

# A STUDY OF THE CAUSES OF FALLING HONEY PRICES IN THE INTERNATIONAL MARKET

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## Introduction

During the last 18 months we have witnessed a significant fall of prices in the international market of honey. This has been especially notable in the US market, main destination of the honey exports of several South American countries (Fig.1). It is noteworthy that the figures here presented (latest available) still correspond to contracts signed some months earlier and do not reflect current even lower prices, that will surely be shown in official statistics during the next few months.

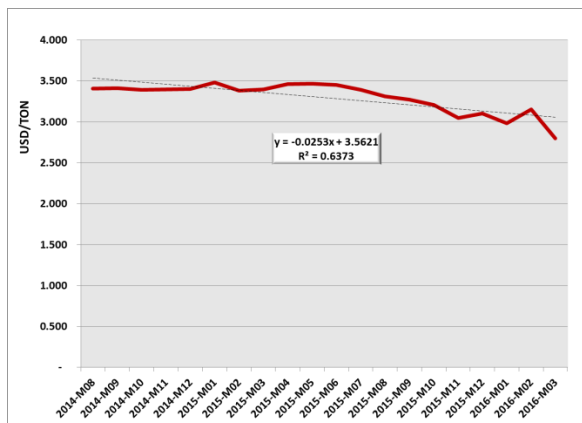


Figure 1: Average unit price of imported bulk honey to U.S.  
Source: ITC-UNCOMTRADE

We are now living in a strange scenario of an apparent surplus of “honey”; there seems to be a special excess of pure honeys from traditionally producing countries.

Various possible causes have been suggested to explain this phenomenon of falling prices: an increase in the number of beehives around the world; a decline in world’s demand of the product; or a massive dilution / adulteration of

honeys (with cheap syrups) from some exporting countries.

This article will discuss those three possible causes of the fall in honey prices, mainly using official statistics available from FAOSTAT and INTERNATIONAL TRADE CENTRE (ITC) - UNCOMTRADE, as well as other available information of the sector.

## The relationship between the number of beehives and the export capacity of different countries.

Honey, as well as other bee products, has been well appreciated by people for many centuries. Its different and delicious flavors and aromas, its close relationship with nature, and its benefits for human health contribute to honey’s revered image. However, the advance of agriculture, the destruction of natural environments, the contamination of bee forage lands with pesticides, in conjunction with the appearance of new bee diseases, make honey an increasingly scarce, difficult and expensive-to-produce, natural food. In addition, with the tremendous growth of human population and the move to meat-based diets in Asia, land that was used for foraging of bees is being used for crops such as soybeans and corn, which are not conducive to the production of honey. Another worrying factor is the increasing average age of beekeepers around the world, with new generations preferring less difficult and more profitable activities.

According to FAO data, during the last seven years the number of beehives around the world has grown 8%, which can be considered a rather moderate increase compared to the evolution of other primary productions, and probably reflects the above mentioned difficulties of beekeeping. However, and for the same period, world honey exports grew definitely faster, reaching a 61% total increase since 2007 (Fig. 2).

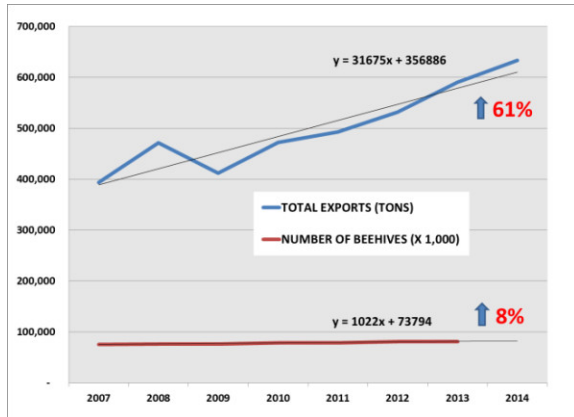


Figure 2: Evolutions of world number of beehives and total honey exports. Source: FAO and ITC-UNCOMTRADE

In order to better understand the relationship between the number of beehives and honey exports, let's now separately analyze the evolution of these parameters for two groups: the seven major exporting countries of honey from the Americas (Argentina, Mexico, Brazil, Canada, Uruguay, Chile and Cuba) and the seven main honey exporters of the Eastern hemisphere (China, India, Viet Nam, Ukraine, Thailand, Taiwan and Turkey)

Major honey exporting countries of the Americas showed a slight increase of their beehives counts since 2007 (+ 3%), while their honey exports fell 9%, probably due to the increased production difficulties for beekeeping in this region (Fig. 3).

