International Honey Market

by RON PHIPPS

Introduction

There has been a positive and profound market change which benefits beekeepers, consumers, global food security and ecological sustainability. Through a series of factors which I will articulate below, there has been a major move for higher prices, fair renumeration to beekeepers, and authenticity of honey.

U.S. honey prices in January 2023 were reported in the range of $2.65-2.80/lb. In 2022, prices of domestic white honey ranged from $3.00-$3.50/lb., depending upon the floral source. There was a concerted effort to bring those prices down to a range of about $2.50-$3.00/lb. as the impact of the flood of Indian honey asserted itself. At the beginning of the 2023 California crop, prices recovered to $3.00-$3.50/lb. FOB beekeeper.

The financial instability plaguing the world, including inflation and debt crises, is driven in ways both direct and indirect by the fact that cumulative national, local, corporate, real estate and personal debt exceeds 400% of the GDP for both America and China. In the developing world, the debt and the presence of non-performing loans is even greater. A general economic crisis occurred in mid-March involving several American banks, then spreading to Credit Suisse. This crisis has repercussions which are global and rooted in free-wheeling speculation and enormous debt.

Analysis of honey samples by the European Union reported the most startling and significant results of any previous study of adulteration. Details follow.

In February 2023, U.S. consumer prices were 6% higher than in February, 2022, due to inflation. Argentina is suffering inflation reaching 100%.

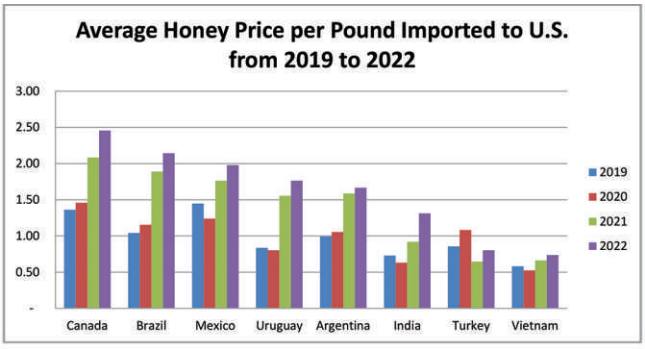

Chart 1

Imported honey prices and quantities

The average imported honey price increase was 11% in the period January to December 2022. Chart 1 shows the price increases in honey from major exporting countries before and after announcement of the antidumping petition in April 2021. Prices from the countries under the antidumping order increased during 2022 relative to the 2020 import prices.

Total U.S. imports of honey increased significantly and unexpectedly (given weather patterns) in 2022 by 27.5% in 2022 compared to 2021. India dominated the import volume, with 32% of the market. Argentine imports declined by 2.9% in volume, and had a 21% share. Brazilian imports declined by 23% to 48 million pounds. Imports from Vietnam plunged in volume to 28 million pounds, representing 6.5% of the market. Exports from Canada, Uruguay and Mexico represented about 10% of the total market. Thailand and Taiwan imports increased to 4,894,146 lbs. (2,219,950 kgs.) and 7,265,000 lbs. (3,295,355 kgs.) respectively. Total organic imports declined by 31.4%.

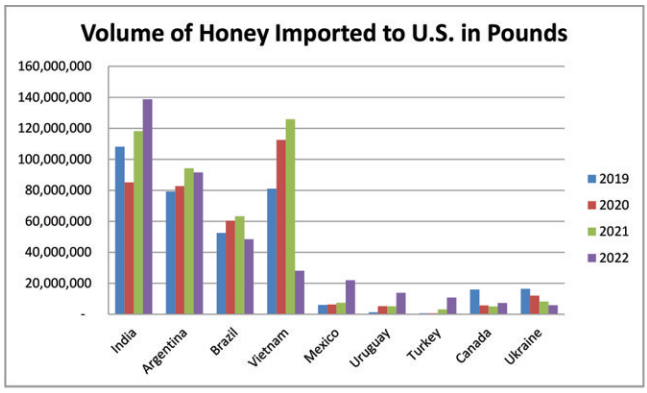

Chart 2

In March of 2023 the U.S. government announced that total honey production in the U.S. during 2022 was about 125 million pounds. This reflects two decades in which American beekeepers — like beekeepers in other countries — suffered from having to compete with honey that was dumped and adulterated in numerous ways.

