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RAPID COMMUNICATION

POLLEN IMPORTATION - A POSSIBLE ROUTE FOR PEST INTRODUCTION (1)

F. W. LEONARD*, C. F. REICHELDERFER** and H. SHIMANUKI*

* *U.S. Department of Agriculture, ARS, Bioenvironmental Bee Laboratory, Bldg. 476, BARC-East, Beltsville, MD 20705, U.S.A.*
** *Department of Entomology, University of Maryland, College Park, MD 20742.*

SUMMARY

The United States imports thousands of pounds of bee-collected pollen each year to meet the demands of the health food industry. Bee-collected pollen is also an attractive food source for insects and mites. This investigation was conducted to identify some of the arthropods inhabiting bee-collected pollen and to determine if pollen shipments were a potential source for pest introduction from one country to another. Seventy-one insect and 27 mite families were discovered in the pollen samples examined from the United States and other countries.

The beehive is an attractive source of food and shelter for many arthropods. BANASZAK (1980) found 150 different species of insects representing 11 orders

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associated with beehives in Poland. Observations on the mites found in beehives have been reported by HOMANN (1983), GROBOV (1975), CHMIELEWSKI (1977), and HARAGSIM *et al.* (1978); with the most recent survey (GROBOV, 1980) listing the number of mite species associated with beehives at 160.

Pollen traps are also subject to invasion by arthropods because of the food and shelter provided while the pollen is accumulating. This survey was conducted to identify arthropods contaminating bee-collected pollen and to determine if pollen shipments could be a source of pest introduction. Participants were supplied with round mailing tubes (18 × 6 cm) and instructed to transfer the pollen from the pollen traps to the mailing tubes which were then mailed to Bioenvironmental Bee Laboratory, Beltsville, Maryland. Upon receipt, the samples were weighed and examined visually for arthropods. Next, approximately one-half of each sample was placed in a Berlese funnel for 24 hours using à 75-watt incandescent light-bulb as the heat source. Arthropods were collected in a vial containing 70 %

TABL. 1. *Origin of pollen samples received in 1981-1982.*

Country	Number of samples	Pollen received (g)
Brazil	9	124
Canada*	7	989
Denmark	2	11
Dominican Republic	2	227
Egypt	1	135
France	4	555
Guatemala	1	203
Hungary	2	842
Israel	1	50
New Zealand	3	316
Phillipines	1	1
Spain*	8	2,254
Australia*	7	935
Trinidad	1	5
United States	460	50,929
Arizona	7	1,266
California	5	1,223
Colorado	7	1,756
Florida	11	1,628
Louisiana	4	906
Maryland	360	36,743
New Jersey	45	3,322
Oklahoma	2	217
Washington	11	2,368
Wisconsin	4	539
Wyoming	4	891

* Major exporters of bee-collected pollen to the United States.

ethanol. The remaining half of the pollen sample was shaken on a 20 mesh per inch sieve to remove debris and small arthropods which were identified using a dissecting microscope. The pollen pellets which did not pass through the sieve were then incubated for 30 days at 32 °C and examined for the presence of newly emerged adult arthropods. Although no mites survived the 30 day incubation period, several types of insects had hatched from eggs; these being psocids, beetles and moths of the family Pyralidae.

Five hundred and nine samples of bee-collected pollen were examined (Table 1). Forty-nine of the samples were from other countries and 32 of these contained insects and mites. However, most of these arthropods were also present in the samples collected in the United States; exceptions being mites in the families Ameroseiidae and Varroidae, and a few parasitic wasps.

The United States pollen samples were usually examined within seven days of mailing and most of the arthropods recovered from these samples were alive. However, the pollen samples from outside the United States were in transit 7 to 30 days and only two samples contained living mites, these were pollen feeders in the family Acaridae. Also, a few of these samples contained living insects which were members of Psocoptera (pollen-feeders), Lepidoptera (wax-moth larvae) or Coleoptera (larvae and adult beetles).

The pollen samples examined contained a total of 71 insect and 27 mite families (Table 2). Among the 27 families of mites present in the pollen, the most numerous were : Acaridae-*Tyrophagus putrescentiae,* Carpoglyphidae-*Carpoglyphus lactis,* and Laelapidae-*Laelaps* sp. The most numerous insects were : Liposcelidae (Psocoptera), Thripidae (Thysanoptera), Meloidae, Nitidulidae, Tenebrionidae (Coleoptera), Stylopidae (Strepsiptera), Pyralidae (Lepidoptera), and Formicidae (Hymenoptera). A s far as the writers, are aware, there are no previous reports on the finding of the mite families : Phytoseiidae, Camerobiidae, Erythraeidae, or Tenuipalpidae in the beehive.

Many of the insects and mites found in bee-collected pollen were represented by only a few individuals as their usual hosts or habitats do not involve *Apis* or beehives. Included in this group were plant-inhabiting arthropods which were collected by the foraging bees. Other flower — and leaf — feeding arthropods are phoretic on the honey bee and may have been accidentally introduced into the pollen traps. The insects and mites most often encountered in the trapped pollen were usually commensal and feed on debris or other mites. The pollen-feeding arthropods are of most concern because they consume the pollen. However, the majority of the arthropods encountered in this study do not pose any danger to the honey bee, although they may vector bee disease organisms.