Meanwhile, the total number of beehives of the Eastern group grew 13%, but they increased their honey exports by 196 %! (Table 1 and Fig.

4). A shocking abnormality that goes completely against world trends of lower productivity per hive. For example, U.S. beekeepers have reported reductions of productivity per hive during the past decade of 50-60%.

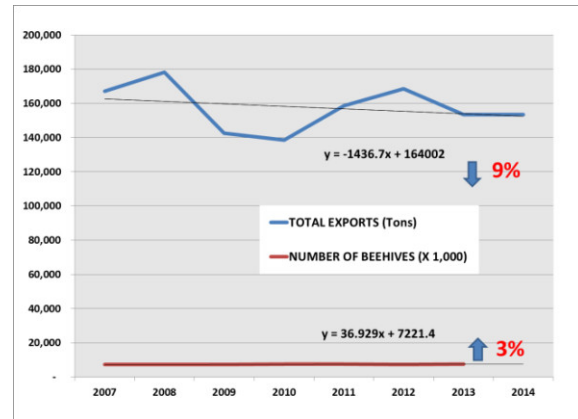


Figure 3: Evolutions of beehives number and total honey exports of the seven main honey export countries of the American continent. Source: FAO and ITC-UNCOMTRADE

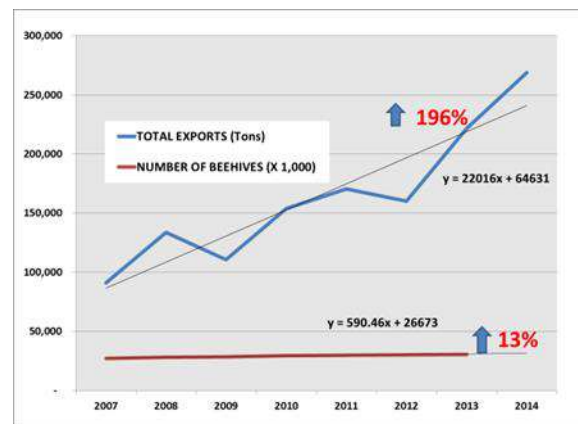


Figure 4: Evolutions of beehives number \* and total honey exports of the 7 main honey export countries of the Eastern hemisphere. Source: FAO and ITC-UNCOMTRADE.

\*(beehives number not available for Thailand)

It is most unlikely that those eastern countries could have reduced their honey consumption (hence increasing their export capacities) in the midst of a general improvement of the purchasing capacity and of the standard of living of consumers of that region. Nor is it plausible that such export growth could have been

achieved through an improvement of the productivity of their hives, when the same adverse factors affecting apiculture worldwide also occur in the Easter Hemisphere.

Table 1: Total honey exports of the seven main honey export countries of the Eastern hemisphere. Source: ITC-UNCOMTRADE

	2007	2015
China	64,354	144,756
India	4,784	40,829
Viet Nam	12,976	39,696
Ukraine	3,516	35,003
Thailand	3,869	19,631
Turkey	398	7,192
Taiwan	1,004	5,086

The emergence of new honey export countries during the last decade is quite suspicious. While some of these countries have strong domestic markets that make it quite difficult to understand their low export prices of honey to some destinations (True Source Honey, 2014), others cannot justify current export volumes nor the quality of the exported honey with their levels of beekeeping activity, their floral sources, and history.

The case of China deserves a separate paragraph. With 9 million beehives, it is by far the world’s largest honey producer and exporter. Its annual honey production is around 450,000 tons and domestic consumption, even though there are no official figures, seems to be much larger than its production capacity. The Chinese consumer appreciates and knows about honey. He attributes important health benefits to this natural product. The gap between [*consumption + export*] and [*production + import*] seems to be covered by dilution with syrups (Phipps, 2016 a).

Chinese beekeepers frequently harvest unripe honey. One part of that crop is sold directly to domestic consumers and the other part is sold to

“honey factories” that filter, eventually eliminate residues, dehumidify and pack the product (Phipps, 2016 b). The Chinese traceability system only seems to start at the honey factory.