Members of the honey industry are confronting legal issues regarding the use of the term "honey" with respect to "bio" and "vegan" "honey." Many believe that the use of the term honey should be reserved exclusively for au-

thentic bee honey which has unique properties which are quite different from other sweet syrups. In Europe steps are being taken to require correct country of origin labeling for retail honey products.

U.S. consumption of honey

U.S. honey consumption was reported by the USDA to exceed 600 million pounds in 2021. Total U.S. imports in 2021 were 334 million pounds and dramatically increased in 2022 to 426 million pounds.

The unfortunate reality is that there is no direct measure of consumption. What we do have statistics for, however, is the total volume of imports into the U.S. Imports increased significantly in 2021, but this followed the announcement of the antidumping order and should be seen in the context of initial violations of critical circumstances, which means there was a surge of imports during antidumping investigations. In the recent nine months there was another surge of imports.

A U.S. International Trade Commission filing requesting an increase of the low rates for India could be a cause of this recent surge. A hearing before the ITC is scheduled for May 2023. In coming months there also will be mandated reviews of the preliminary rates first effected in 2021. All of these import surges could be expressions of artificial increases designed to: 1) take advantage of preliminary antidumping findings with lower antidumping rates, and 2) concerns about future increases of antidumping duty rates.

Since there is no direct form of measuring consumption, and imports were influenced by the desire to load up on imported honey before the antidumping duties, if any, would be effected, the consumption figures are not as persuasive as they were proclaimed to be. An even more dramatic increase is reported in the import volumes for 2022. But once again, importers and exporters are facing potential increases of duties including potentially huge retroactive duties.

Observers of the honey market have commented that the amount of space for honey on retail shelves has been reduced by half since the beginning of the COVID-19 pandemic in 2020.

2022	2021
U.S. Total Honey Imports	
193,525,071 kgs. (426 m lbs.)	151,721,007 kgs. (334 m lbs.)
Organic Honey	
19,335,306 kgs. (42 m lbs.)	32,826,564 kgs. (72 m lbs.)

Chart 3 *U.S. Total Honey Imports 2021 and 2022*

Honey antidumping case

Dumping used as a means to destroy competition and dominate markets, which harms domestic producers and drives companies into bankruptcy, is not confined to honey but reaches into many sectors. For example, in March 2023 walnut farmers in the famous walnut groves of California were cutting down the trees which have provided walnuts to Americans and the world for almost two centuries. The reason is, China greatly increased their production and are selling walnuts as low as $0.35/lb. or $771/metric ton. This type of existential threat suffered by walnut farmers has its parallel for the producers of American, Canadian, Mexican, Argentine, and European honeys. Anyone who has seen the walnut groves in the autumn ablaze with their golden leaves knows this is not only a commercial but an aesthetic loss.

The overall data and market dynamics show that it was with the emergence of the antidumping filing and the subsequent findings that the honey market began an uptick which in its aggregate has meant higher prices and fairer remuneration for America beekeepers. Antidumping duty rates for different countries and different exporters within different countries are not uniform, ranging from 7% to 60%.

A sustainable comparative advantage for particular countries and exporters will depend upon both fair prices and the authenticity of the exports. The impact of the Preliminary Antidumping Duty rates is that some exporters have a comparative advantage and others a disadvantage. The impact is not fully knowable because of the pending appeals before the ITC. The appeals concern 1) retroactive duties for critical circumstances violations, 2) low antidumping rates on Indian honey, and 3) an appeal by Argentina to reduce their antidumping duty rates. In the case of India, extraordinarily low rates were calculated because the government used the cost of acquisition (which is very hard to verify) rather than a deep and comprehensive analysis of the cost of production at the beekeeper and factory level.

Antidumping duties assessed during the first period of review could be increased after the review in 2023. Since the rates for India were so extremely low, there is anticipation that there is high probability that those rates will be substantially increased.

Honey markets by country

Ukraine

As the world witnesses, the Ukrainian people are caught in a vicious vice of war. Traditionally Ukraine is the largest European producer and supplier of honey to Europe. What is happening in Ukraine is important to the international honey market. Within Ukraine there are 24 regions, 16 of which produce the majority of their honey. Of these 16 regions, at least 30% of the land didn't grow any crops in 2022. What was seeded was mostly grain crops, such as wheat, barley and oats, with smaller amounts of sunflower and canola. The farmers didn't have money to buy seeds, so they seeded what they had that they had not sold the previous year.