TABL. 2. — *Summary of each insect and mite family found in all the pollen samples.*

INSECTA			INSECTA			INSECTA			ARACHNIDA		
Orders	Families	Frequency	Orders	Families	Frequency	Orders	Families	Frequency	Orders	Families	Frequency
THYSANURA	Lepismatidae	< 10	COLEOPTERA	Anobiidae	< 10	DIPTERA	Cecidomyidae	< 10	PARASITIFORMES	Ameroseiidae	< 10
COLLEMBOLA	Entomobryidae	< 100		Byturidae	< 10		Culicidae	< 10		Laelapidae	< 1000
	Smithuridae	< 10		Carabidae	< 10		Drosophilidae	< 10		Macrochelidae	< 10
ORTHOPTERA	Blattidae	< 10		Chrysomelidae	< 10		Phoridae	< 10		Parasitidae	< 100
PSOCOPTERA	Liposcelidae	< 1000		Coccinellidae	< 10		Psychodidae	< 10		Phytoseiidae	< 100
	Pseudocaecillidae	< 100		Cucujidae	< 10		Sciaridae	< 10		Uropodidae	< 10
	Psocidae	< 10		Curculionidae	< 10	HYMENOPTERA	Braconidae	< 10		Varroidae	< 100
	Trogiidae	< 10		Dermestidae	< 10		Ceraphronidae	< 10	ACARIFORMES	Acaridae	> 1000
THYSANOPERA	Thripidae	< 1000		Elateridae	< 10		Chrysididae	< 10		Anystidae	< 10
HEMIPTERA	Anthocoridae	< 10		Histeridae	< 10		Cynipidae	< 10		Ascidae	< 10
	Lygaeidae	< 10		Lathridiidae	< 100		Diapriidae	< 10		Brachychthoniidae	> 10
HOMOPTERA	Aphidae	< 100		Meloidae*	< 1000		Encyrtidae	< 10		Camerobiidae	< 10
	Coccidae	< 10		Mordellidae	< 10		Eucharistidae	< 10		Carpoglyphidae	> 1000
	Diaspididae	< 10		Mycetophagidae	< 100		Eucoilidae	< 10		Cheyletidae	< 10
	Psyllidae	< 10		Nitidulidae	< 1000		Eulophidae	< 10		Cunaxidae	< 10
				Orthoperidae	< 100		Eupelmidae	< 10		Erythraeidae	< 10
				Ostomidae			Formicidae	< 1000		Galumnidae	< 100
				Phalacridae	< 10		Halictidae	< 10		Liacaridae	< 10
				Phalacridae	< 10		Mymaridae	< 100		Oribatulidae	< 100
				Ptilidae	< 10		Platygasteridae	< 10		Perlohmanniidae	< 10
				Ripiphoridae	< 10		Proctrupidae	< 10		Pygmephoridae	< 10
				Scraptiidae	< 10		Pteromalidae	< 10		Scutararidae	< 10
				Silphidae	< 10		Trichogrammatidae	< 10		Tarsonemidae	< 100
				Silvanidae	< 100		Vespidae	< 10		Tenuipalpidae	< 100
				Staphylinidae	< 10					Tetranychidae	< 10
				Tenebrionidae	< 1000					Trombidiidae	< 10
			STREPSIPTERA	Stylopidae*	< 1000					Tydeidae	< 10
			LEPIDOPTERA	Acrolophidae*	< 10						
				Arctiidae*	< 10						
				Geometridae*	< 10						
				Incurvaridae*	< 10						
				Limacodidae*	< 10						
				Pyralidae*	< 1000						

* Only larval stage occuring with the bee-collected pollen
< 10 — Rarely associated w/*Apis* or beehives
< 100 — Occasional inhabitants of the pollen trap
< 1000 — Common inhabitants of the pollen trap
> 1000 — Many pollen feeding arthropods.

This survey shows that many small arthropods inhabit trapped pollen and they can survive the conditions under which the pollen is shipped. Because the possibility does exist for pest insects and mites to be transported with pollen, it is necessary to treat the pollen upon harvesting (e.g. air-drying, freezing, and removal of debris).

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RÉSUMÉ

L'IMPORTATION DE POLLEN, UNE VOIE ÉVENTUELLE D'INTRODUCTION DES PARASITES

Les États-Unis importent chaque année des milliers de livres de pollen récolté par les abeilles afin de répondre à la demande de l'industrie de l'alimentation diététique. Le pollen récolté par les abeilles est aussi une source de nourriture attractive pour les insectes et les acariens. Cette recherche a été menée en vue d'identifier quelques uns des Arthropodes présents dans le pollen récolté par les abeilles et de déterminer si les expéditions de pollen peuvent constituer une source potentielle d'introduction de parasites d'un pays à un autre. On a déterminé 71 familles d'insectes et 27 acariens dans les échantillons de pollen examinés provenant des États-Unis et d'autres pays.

ZUSAMMENFASSUNG

POLLENIMPORTE - EIN MÖGLICHER WEG FÜR DIE EINSCHLEPPUNG VON SEUCHEN

Die Vereinigten Staaten importieren jedes Jahr Tausende Pfund von bienengesammeltem Pollen, um den Bedarf der Industrie für Diät-Ernährung zu decken. Bienengesammelter Pollen ist auch ein attraktives Futter für Insekten und Milben. Diese Untersuchung wurde durchgeführt um einige der Arthropoden zu bestimmen, die im bienengesammelten Pollen leben, und um festzustellen, ob Pollentransporte eine mögliche Quelle für die Seuchenverschleppung von einem Land zum anderen sein könnten. Einundsiebzig Insekten- und 27 Milben-Familien wurden in den untersuchten Pollenproben aus den Vereinigten Staaten und anderen Ländern gefunden.

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