

POLLEN PELLETS AS A MEDIUM FOR CULTURE OF MITES *Suidasia pontifica* (Oud.) (Acarina, Suidasiidae)

Wit Chmielewski

Research Institute of Pomology and Floriculture, Apiculture Division in Puławy,
Department of Bee Products
Kazimierska 2, 24 - 100 Puławy, Poland
e-mail: wit.chmielewski@man.pulawy.pl

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S u m m a r y

Bee-collected pollen was tested as a medium for the rearing of *Suidasia pontifica*. This species is an allergenic mite which is important when considering the implications of economic and sanitary conditions. This species sometimes occurs in bee's nests. Cultures and experiments were conducted under laboratory conditions, i.e. temperature - ca. +20°C, RH - near 85%, food - bee-collected pollen (pollen loads). Some obtained life parameters of this mite species (average data) are as follows: ontogenesis - 17.3 days; eclosion of adults - 87.0%; ratio of females - 54.0%; longevity of imagines - 26.1 days; productivity - 59.1 eggs per female lifespan. These results show the comparatively high biological potential of the mites and usefulness of flower pollen as an attractive and effective medium for laboratory culture of these mites. The acceptance of bee-collected pollen seems to explain the occurrence of mites and their population increase in the nests of bees.

Keywords: *Acarina*, biology, mites, flower pollen, life parameters, rearing method, *Suidasia pontifica*.

INTRODUCTION

Mites of *Suidasia* genus (fam. *Suidasiidae* or *Saproglyphidae*, until recently) belong to the type of pest found in stored products. The mites occurring mainly in countries within the tropical zone of Africa, America, Australia and Asia (e.g. India, Japan, Taiwan, Thailand). They are found, but rarely in European countries (Germany, Great Britain, Poland). They are known as type of the pest which infests various imported goods. First in line of the imported goods are foodstuffs and fodder (rice, coffee-beans, fish meal, oilcakes). These mites are also found in house dust (Chmielewski 2005, Hughes 1976, Oshima 1970, Smiley 1991). They were also observed in laboratory insect cultures and museum collections. In Poland it is considered to be rather an exotic species

but it has even invaded Poland. Its first occurrence in Poland was in 1970 as one of pests collected from some samples of oilcakes imported from India, in fish meal from Western Africa and in coffee-beans from Kenya (Chmielewski 1971). Morphological descriptions and additional information on *S. pontifica* are available in foreign references. This species was first described over a hundred years ago as *Suidasia medanensis* Oudemans. This description was based on the basis of specimens recorded from a *Xylocopa* bee nest (Oudemans 1924), which seems to be its natural habitat.

There are also 3 other related species belonging to this genus. Scaly grain mite, *Suidasia nesbitti* Hughes has been found in samples of various products (bran, bird skins, rice, whale meat) collected mainly in

various tropical countries (Africa) or in imported goods to Europe (Hughes 1976) *Suidasia reticulata* Manson collected from *Silphidae* beetles in Australia (Manson 1973) *Suidasia australiensis* Fain et Philips was recorded as specimens attached to several Australian beetles of the genus *Trox* (Fain, Philips 1978).

The first two *Suidasia* species (*S. pontifica*, *S. nesbitti*) are considered as mites of medical and sanitary significance. They are considered to be producers of strong allergens causing serious diseases, e.g. dermatitis, rhinitis (Kilpio, Pirila 1952). These and other reports show that *Suidasia* mites occur mainly in hot climates and are representatives of the acarofauna of tropical countries (Chmielewski 1971, Fain 1971, 1973, 1977, Fain, Philips 1978, Flechtman 1968, Fox 1950, Hughes 1955, 1976, Manson 1973, Samśińak, Dlabola 1978, Tjying 1972). Authors of some papers note that *S. pontifica* mites were also found in bee nests and honeycombs (Delfinado-Baker et al. 1969, Eickwort 1988, 1990, Koeniger, Koeniger 1983). Their characteristics and morphology were described in some other acarological literature (Hughes 1955, 1976, Karg 1971, Oudemans 1923, 1924, Smiley 1991).

The biology of *S. pontifica* was almost unknown. There was only a little information available on its reproduction and about its feeding on seed-borne fungi (Sinha 1966). The aim of the research presented in this paper is to supplement the knowledge in this area. Studying the acceptance of bee-collected pollen as mite-food by this species and explaining the occurrence of this mite in beehives as well as explaining its population increase in hive debris were additional purposes of the present study.

MATERIAL AND METHODS

Live adults of *S. pontifica* for laboratory monocultures were separated from green coffee-beans and some other imported goods. Mite cultures and biological experiments were conducted under controlled conditions: temperature - ca. +20 °C, RH - near 85%, food - bee-collected pollen (pollen loads). Experiments and observations of fecundity and longevity of mites were based on 25 pairs (female + male) and the life history (from eggs to adults) of 200 individuals. Resting deutonymphs just before transforming into adults, were picked up from mass cultures and put in rearing cages supplied with some food. The food consisted of pollen pellets. Soon after eclosion, newly emerged imagines were paired (♀ + ♂). Each of the 25 pairs was placed into a separate rearing cell. They were observed every 1-2 days until their natural death. Longevity and egg laying were registered. Fresh laid one-day old eggs were taken from parental cages and placed in other cages supplied with food (20 cages x 10 eggs). Observations of them were conducted every 1-2 days until the end of the mite development cycle. After eclosion of imagines their sex was determined and duration of development was established.

