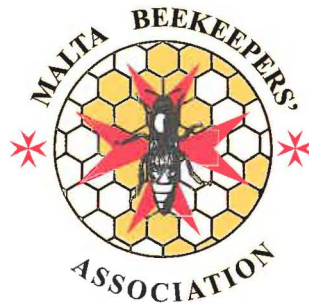


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Nutritional and Palynological Screening of Bee Pollen from Different Regions of Portugal

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Pollen is a product with an increasing market potential, particularly in the nutraceutical and food supplements segment. Besides of its image association with natural products, it is a source of proteins, rich in minerals, antioxidant compounds and essential amino acids. This composition richness is also the reason why honeybees rely in its collection to feed the colony. Bees fly from flower to flower and agglutinate the pollen grains through the addition of salivary substances and small amounts of nectar, which are then transport into the hive as a pollen load, the bee pollen.

This work is part of the project DivInA, Diversification and Innovation in Beekeeping, (financed by the Rural Development Program 2014-2020), and aims to diversify the outcomes of the Portuguese beekeepers in order to increase its profitability and guarantee the sustainability of its economic activity.

In this communication, the nutritional value and palynological profile of 31 pollen samples, collected from four regions of Portugal, during spring and summer of 2018, are presented. The nutritional parameters include ash, moisture, total fat, total protein, and total carbohydrate contents. The palynological analysis was achieved by microscopy and comparison with the pollen database available in the laboratory.

Besides the variation in humidity of the samples, which ranged from 9 to 30%, the major nutritional parameters of the samples were in agreement with the values reported in the literature. Nevertheless, it seems clear that the differences registered in the evaluated nutritional parameters reflect the floral differences between samples.

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The Determination of Fat Content and Fatty Acid Composition of Bee Pollen

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Pollen is an exceptional food supplement, that thanks to its nutritive value, has been included in human's daily diet. Furthermore, honeybees use pollen as their nutritional source of numerous components including lipids and essential fatty acids among others. However, it is important to know that all types of pollen do not have the same chemical composition and therefore they do not have to the same extent all the characteristics and properties attributed to the term "pollen" in general. Pollen derived from different plants varies in nutritional value. The aim of this study was to investigate the total fat content and the fatty acid composition of honeybee-collected pollen from various plant species. Specifically, for the determination of total fat content of 46 taxa, Soxhlet method was applied and a great range was found (13.2%). The highest contents were marked in families Brassicaceae (*Sisymbrium irio* 8.09%, *Brassica napus* 7.76%, and *Brassica nigra* 7.60%) and Asteraceae (*Echinops ritro* 13.60%, *Taraxacum officinale* 7.97%). Moreover, the results from the GC/MS analysis of 20 unifloral pollen taxa showed considerable differences in their fatty acid composition, depending on their botanical origin, confirming the need for polycarbonate pollen collection and consumption by bees to ensure a balanced diet. Regarding the unsaturated fatty acids, the highest contents of linolenic (C 18:3), oleic (cis C 18:1) and linoleic (C 18:2) acid were found in *Cephalaria transylvanica* (77.86%), *Eucalyptus sp.* (68.23%) and *Echinops ritro* (38.76%), respectively. As for saturated fatty acids, the highest contents of palmitic (C 16:0) and stearic (C 18:0) acid were recorded in *Ranunculus sp.* (35.37%) and *Convolvulus arvensis* (24.57%), respectively. From the analyzed fatty acids the 68.5% corresponded to unsaturated, from which the 43.8% corresponded to poly-unsaturated and the 24.7% to the mono-unsaturated. Due to the high concentration of unsaturated essential fatty acids, bee - collected pollen can be applied as a dietary supplement for human beings and play an essential role in the reproduction, development, and growth of honeybees.