The intrusion and extraction of any substance from honey, as opposed to the activities of the bees themselves, is not allowed by international standards (CODEX, 1981). This artificial way of production could be used to increase productivity, but alters the natural quality of the product.

The above described “production model” could at least partially explain the amazing increase of Chinese honey exports during the last years, which showed an average annual increase of 8,167 tons (Fig. 5).

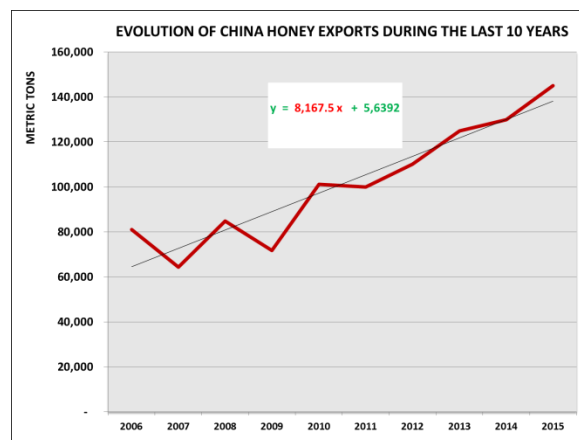


Figure 5: Chinese honey exports during the last ten years. Source: ITC-UNCOMTRADE

The evolution of global exports of honey shows two clearly different stages since the beginning of this century. During 2001-2009, world honey exports had moderate growth with an average rate of about 7,398 tons/year. However, starting in 2010 that rate significantly grew, reaching an average increase rate of 40,705 tons/ year.

As will be explained in more detail in the following section, in recent years some European countries increased their imports of cheap honeys, thus increasing their honey export

capacities, and sometimes making it very difficult to properly trace the country of origin of the product.

Transshipping mechanisms of Chinese honey may have also been encouraged in recent years to evade anti-dumping duties upon arrival to the United States (True Source Honey 2014 and 2015).

Both above described mechanisms result in the overestimation of global honey export figures. In order to overcome that overestimation, the net honey exports of each country were calculated, by subtracting honey imports from the total exports of each export country. Net honey exports of a country represent a closer estimation of its export capacity, more related to its production capability.

During the period 2010-2015 global net exports grew at a rate of 26,612 tons/year. Total net exports of 345,565 tons in 2010 increased to over 478,801 tons in 2015. That increase was mainly driven by the export capacity of eastern countries, while the net exports from the rest of the world remained quite stable (Fig. 6). Now the question is: How did eastern countries make that possible without an important increase of their colony numbers?

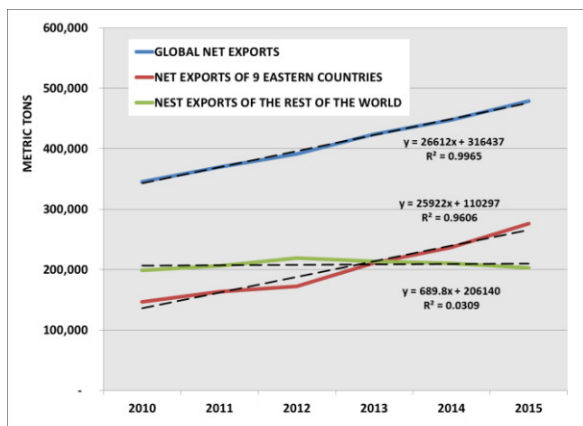


Figure 6: Evolutions of global net exports of honey, total net honey exports of the main nine honey export countries of the Eastern hemisphere, and total net honey exports of the rest of the world. Source: ITC-UNCOMTRADE

## The Global Demand of Honey

The second factor proposed to explain current honey prices fall is an eventual decrease of global honey demand. Let's investigate that possibility...

Major honey import markets, the European Union and the United States, significantly and steadily increased its total honey imports over the past years. The EU did that at an average increase rate of 10,544 tons/year. 85% of this growing need for honey was covered by China (Fig. 7). The attractive low price of Chinese honey (which was not able to competitively enter the United States market after the 2001 anti-dumping action resulted in prohibitively high duties), and a global context of overall increasing honey prices can explain the increase of Chinese honey purchases from Europe. That decision, started in 2004 and continuing, can be considered a clear change of the honey purchasing policy by the old continent, clearly prioritizing price above their historical demands of quality.