The methods used in the present work were similar to those described and used in earlier biological investigations on *Suidasia* mites (Chmielewski 1991, 2000).

RESULTS AND DISCUSSION

The bionomics of the mites obtained during the laboratory experiments are presented in the table below (Tab. 1). Comparison of them with respective parameters of this species reared on dried baker's yeast as mite-food show, that this last medium seems to be more effective

than pollen diet. The majority of the biological data, e.g. embryonic phase, mortality of juvenile instars during development cycle, percentage of newly hatched imagines or frequency of females, and pollen and yeast used as food, were similar, but some bionomics were different. E.g. the longevity of mites fed pollen was almost twice as short (the average being 26.1 days) and productivity was over 2 times lower (59.1 eggs per female life span) than in the case of specimens feeding on yeast (i.e. 59.8 days and 125.0 eggs, respectively) (Chmielewski 2000). However, acaroids accept both kinds of food. Pollen loads seem to be effective mite-food for *S. pontifica* and could be recommended as an alternative medium for feeding of mites in laboratory cultures of this species.

Confrontation of bionomics of *S. pontifica* calculated and presented herein with respective parameters of the related species *S. nesbitti* obtained earlier under comparative conditions show that the biological potential of the latter seems to be

higher, but mode of life of both species in question are very similar (Chmielewski 1991).

Data on the biology of the species are limited to its ontogenesis only. In English literature (Hughes 1976) there is information on its life history, which takes 16-18 days under laboratory conditions, i.e. + 23°C, RH - 87%, food – wheat germ. This is comparable to the parameter (at average - 17.3 days) obtained during the present author's studies.

Live parameters obtained herein show the high biological potential of mites fed flower pollen. The flower pollen seems to be an effective medium or attractive addition of mite food for rearing of these species under laboratory conditions.

Use of fresh flower pollen or dried pollen loads as a supplement or alternative mite food give satisfactory results in the population increase of mites and mass production of acarological material for experimental, diagnostic and educational purposes.

Table 1

Biological data of *Suidasia pontifica* Oudemans obtained during laboratory experiments; temperature - ca. +20°C, RH - ca. 85%, medium - pollen pellets; initial numbers of mites in experiments: n - 200 individuals (life history), n - 25 pairs of imagines (longevity, productivity)

Life parameters	Average data (from - to)
Embryonic development (days)	3.8 (2-8)
Complete development cycle (days)	17.3 (12-25)
Hatch of larvae (%)	94.0 (85-100)
Eclosion of adult mites (%)	87.0 (80-100)
Frequency of females (%)	54.0 (40-80)
Longevity of imagines (days)	26.1 (18-45)
Preoviposition period (days)	3.4 (2-5)
Oviposition period (days)	16.0 (13-21)
Postoviposition period (days)	7.2 (2-18)
Fecundity of female per whole life span (eggs)	59.1 (26-80)
Productivity per female life day (eggs)	2.6 (0-14)
Productivity per oviposition day (eggs)	3.7 (1-14)

DISCUSSION AND CONCLUSIONS

Calculated life parameters of *S. pontifica* are evidence of the good condition and vitality of this species fed bee-collected flower pollen (pollen pellets) and show its high biological potential.

Presented mite bionomics observed on pollen loads are comparable to the results obtained in similar experiments conducted on baker's yeast under similar conditions and published earlier (Chmielewski 2000).

Pollen diet is accepted by mites and can be recommended as an attractive and effective medium for mite rearing and as a production of biological material destined for allergological tests, diagnostics and experimental or educational purposes.

The acceptance of pollen loads as food by *S. pontifica* seems to be sensible explanation of some aspects of the mite's mode of life and their relation with bees as hosts, i.e. colonization of hive debris and mite population increase in honey combs and bee nests.

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OBNÓŻA PYŁKOWE JAKO POŻYWKĄ W HODOWLI ROZTOCZY *Suidasia pontifica* (Oud.) (*Acarina, Suidasiidae*)

Chmielewski W.

S t r e s z c z e n i e

Wypróbowano pyłek kwiatowy zbierany przez pszczoły jako pożywkę dla roztoczy w hodowli *Suidasia pontifica* – szkodliwego gatunku przechowalnianego o gospodarczym i sanitarnym znaczeniu (alergia), który występuje też czasem w gniazdach pszczół.

Hodowle i doświadczenia biologiczne prowadzono w kontrolowanych warunkach laboratoryjnych: temperatura ok. +20°C, wilgotność względna powietrza - ok. 85%, pokarm – pyłek zbierany przez pszczoły (obnóża pozyskiwane za pomocą poławiaczy).

Niektóre z wyliczonych parametrów życiowych gatunku (średnie dane) przedstawiały się następująco: czas rozwoju osobniczego od jaja do osobnika dorosłego – 17,3 dni, wylęg imagines – 87,0%, udział samic – 54,0%, długość życia osobników dorosłych – 26,1 dni, płodność – 59,1 jaj w ciągu całego życia samicy.

Wyniki te wskazują na wysoki potencjał biologiczny gatunku i świadczą o przydatności pyłku kwiatowego jako atrakcyjnej i skutecznej pożywki w laboratoryjnej hodowli tych roztoczy.

Akceptacja przez nie pyłku zbieranego przez pszczoły jako pokarmu wyjaśnia częściowo ich występowanie i wzrost populacji w gniazdach tych owadów.

Słowa kluczowe: *Acarina*, biologia, metoda hodowli, parametry życiowe, pyłek kwiatowy, roztocze, *Suidasia pontifica*.