

Bee pollen - microorganisms interactions

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Abstract.

Taking into account the food safety aspects, there are many possible interactions of different importance between microorganisms - plant pollen - bee nutrition - pollination - plant production for food and feed. In our study we have oriented on the interactions between the bee pollen and bacteria. In pollen samples nos. 1 and 2 several species of *Serratia* genus were identified including *Serratia marcescens*, which is an opportunistic pathogen and occasionally could be dangerous for immunodepressive individuals. This bacterial species is often occurring on plants, anyway on the most pollen samples (nos. 3 - 8) it was absent. Among the bacterial isolates occupying the tested pollen samples species of *Agrobacterium radiobacter* and *Serratia marcescens* have been taxonomically identified. Bacteria as common microflora of pollen and pollinator insects have received little attention. Therefore we would like to stress some aspects of possible mutual effects between the environment and pollen quality. Our results could help with introduction of new thoughts in the branch of pollen hygienical status, e.g. by elaboration of good manufacturing practices in the process of collection and processing of pollen.

Material and methods.

Corbicular pollen samples were collected in 8 localities of the south-western Slovakia during the spring of 2002 and supplied by the firm Vega Konti Ltd., Slovakia. The bacterial strains were grown in Peptone broth, Nutrient agar and/or on MacConkey, Slanetz-Bartley and Cetrimid agar selective media (Biomark Laboratories). Fractions of pollen sample (3 g) were extracted overnight in 5 ml of physiological mineral medium under continual mixing on shaker at 30°C. The obtained suspension was inoculated (2 aliquots of 0.5 ml) on the surface of Nutrient agar - the grown colony forming units indicated the total number of bacteria. The sporulating bacteria were determined after inoculation of the suspension formerly heated for 20 minutes at 80°C. Enterococci were estimated on Slanetz-Bartley agar. Microorganisms occurring on pollen were identified using cultivation and microscopic observation supplemented with biochemical tests. To differentiate the fermenting and non-fermenting bacteria the NEFER and ENTERO tests (Lachema Brno) were applied.

Results.

Total number of bacteria colonizing the bee pollen ranged from 100 to 13,125 colony forming units per 1 g of pollen. The bacterial isolates were further analysed exploiting several commercial biochemical tests. In the pollen were found fermenting and non-fermenting Gram-negative (G⁻) rods, Gram-positive (G⁺) sporulating cocci, non-haemolytic G⁺ cocci and fermenting G⁻ rods were qualitatively differentiated on the base of their growth characteristics and biochemical traits as physiological groups.

Tab. Number of bacteria detected as colony forming units (CFU) on pollen samples

Pollen sample No.	Bacteria - CFU/g of pollen
1	300
2	1100
3	13125
4	1125
5	1250
6	1000
7	100
8	1200

Tab. Identified bacterial species and physiological groups occurring on pollen samples.

Samples of	Bacteria
Pollen no. 1	<i>Serratia marcescens</i> <i>Agrobacterium radiobacter</i> Fermenting and non-fermenting Gram-negative rods
Pollen no. 2	<i>Serratia marcescens</i> <i>Agrobacterium radiobacter</i> Fermenting and non-fermenting Gram-negative rods
Pollen no. 3	Gram-positive sporulating cocci Non-haemolytic Gram-positive cocci Fermenting and non-fermenting Gram-negative rods <i>Agrobacterium radiobacter</i>
Pollen no. 4	Fermenting and non-fermenting Gram-negative rods <i>Agrobacterium radiobacter</i>
Pollen no. 5	Fermenting and non-fermenting Gram-negative rods <i>Agrobacterium radiobacter</i>
Pollen no. 6	Fermenting Gram-negative rods
Pollen no. 7	Fermenting Gram-negative rods
Pollen no. 8	Fermenting Gram-negative rods

In August 2007 we controlled the bacterial amounts occurring on pollen of two plant species - poppy and rape.

Tab. Comparison of bacteria occurrence on pollen of two plant species in August 2007.

Pollen of	CFU/g of pollen		
	Total no. of bacteria	Enterococci	Sporulating bacteria
Poppy	2000	33	23
Rape	1070	20	23

Tab. Comparison of bacteria occurrence on pollen of two plant species in February 2008.

Pollen of	CFU/g of pollen		
	Total no. of bacteria	Enterococci	Sporulating bacteria
Poppy	2660	0	94
Rape	3670	0	244

Pollen samples stored at -20°C for 6 months showed a moderate increase of the total amount of bacteria, slightly higher increase of sporulating group of bacteria and full elimination of the Enterococci.

Conclusions.

Bacterial species and physiological groups were represented as common microflora of pollen, although they are usually receiving a scarce attention. Therefore this contribution tried to stress some aspects of possible mutual effects between the environment, pollinators (as possible carriers of microflora) and pollen quality. Our results could support to introduce some new thoughts concerning the pollen hygienical status, e.g. by elaboration of good manufacturing practices in the process of collection, storing and processing of pollen.

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