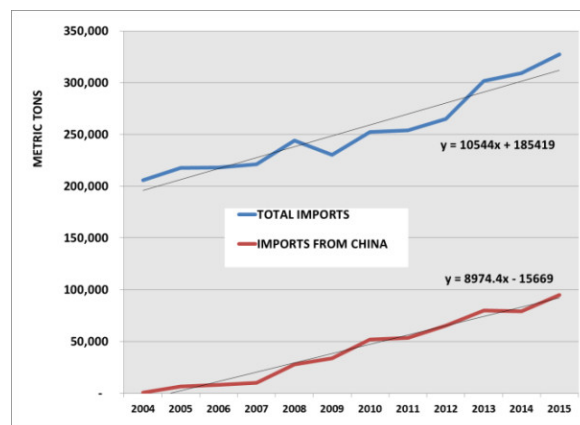


Figure 7: Evolution of total honey imports of the E.U. and its imports from China. Source: ITC-UNCOMTRADE

A few years later, the U.S. authorities took another very relevant decision for the international honey market. In 2008, U.S. federal authorities started to investigate circumvention and transshipping schemes of

Chinese honey through third countries with the purpose of evading antidumping duties. These investigations demonstrated the largest fraud of the food industry in the United States (Honeygate) and involved the prosecution of several operators (importers and packers) in the U.S. honey market (Strayer *et al.*, 2014; Phipps *et al.*, 2015).

In 2010, the United States needed to import 59% of its total domestic consumption of honey, and now needs to import 71% of its total demand.

Since 2010, and until 2012, as a result of the outcome of the investigations carried out to combat circumvention and transshipping schemes of Chinese honey, the US reduced its imports of Asian honeys and increased the volume of honey coming from countries of the American continent (Fig. 8). That linear and constant increase of U.S. honey imports (at an average rate of increase of 12,137 tons/year), and an increasing shortage of trustworthy product, began to push prices upward in the world market for bulk honey. Total consumption of honey increased and *per capita* consumption remained stable despite these substantial price increases.

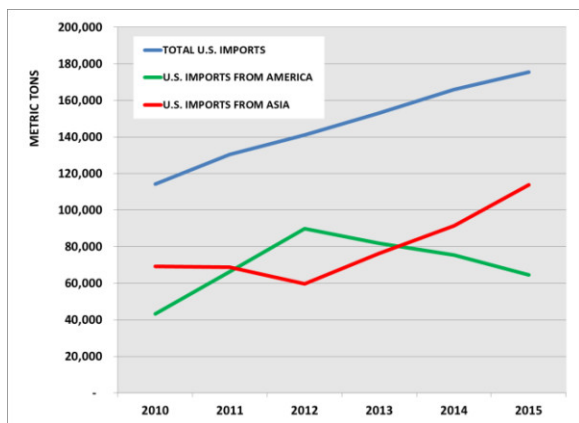


Figure 8: Evolution of U.S. honey imports of two different origins. Source: ITC-UNCOMTRADE

However, the sustained increase of honey prices from the Americas provoked a decrease of the

volume purchased by U.S. buyers from that origin since 2012, leading to replacement by lower priced and more risky Asian honeys.

The observed increase of bulk honey prices in the international market until 2014 was not homogeneous for all geographical origins. Chinese honey prices initially increased during the period 2007-2011, then remained quite stable at around USD 2,000/ton (Fig. 9). Honeys from other major exporting countries of the Eastern hemisphere (India, Viet Nam, Ukraine, Thailand and Taiwan) increased their prices relatively moderately. In contrast, honeys from leading exporters of the Americas (Argentina, Canada, Mexico, Brazil, Uruguay and Chile) significantly increased in price during the period 2007 to mid-2015.

Honey price differences according to their geographical origin had never been of such dramatic magnitude, and in 2014 honey prices from the Americas averaged \$2,000 per ton higher than Chinese honey (Fig. 9).

