

October 2012 Issue 7

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### Characterisation of Maltese Honey

# Characterisation



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The history of the Maltese honey industry dates back to the Pheonician Era, some 800 years B.C. Earthenware jars used for the domestication of wild swarms, are still found today in some Punic apiaries (Selmun Bay, *Mgiebah*) (figure 1). Malta was known as the island of honey or Melite, for the Greeks and Romans. In spite of cultural changes and change in land use over time, Maltese honey is still sought after nowadays.

Local honey production depends mainly on season and location of apiaries. There are three honey harvests occurring during spring, summer and autumn, successively. Winter is not a favourable season for honey production. Most frequently, bees do not forage during this season, due to the cold weather and due to the scarcity of flowers in the Maltese countryside. Honey colour is usually associated with a particular season (figure 2). Spring honey is a multifloral type of honey characterised by the presence of red clover (*Hedysarum coronarium*), boar thistle (*Galactites tomentosa*) and borage (*Borago officinalis*) pollens. The honey is usually light yellow in colour. The second season, summer, is typified by monofloral golden yellow thyme honey. Wild thyme (*Thymus capitatus*) is a shrub that starts flowering during late May. Wild Thyme grows on the garrigue in the north of Malta and on the Island of Comino. Consequently, many beekeepers translocate their hives to the North of Malta. During the autumn season, bees collect their nectar from the flowers of eucalyptus (*Eucalyptus melliodora*) followed by those of the carob trees (*Ceratonia siliqua*). The carob honey may occur as a monofloral type of honey and is characterized by a dark brown colour. During these seasons, other monofloral honey types may also occur, mainly depending on the foraging area of a particular plant species. Typical monofloral honeys include boar thistle, citrus and red clover. Honey can be declared as monofloral or polyfloral mainly on the abundance of pollen grains from typical plant species.

In 2007, the Division of Rural Sciences and Food Systems, within the Institute of Earth Systems, embarked on several research projects dealing with the quality of honey.

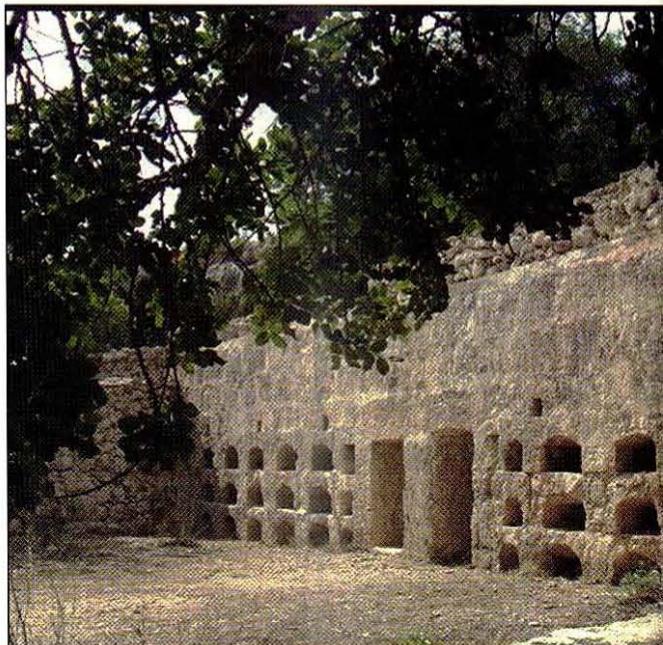


Figure 1 - Punic apiaries in Xemxija.

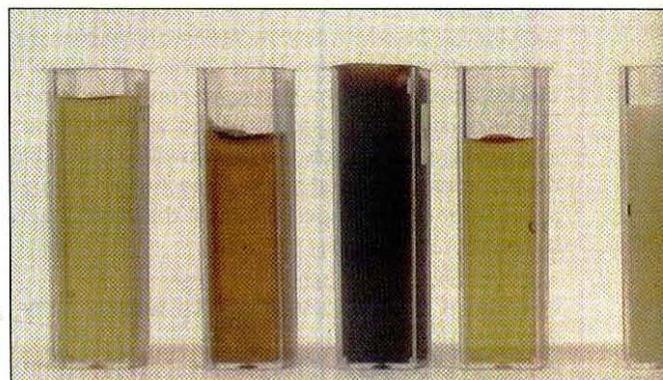


Figure 2 - Honey samples from different localities and different seasons.

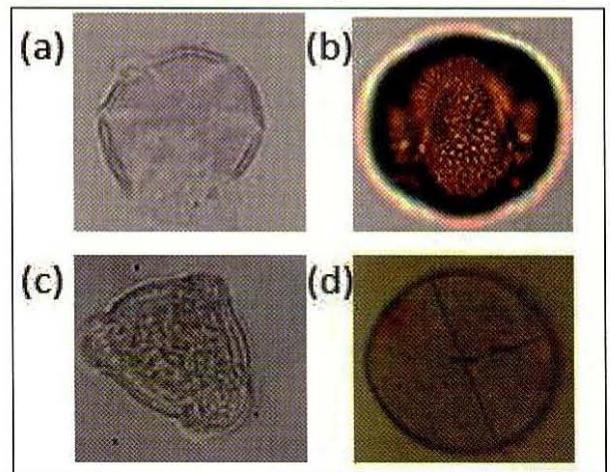


Figure 3 - Pollens in honey - (a) thyme, (b) carob, (c) eucalyptus and (d) red clover

# of Maltese Honey



Prior to this research, a few scattered pieces of work were conducted with no conclusive results. The quality of Maltese honey was investigated as a response to several challenges and opportunities arising due to the accession of Malta into the European Union, the increasing competition from neighbouring countries and the ever increasing number of tourists visiting Malta. Along these years several part-time beekeepers have emerged. Although this may be positively foreseen as a way of strengthening our honey industry, amateur honey products may jeopardize the industry altogether.