Our beekeeper friends told us that the 2022 crop was 25% of a normal crop. "Many Ukrainian beekeepers volunteered to fight the Russian invasion. The kids and older men and women lacked the knowledge for effectively caring for the hives. Production collapsed because of the war and the loss of expertise caused by the war. Sadly a large number of the beekeepers who volunteered to fight are dead, meaning honey production in 2023 will most likely be further reduced."

The cost of inputs for keeping the bees has increased dramatically and the beehives are very stressed. The Ukrainian companies dealing in honey have suffered bankruptcy but some foreign-owned companies seem to maintain an operating presence. What is being exported from Ukraine in the first half of 2023 is old crop from 2020 and 2021. Ukrainian beekeepers are advising the international export market that if there is not a significant reduction in Ukrainian honey exports "there is definitely funny stuff coming out of Ukraine." Ukrainian beekeepers themselves are warning of the danger of transshipment.

The weather in December of 2022 had much higher temperatures, leading to the" bees flying." This has disrupted the bees' biology. The unusually warm temperatures in February and early March are leading to higher bee losses.

Ukrainian farmers also report that the Russian army planted land mines all over Ukraine's main agricultural regions. The land mines damaged equipment and the Russians also stole a lot of the equipment that was still functioning and moved it to Russia. The Ukrainians reported that "the funny part is the new modern equipment from John Deere included highly computerized systems with GPS positioning. This allowed the equipment to be rendered non-operable through satellite disruption."

The world is waiting for a peaceful resolution.

Ukraine's exports to the U.S. declined in 2022 relative to 2021, while prices have increased steadily since 2019:

Ukraine honey exports

2021	2022
3,355,080 kgs. (7,396,676 lbs.)	2,623,308 kgs. (5,783,397 lbs.)

Prices for Ukrainian honey increased as follows:

U.S. Honey Imports from Ukraine – FOB Value

2019	2020	2021	2022
$0.83/lb.	$1.21/lb.	$1.56/lb.	$2.38/lb.

Chart 4 *U.S. Honey Imports from Ukraine*

Mexico

In general the condition of the bees in early 2023 was good. Mexican bees, however, are highly Africanized and the low income of beekeepers over the past decade or two has made it impossible for beekeepers to replace the Africanized bees with others. Yucatan starts the year very dry but it is too early to call it a drought. The carryover from the 2022 crop is about 4,000 metric tons as of March. This is a highly unusually low quantity for Mexico which has a temperate to semi-tropical climate and, like Brazil, can produce honey for many months of the year. The Mexican beekeepers are in anguish at attempts to engineer an abrupt and steep decline in prices; as some Mexican beekeepers have put it, "the current market is under the increased dominance of the sharks, imposing losses upon the beekeepers." The market is being manipulated by cartels in order to create a crisis of cash management. This means beekeepers are stalled and unable to sell the early crop. They feel they are being manipulated by the fact that they are "cash starved."

Mexican beekeepers today are more sophisticated and informed than in the past. They are blaming their current crisis on the massive amount and increase of Indian honey imported into the American market. This seems correlated with the filing with the ITC demanding an increase in the duty for Indian honey. As has been pointed out before, the average price levels from Indian honey exports before the filing were $0.63/lb., Mexican prices were about double that at $1.24/lb. and Argentina's were $1.05/lb. The tremendous volumes from India came in despite the terrible drought that was suffered in India in 2022.

European demand for honey from Mexico was weak and packers claimed they were overstocked. Asia as a whole has only one country, Japan, demanding high-quality authentic honey. The Mexican beekeepers believe that India achieved the overwhelming quantities they did by early extraction, the use of resin technology and the creation of "funny blends" involving bioengineered sweeteners.

Mexican honey exports to the U.S. were largely driven by the Apimondia Standards for authentic honey, the antidumping determination, and the U.S. Pharmacopeia standard for honey.