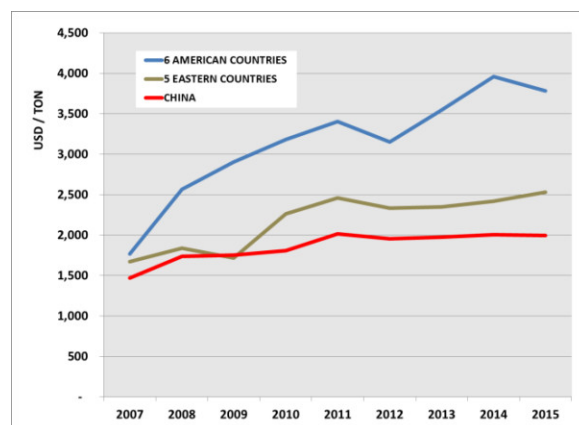


Figure 9: Unit prices of honeys from different origins. Source: ITC-UNCOMTRADE

The heterogeneity of honey prices according to their geographic origin could have constituted an incentive for several European countries to import cheap honey from China and then re-export it as locally produced (Fig. 10). Similarly, some Asian countries, for example Thailand,



were found to increase their imports of Chinese honey that enabled an increase of their exports (mainly to the U.S.), thus generating new possible routes of transshipping (Fig. 11) (True Source Honey, 2015).

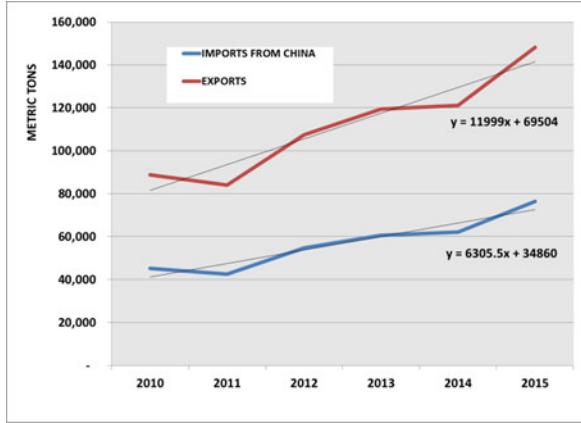


Figure 10: Total honey exports and imports from China of ten selected European countries (Belgium, Germany, Ireland, Italy, Lithuania, Netherlands, Poland, Portugal, Slovakia, and Spain). Source: ITC-UNCOMTRADE

These mechanisms of transshipping to evade duties in the U.S. do not stop, routes constantly change, and according to some important U.S. commercial actors could currently involve important honey supplying countries like India, and Viet Nam. (Health Awareness, 2016). Indeed, U.S. authorities recently seized sixty tons of Chinese honey that tried to pass the U.S. borders as Vietnamese honey (ICE, 2016).

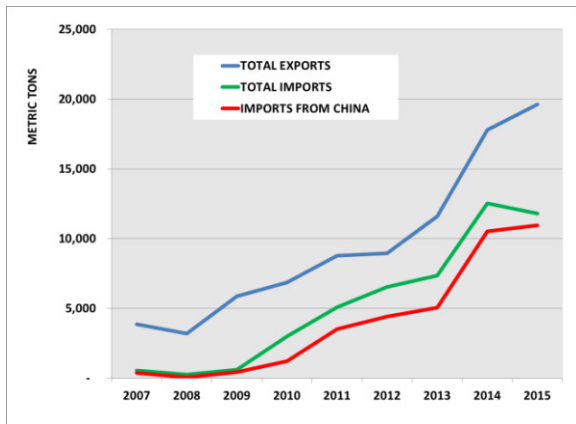


Figure 11: Thailand honey exports and imports. Source: ITC-UNCOMTRADE

Cheap honey imports and re-exports as locally produced and transshipping mechanisms are also causing an overestimation of total honey import figures.

The lack of reliable statistics of honey consumption in many countries adds an additional difficulty to the study of the eventual variations of honey consumption as a function of prices. A frequent way to estimate the evolution of global or country honey demand is through the use of statistics on honey imports. However, in order to avoid the described mechanisms of overstatements, the net imports of honey were calculated, which result from subtracting exports to total imports of each import country. Through net import data we have a more accurate estimate of honey demand linked to the consumption of each country. Import and re-export activities are hence excluded.

Global net honey imports grew at a rate of 4,313 tons per year during the period 2001-2009 (Fig. 12).