The study of Maltese honey initiated with the characterisation of the basic physicochemical parameters. The main characteristics studies were pH, conductivity, colour intensity and refractive index. This initial study was conducted on twenty honey samples, around the Maltese archipelago, obtained from various beekeepers who were keen to know more about the honey they were producing. The study was extended to the phytochemical and pharmacological activity of Maltese honey. Maltese honey contains several

phytochemicals including flavonoids, terpenoids and proteins that are derived from blossom nectar. Honey also exhibited a significant pharmacological activity when compared to a fructose/glucose/sucrose solution that mimics the sugars present in honey. The characterisation of honey by pollen abundance was also studied (figure 3). This is scientifically termed as melissopalynology. Another study was initiated to follow the procedure of beekeeping and honey production on the island of Gozo. Several honey samples were obtained from various beekeepers and the physicochemical characterisation was conducted. This study revealed the abundance of polyphenols in honey and concluded that within this context, Gozitan honey contains less than 20 mg/kg hydroxymethylfurfural (HMF). HMF values increase when honey is liquefied. This is because during heating sugars and amino acids, present in honey, react via the Maillard reaction to give HMF (figure 4). Unfortunately, the Maltese consumers prefer liquefied honey as opposed to several foreign consumers. A Hazard Analysis Critical Control System (HACCP) was assessed on various beekeepers' premises. This system was complemented with microbial analysis of various components on the system, by swabbing. Operators showed a high level of awareness of hygiene practices.

A project under the National Research and Innovation Programme, funded by the Malta Council for Science and Technology, was awarded in 2010 aiming at developing molecular technique to determine the quality and quantity of pollens in honey samples, without the need to count pollen samples under the microscope. The first phase of this project was concluded and results will be presented during the second International Symposium on Bee Products (9-12 September 2012) Bragança in Portugal. Briefly, eleven physicochemical characteristics were studied, namely visual colour, consistency, colorimetric analysis, Brix, moisture content, pH, free acidity, conductivity, HMF content, diastase and proline levels. Statistical analysis revealed that the honey samples were segregated by season. During the same year, a collaborative study was initiated with the Aristotle University of Thessaloniki, Laboratory of Apiculture and Sericulture and the Universidade do Porto, Faculdade de Farmácia, to conduct research on Mediterranean thyme honey.

The Division will continue to pursue work on the value of Maltese honey in order to confirm its worth through scientific methods. For more information contact Dr. Everaldo Attard on [everaldo.attard@um.edu.mt](mailto:everaldo.attard@um.edu.mt) or visit <http://staff.um.edu.mt/eattl>

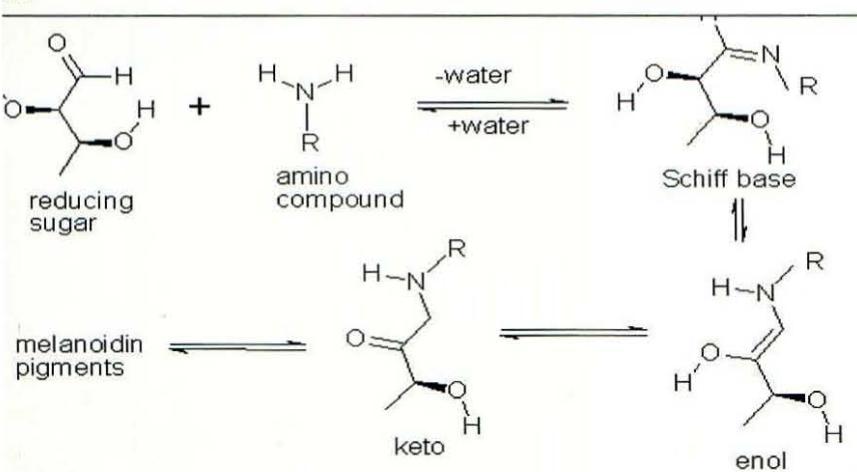
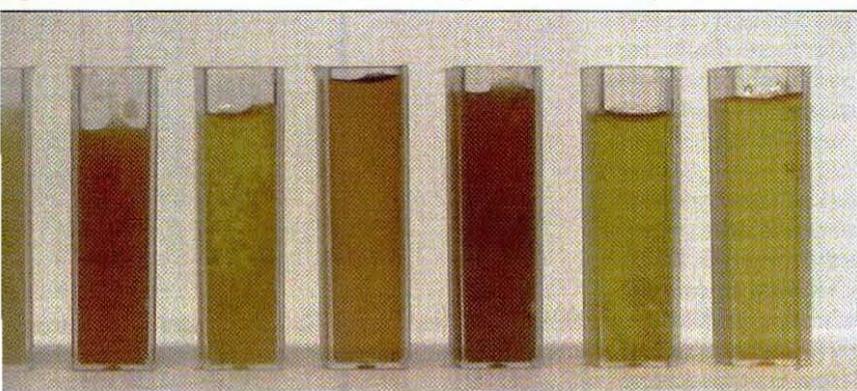


Figure 4 - The Maillard reaction monosaccharide-amino acid interaction