LEVELS OF INFESTATION BY THE MITE *VARROA JACOBSONI* IN COLONIES OF *APIS MELLIFERA* HONEYBEES IN THE STATE OF SANTA CATARINA, BRAZIL

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Introduction

The mite *Varroa jacobsoni,* originally an ectoparasite of the Asian bee *Apis cerana,* was limited to only a few regions in the world while infesting only this bee species. The low degree of varroa infestation of its original host apparently does not cause serious damage to *Apis cerana* apiculture (KOENIGER, 1985).

The parasite-host relationship between *Apis cerana* and the parasitic mite varroa seems to have reached an equilibrium due to the development of defense mechanisms against the parasite by this bee species (PENG et al., 1987). However, TEWARSON (1990) reported that, in Northern India, *Apis cerana* has been presenting serious health problems such as "sac brood" and other diseases caused by microorganisms. These diseases are due to pathogens transmitted by the varroa mite.

The contact of varroa with *Apis mellifera* has been mainly characterized by a rapid dispersal of the pest. Today, the parasite has spread to a large number of countries in Europe, Africa, Asia and America (DE JONG, 1990). Since the end of the 1950 decade, the world apiculture started to suffer from the impact with the drastic effects of varroasis in several regions of the world due to the high rates of brood and adult bee infestation in *Apis mellifera* bee colonies (DE JONG et al., 1982). Since its contact with *Apis mellifera,* varroa has caused the death of thousands of beehives (MORSE and GONÇALVES, 1979; DE JONG et al., 1984). In addition to the serious damage caused by the mite to *Apis mellifera* colonies, varroa is considered nowadays to be one of the most serious problems of the world apiculture, being one of the transmitters of the acute paralysis virus (APV) and of the "sac brood", as well as of the other pathogenic microorganisms such as fungi, bacteria and protozoa (BALL, 1989; BALL and ALLEN, 1988).

To minimize the effects of varroasis in *Apis mellifera,* several acaricides have been produced by different industrial chemical laboratories. However, no chemical product has proved to be fully effective thus far, in terms of eradication of the pest. Furthermore, the use of acaricides has made apiculture very expensive due to the cost of these products. Natural control, by using the biological control based on trap combs and on the distribution of drone brood, has made apiculture very expensive and inviable for practice on a large scale (Tibor SZABO, 1989).

As *Varroa jacobsoni* dispersed throughout the world, several research centers in different countries started lines of research directed towards the field of biology, of behaviour and of mite control. Different degrees of infestation by this mite have been detected in different regions, the climate and the race of *Apis mellifera* being factors that affect the development of the parasite (DE JONG et al., 1984; MORETTO et al., 1991). Thus, under the temperate climatic conditions of Europe, varroa has made apiculture impossible without the use of acaricides. However, in other regions of a milder climate, such as the Ribeirão Preto region (State of São Paulo), varroa was detected more than 15 years ago and has stabilized at low levels of infestation, apparently causing no serious damage to apiculture and requiring no chemotherapy (GONÇALVES, 1987). In contrast, in São Joaquim, State of Santa Catarina, in the South of Brazil, where climatic conditions are similar to those of Europe, higher rates of infestation by the mite have been recorded, compared to other regions in the country (MORETTO et al., 1991).

The objective of the present study was to evaluate the level of varroa infestation in *Apis mellifera* colonies located in different regions of the State of Santa Catarina.

Materials and Methods

Santa Catarina is a state in the South of Brazil, located between the 26th and 29th parallel of southern latitude. Santa Catarina has regions of strongly diversified climates. In general, the characteristics are those of the subtropical climate (LAGO, 1978). Winter and summer temperatures vary according to each region. In the more elevated regions, the mean winter temperatures are less than 10°C and the mean summer temperatures are of approximately 20°C. In coastal and valley regions, the mean winter temperatures oscillate between 15°C and 18°C and the mean summer temperatures are higher than 24°C (NIMER, 1971).

To evaluate the current situation of the varroasis pest in the State of Santa Catarina, adult bee samples were collected from commercial apiaries distributed throughout the State. The samples were collected in the spring of 1993, a season cha-

racterized by full development of bee colonies. The samples were collected from 8 to 10 bee colonies per apiary. Two hundred to five hundred adult bees were collected from each bee colony and placed in 200 ml plastic posts containing 70% alcohol.

The rate of infestation of the Africanized bee colonies by the parasite *Varroa jacobsoni* was determined by the method of STORT et al. (1981).

The statistical analysis for the evaluation of the effect of location was performed by means of the analysis of variance, with the level of significance set at 5%.

Results and Discussion

Table 1 presents the mean degrees of varroa infestation in the bee colonies from the 16 locations sampled.

The statistical analysis of the mean degrees of infestation showed a difference between locations ($F = 2,02$; $P < 0.05$).

Varroa jacobsoni is known to have been introduced to Brazil in the 1970's, but no damage caused by the pest to apiculture has been detected so far.

Damage to bee colonies starts to be visible when the rate of varroa infestation reaches 20 to 30% in adult bees (LANGHE and NATZKI, 1977). Under the climatic conditions of Santa Catarina, although the degree of varroa infestation differed between the locations sampled, the rate of infestation was never higher than 2.51% in any of the apiaries, a level that does not cause any apparent damage to bee colonies.

Table 1

Rates of *Varroa jacobsoni* infestation (%) in *Apis mellifera* bee colonies in apiaries from 16 locations in the State of Santa Catarina, Brazil

Location	Rate of infestation
Joaçaba	0.89
Videira	1.86
Fraiburgo	2.09
São Joaquim	2.03
Bom Retiro	0.40
Chapecó	1.91
S. Miguel do Oeste	2.51
Xanxeré	1.73
Mafra	1.91
Rio Negrinho	0.91
Joinville	2.40
Rio do Sul	1.78
Ituporanga	1.32
Taió	1.87
Blumenau	1.46
Timbó	1.78

Varroa was introduced to the State more than 10 years ago and, at present, the degree of infestation has stabilized at low levels similar to those reached by the pest in other Brazilian states (SILVA et al., 1992). In São Joaquim, one of the locations studied here, in 1987, varroa presented infestation rates almost 5 times higher than those detected today (MORETTO, 1988). This reduction in the infestation rate under the climatic conditions of this location suggests that Africanized bees must have developed some mechanisms of resistance to the parasite and that the equilibrium between parasite and host

must have stabilized under the climatic conditions of Santa Catarina, as well as of other regions of Brazil.

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