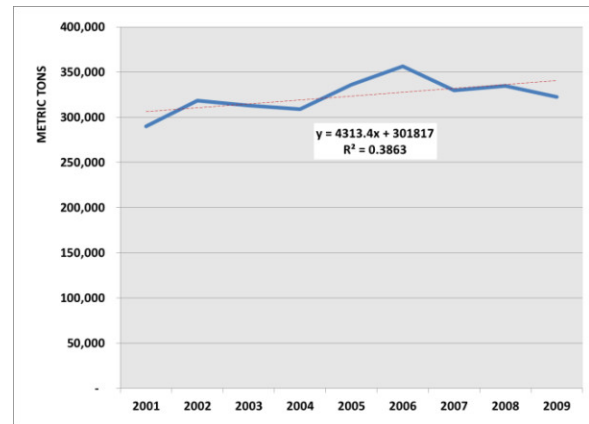


Figure12: Global net imports 2001-2009.

However, since 2010 global honey demand grew at a much higher rate of 19,504 tons/year (Fig. 13). Total net imports increased by 150,000 tons from 2001 to 2015.

Consider the evolution of the three major honey import markets: the United States led the demand growth at a rate of 12,797 tons/year, while the honey demands of Germany and Japan showed a remarkable stability during that period (Fig. 14).

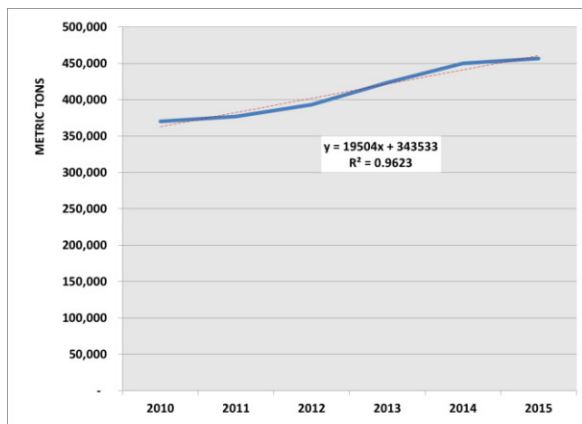


Figure 13: Global net imports 2010-2015.

We can then conclude that global net honey demand continues its uptrend, mainly powered by the United States. As a result, the current sharp fall of honey prices cannot be explained through a decline of global honey demand.

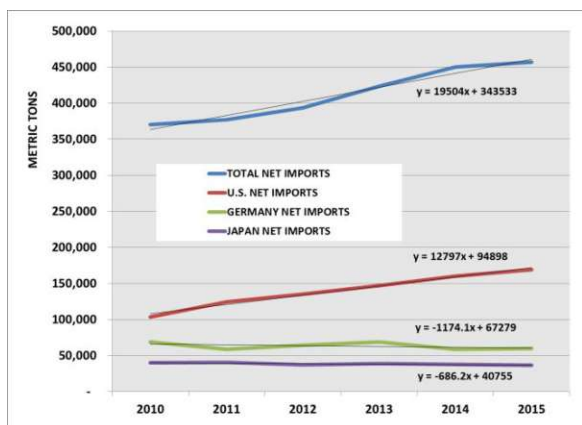


Figure 14: Evolution of net honey imports: global and of the main three import markets.

## Economically Motivated Adulteration of Honey

Honey is amongst the sadly select group of nine foods with most reported cases of economically motivated adulteration (Johnson, 2014).

The temptation of honey adulterators increased in recent years because of the high prices of the product, the availability of cheap adulterants, and the obsolescence of official methodologies to detect the fraud. The tremendous magnitude and severity of the current version of the phenomenon, and its possible impact on both the prices of honey and the viability of the beekeeping industry, was already anticipated a few years ago (Garcia, 2013).

Economically motivated adulteration of honey includes cases of intentional dilution with syrups (corn, rice, beet, etc.), feeding hives during a nectar flow, use of antibiotics and other chemicals in honey bee populations in a way that results in residues in honey, and masking the true country of origin of honey to avoid tariffs and testing (Strayer, 2014). As mentioned above, adulteration could also include the widespread practice of extracting immature honey and then dehumidifying it by mechanical means.

C13-IRMS, the official method of the main import countries for adulteration detection with syrups from C4 plants like corn or sugar cane, along with pollen and sensory analysis of honeys have been the main tools to analyze the purity and origin of honeys so far.