The Mexican beekeeping industry is waiting for the publication of new Mexican Honey Norms. The beekeepers have made clear proposals to the South American group FILAPI. Mexican beekeepers are looking to the leadership of Apimondia to provide the world beekeeping community guidance and to demand strong standards from both government executive branches and judicial systems of importing countries. The Mexican beekeepers think this pressure is entirely justified in light of the importance of bees and their pollination contributions to global food security and ecological sustainability. The Mexicans are acutely aware that what happens in one producing country directly affects other producing countries: "We recognize Argentina has been harmed due to the food fraud in other producing countries."

Argentina

The 2022/2023 Argentine honey crop has now been completed. The crop began in the tropical and humid areas of Argentina and was reasonably good for darker, stronger-flavored honeys. From the time of the main production of delicious clover, thistle, alfalfa, and canola honey there was a protracted drought and devastating heat wave. This means the current Argentine crop is much smaller and much darker than normal. Through the efforts of Prof. Norberto Garcia, Lucas Martinez, President of the Regional Commission of the Americas, and the agricultural expertise of Prof. Enrique Bedascurrabure, Argentine beekeepers assiduously practice proper modes of honey production, resulting in high-quality authentic honey.

Argentina provided thorough data on costs of honey production as requested for the antidumping investigation, in stark contrast to some other countries. All in all, Argentina is a very responsible producer and exporter of authentic honey which others should emulate.

Brazil

Brazil remains the dominant provider of organic honey to the U.S. market. In 2022, Brazilian organic honey imports to the U.S. declined significantly from 63,268,269 lbs. (28,698,038 kgs.) to 48,415,450 lbs. (21,960,905 kgs). Brazilian honey exporters and beekeepers are concerned about competing with fraudulently described "organic" honey which is produced using Chinese resin technology. Brazil, like Canada and Argentina, has been seeking export markets outside the U.S.

The concern with protecting the Amazon rainforest from transformation into soybean fields and cattle ranches has intensified globally and in Brazil, as the devastation of tropical forests in Brazil, the Congo, Indonesia, vast forests of Siberia and rosewood forests in Honduras and Myanmar continues to make headlines.

Canada

The Canadian Honey Council reported large winter losses of bees in 2021/2022 and a number of beekeepers spent 2022 rebuilding their hives rather than producing honey. The bees went into the 2023 winter in relatively good shape. There is interest in U.S. package bees from some beekeepers, but approved sources should be able to meet the demand for queens.

Very little carryover of honey from past years is available. Prices have been stable in the CDN$3.05 to $3.20/lb. range. European buyers seeking authentic honey turned to Canada last year, as have the Japanese for some years. The U.S. was the largest importer of Canadian honey in 2022

at 7,305,714 lbs. (3,313,820 kgs). Brazil and India were top sources of Canada's imports in 2021.

In 2022, the Canadian honey industry made a decision to market their high-quality authentic honey in markets outside North America, such as Europe. The Canadian Honey Council exhibited at international food shows in Japan and Jakarta this year.

Vietnam

The 2023 honey crop looks below normal generally, and beekeepers lost some of the first flows of honey because of unseasonable rains and cold winds which weakened the bees. This is the third consecutive year considered to have been affected by La Nina. Almost all the honey from the last crop has been sold off during January and February. There have not been many contracts negotiated for new crop as the crop begins. Prices seem to be higher than last year. Since suffering the antidumping duty, there has been a big quantity of honey exported to the EU, Asia, and the Middle East. The commitment to diversifying Vietnam's honey export market is stronger than ever. Vietnam has some delicious floral sources such as lychee. However, the U.S. antidumping order has had a negative impact on the beekeeping industry of the nation; for instance, the number of beehives declined about 38% compared to 2020.

India

The two significant graphs below show the dramatic growth of Indian honey exports to the U.S. from 2013 to 2022. Of particular note is the escalation of exports from 2020 to 2022, which reached 138,775,988 lbs. (62,947,804 kgs.) in 2022, a 63% increase compared to 2020.

