi 1985.
3. Parasitic mites of the honey bee: *Varroa jacobsoni* and *Tropilaelaps clareae* and their control. Min. Agricult., Bee Company, and FAO. Hanoi 1985.
4. Rearing of queen honey bees. Min. Agricult., Bee Company, and FAO. Hanoi 1985.
5. Instruction - to determine infestation rate of bee colonies by parasitic mites, and evaluation of the results of biological control. Min. Agricult., Bee Company, and FAO. Hanoi 1985.
6. Infestation of honey bee colonies by parasitic mites *Varroa jacobsoni* and *Tropilaelaps clareae* in South Vietnam and results of chemical treatment. Min. Agricult., Bee Company, and FAO. Hanoi 1985.
7. Present situation of parasitic infestation of bee colonies by *Varroa jacobsoni* and *Tropilaelaps clareae* in Vietnam and methods to combat these mites. Min. Agricult., Bee Company, and FAO. Hanoi 1985.
8. Multiplication of bee colonies. Min. Agricult., Bee Company, and FAO. Hanoi 1985.

9. Methods to combat the parasitic bee mite, *Tropilaelaps clareae* without the use of medicine. Min. Agricult., Bee Company, and FAO. Hanoi 1985. (Paper presented also at the XXX International Apicultural Congress in Nagoya, Japan 1985)

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