However, recent use of other syrups made from C3 plants (mainly from rice and undetectable by C13-IRMS) for the adulteration of honey has made detection of fraud much more difficult.

International trade of cheap honeys with frequent quality problems, including adulteration, made several prestigious European

laboratories intensify their efforts to develop new methods for the detection of honey adulteration in recent years.

Methods have been developed based: i) on the detection of exogenous enzymes that do not naturally occur in honey, and may be present in syrups (heat stable amylase,  $\beta$ -fructofuranosidase); ii) on the presence of typical oligosaccharides of syrups and non-existent in honey; iii) or on the detection of specific markers of rice or sugar beet syrups. These methods of detection were useful for some time, until adulterators developed new syrups specially formulated to pass the tests.

In December 2015 the European Union published the results of a plan to determine the prevalence of fraud in honey. 19% of the samples were non-compliant, and an additional 13% were suspected of non-compliance. Only conventional methods for the detection of adulteration were used in this study. During June 2016, the European authorities will announce the results of a new study comprising 1,200 samples that are being tested with more advanced methods for the detection of honey adulteration (JRC-IRMM, 2015).

Nuclear Magnetic Resonance (NMR) is the newest method for the detection of adulteration in honey, including the determination of its botanical and geographical origins (Spiteri *et al.*, 2015). Unlike other methods that focus on a particular substance, NMR analyses a spectrum that includes 36 different substances and their proportions (Luellmann, 2016).

The amplitude and complexity of the spectrum examined by the NMR method implies an enormous difficulty and cost for adulterators to develop new syrups that can circumvent the test. In addition, current honey prices make it very difficult to recover the "investment" in developing that kind of syrup. Hence it is

believed that NMR will be a decisive tool to clean up the problem of honey adulteration in the international market over the next few years.

NMR requires the buildup of an important international database, which process is currently in full development. Meanwhile, there are an increasing number of European supermarkets that already require this test for their purchases of honey. Two European laboratories, QSI and Eurofins have accredited the technique for honey.

In order to increase the accuracy of NMR test, laboratories are recommending the use of NMR in conjunction with other methods like IRMS or pollen tests.

According to the German laboratory QSI, 60% of honey samples tested by NMR during 2016 were adulterated (Luellmann, 2016).

According to the experience of Eurofins laboratory, honey samples from Asia are considered to have a high risk of adulteration. Samples from Europe have a medium risk, while samples from Central and South America are considered to have a low-risk of adulteration (Lees, 2015).

## Conclusions

The information presented in this article shows that the current drop in honey prices cannot be attributed to a global increase in beehive numbers nor to a decrease in the demand of the product.

In contrast, the enormous and difficult-to-justify increase of honey exports from several countries in Eastern Europe and Asia, combined with the information coming from official surveys and private laboratories on the prevalence of adulteration of honey, allow to conclude that fraud mechanisms are responsible for the



injection of a very important volume of cheap “manufactured” and diluted honeys to the market. The use of adulteration by various means becomes the method by which circumvention can be disguised and market share is increased.

China launched its Global Pledge of Honey Purity and Integrity during the Congress at Guangzhou in March 2015. Since then the Chinese health authorities (AQSIQ) have reported to be working to combat the adulteration of honey, both domestically and in the exporting sector. The world beekeeping industry needs China to be part of the solution to this huge problem.

Current honey prices paid to the beekeeper, no matter his nationality, are not sustainable. If the current situation of low prices persists, many beekeepers will abandon the activity and those who decide to continue will not be incentivized to keep their current number of beehives.

In order to better understand the magnitude of the problem, we must remember that honey is the best-known product of bees but surely not the most important one. Bees, through their pollination work, are essential for the maintenance of the planet's biodiversity, and absolutely necessary for the pollination of many crops that represent 35% of all our food. In the United States alone, pollination by honey bees, native bees and other insects enables the production of food worth 40 billion dollars. Much of that pollination dependent food consists of phytochemically vital foods, fruits, vegetables and nuts.

The protection of honey purity is not only a problem of food safety or food defense but it is mainly a problem of food security, thus concerning the capacity of countries to provide their own food.

Thousands of beekeepers and millions of consumers around the world urgently need the authorities of the main honey exporting and importing countries to take the necessary measures to protect honey purity before the damage to the beekeeping industry becomes irreversible.

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