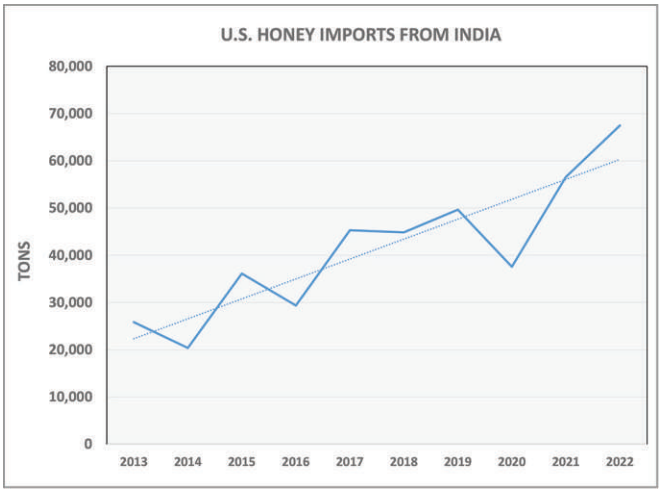

Chart 5

That the U.S. is such an extraordinarily dominant market for Indian honey many believe is due to lack of testing for adulteration in the U.S. market. Indian honey exporters in formal settings have praised Chinese resin technology for use in honey. There are reports of India importing bioengineered sweeteners from China and subsequently establishing factories for producing these sweeteners, which are not detectable by the archaic SCIRA testing technology, and of large quantities of their honey being extracted immaturely.

Honey exporters note that in 2022, Indian honey export price levels increased due to the fact that the Indian government had required the use of NMR analysis of all honey exported from India. The NMR protocols had this effect even though the latest version of NMR was not consistently being utilized.

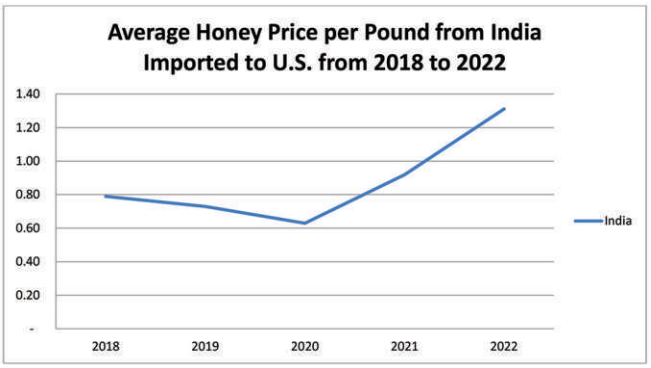

Chart 6

New Zealand

Beekeepers in several regions are predicting the worst season for honey yields in 10 years, due to cold weather and too much rain. A surplus of honey and falling prices for manuka and non-manuka honey have been reported. Hive numbers dropped to 731,000 for the 2022 season.

False labelling of "manuka" in the international markets also harmed the industry.

Imports into the U.S. from New Zealand in 2022 were 4,622,546 lbs. (2,096,754 kgs.), little changed from 2021, and averaging $12.96/lb. for primarily specialty honey.

Agricultural production and global weather patterns

It has become increasingly clear that national and global agriculture cannot ignore the problems of climate change. In February 2022, the New York Times had a front page article about the impact of drought on cotton production in West Texas. "In the biggest loss on record, Texas farmers abandoned 74 percent of their planted crops — nearly six million acres — because of heat and parched soil, hallmarks of a megadrought made worse by climate change."

The ten atmospheric rivers with enormous snow, rainstorms and floods in California have caused the bees to come out of the almonds with more stress than usual. The movement of bees to other areas has been delayed because of the repetition of extremely severe weather events. The floods and massive mudslides in the mountains and coastal areas have been terrible, causing considerable delays in moving bees to other pollination sites which need bees. A benefit from all the moisture is that California's wild sage crop, whose quality is extraordinary, should be abundant. General observations are that the number of bee colonies has been reduced in California due to the weather in 2023, and the number of bees expected to be enough for the 2023 crop has been diminished.

In 2022 and the first quarter of 2023 this volatility is poignantly illustrated in California which went from severe heat, drought and forest fires to snow, torrential rains and floods. The availability and the cost of water may also influence growing decisions on walnut and other crops.

It should be noted that China contributes about 155% of the greenhouse gases emitted by America and all of Europe. India's contributions are also significant. In the summer of 2022, in response to the severe heat wave, China's Xi Jinping announced that there would be a very big increase in coal powered plants within China to provide air conditioning. This is one among several factors that make global warming a self-feeding process.

In respect to the international honey market, this volatility has revealed anomalies which require global scrutiny.

For example, India in 2022 had one of the worst heat waves and drought in modern history. China's heat wave in 2022 was the worst found in any place in the world in 2022. Yet both had explosions of exports of "honey." How could the honey situation be so different from the situation in cotton?

If resin technology is used to remove colors, offensive aromas and unpalatable taste – no less pesticides and antibiotics — and if honey is extracted immaturely and bio-engineered sweeteners are blended, if beehives are constructed with continuous feeding boxes, the quantities of "honey" can defy weather.

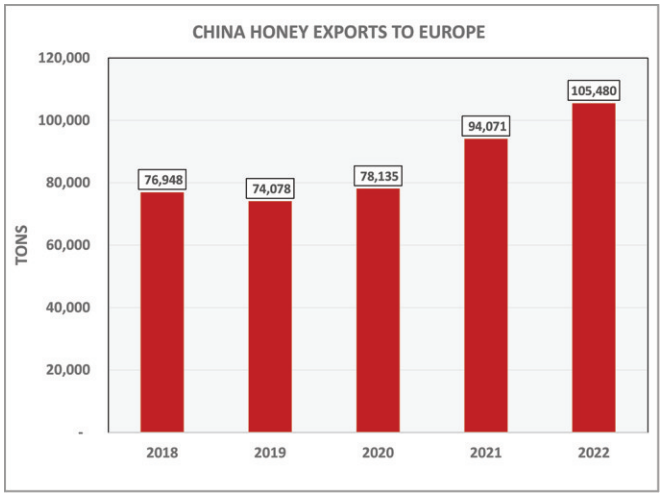

Chart 7

Honey adulteration studies

The quest for fairness and authenticity in the international honey market is like a great river created by the joining of countless tributaries. In 2022, government sampling and testing of exported honey was reported by the U.S. FDA, the Canadian CFIA, and the European Commission. In December 2022 the FDA tested honey imported during 2021 and 2022 and found 10% of the samples to be adulterated. The method of detection used was the SCIRA test which analyzes for C4 (corn and cane) sugars. This test was developed in the 1970s. The FDA cited studies for honey adulteration which reported 13% adulteration in Canada and 14% in the EU in recent years. Details can be found on the FDA website.

The U.K. Honey Authenticity Project reported in late 2022 that, in a study of 11 samples pulled at retail in the U.K., most failed tests for Psicose, Sucrose, Diastase, Proline and HMF. However, the samples in the study passed the 13C EA-LC/IRMS method with no adulteration found. The tests for Psicose, Sucrose, Diastase, Proline and HMF are the methods which were used to test the honeys used as the foundation of the 13C-EA-LC/IRMS testing method (Elflein, Raezke 2008), and failure of those tests was taken to indicate adulteration. Passing those tests was taken as an indication of authenticity. That the Honey Authenticity Project's 11 samples failed the 5 tests but passed the 13C EA-LC/IRMS test is a basic contradiction. Questions about the validity of the 13C-EA-LC/IRMS 2008 test are now being raised in the European testing community. Concerns about the ability to pick and choose which tests to accept or reject have increasingly been circulating in the international honey community.

As modern modes of honey adulteration have multiplied and become more sophisticated, and as new studies on detecting different modes of adulteration, including resin technology and the extraction of unripe honey have emerged, the U.K. report should be seen as a precursor to the development of more powerful and comprehensive tools for detecting adulteration in food products, including honey.

In 2023 a report was issued in Europe on testing which involved pulling samples at random from several hundred consignments and over 100 honey exporters. Astonishingly, over 46% of the exporters were exporting adulterated honey, as determined by the sampling and testing. It is important to note that the mode of adulteration studied involved the addition of extraneous sugars. The report calls for a deeper harmonization and utilization of analytic methodologies needed to increase the capacity for control by official laboratories of the problem of honey adulteration. The impact of this rather startling report in Europe and internationally is expected to be great.

In Canada, the CFIA tested 127 samples of honey using SCIRA (for corn and cane adulteration) and NMR testing methods. Seventeen samples failed one or both methods (13%) and 16 were identified as imported. In 2021-2022, CFIA honey sampling found that 77% of the samples were satisfactory, a decline from 87% in the previous study. Canada's results are available on their government website.

In April 2022 a 37% positive finding was detected for samples from India by a major laboratory using the NMR test that has a database of 28,000 samples. This use of NMR investigated only some, but not all of the modes of honey adulteration present in Asia, which include resin technology and the extraction of immature honey. Furthermore, the newer version, introduced in early 2023, has found higher percentages of adulterated samples.

It should be noted that a class action suit initiated in the federal judicial system in California's Central Valley on behalf of American beekeepers regarding antitrust allegations of food fraud in the honey sphere is still pending. Similar legal actions may be initiated in other U.S federal courts.

As all judicial systems realize, there is neither production nor transit of adulterated and/or illicit products if there isn't demand. This in fact was the principle which led to the U.S. judicial system and the Customs and Border Control collaboration to achieve the prosecution known as Honeygate, the largest case of food fraud adjudicated in the U.S.

In the honey sphere, the past 3-4 decades have seen the emergence and cultivation of modern modes of adulteration, including the creation of "factory produced honey," "unripened, immature honey" in which the interaction between bees and flowers is interfered with and rendered incomplete, the use of resin technology to lighten the colors and remove offensive and unpalatable aromas and flavors, and the blending of bio-engineered sweeteners which are designed to elude detection by more primitive scientific methodologies.

These modern modes have been created and utilized, most prominently, in Asian nations. Walter Haefeker has used a poignant metaphor in calling China's honey production "factory made honey." He distinguished slow and authentic honey from fast and fake honey.

A new mode of adulteration has become prevalent, the continuous feeding of bees with syrups and sweeteners during the honey production period. Big boxes are put atop hives. Since those who conspire in adulteration are clever, they allow the bees, which are relatively weak and small in number, to forage in order to gather pollen, nectar and other ingredients that suggest legitimate honey. This practice has been exported from the country in which it

originated. Honey testing laboratories have commented on these excessive bee feeding practices.

An ominous trend has emerged whereby the most sophisticated scientific methods of detecting adulteration are being moved out of the toolbox for detecting adulteration. This attempt is purposeful. Some organizations are allowing those who have the greatest benefit from adulteration to choose the methodologies and to choose the particular parameters and test results to verify authenticity.

Scientific integrity demands the opposite. If a scientific methodology with a broad database finds adulteration, then that result should overrule other findings. It is also the case that the toolbox for detection of honey adulteration is increasing. New techniques shows great promise in analyzing proper vs. illicit modes of the extraction of honey.

The charm and diversity of honey is a reflection of the diversity of flowers. In the future a more scientifically sophisticated approach to verification of honey's authenticity may be found in creating computerized data banks of honey profiles that are based upon taking into account the multiplicity of factors which lead to that diversity. That database of profiles will include variables of geography, elevation, floral sources, time of extraction, methods of processing and blending. Since honey is a globally traded product, the bank of chemical profiles must be global in scope.

The Codex definition of honey, the Apimondia Statement on Honey, and the U.S. Pharmacopeia Identity Standard for honey are major steps forward, and we need more, not fewer, modes of detecting honey adulteration. This is especially important in the era when terms such as "vegan" honey and "bio" honey are being used on products which do not contain any authentic honey.

Prof. Stephan Schwarzinger, one of the leading academic experts on honey, wrote on Food Fraud in 2022: "However, particularly products that are directly affected by production shortages and/or export problems, such as wheat, honey, and sunflower oil, should be re-evaluated in depth for fraud risk."

Trying to detect adulteration by throwing out of the toolbox powerful and sophisticated methodologies with large databases (for example the Bruker 3.0 has a database of 36,000 and can detect 38 parameters within honey) is equivalent to trying to discern the complexity, structure and dynamics of the cosmos by looking through binoculars rather than the James Webb Telescope. I suggested this metaphor to Dr. Jeff Pettis, President of Apimondia, as a way our honey scientists can learn from astrophysicists.

A James Webb Telescope view of the early universe. An accurate picture requres sophisticated tools.

I have in past reports supplied charts contrasting impossibly rising "honey" export volumes with declining bee colony numbers. Bret Adee, co-star of the important movie "Pollinators," has contributed another variable to this discussion: soil and water quality.

Agricultural universities doing work on Regenerative Agriculture have reported declining quality of soil, fungus, organic nutrient and bacterial activity which directly affect the quality of the nectar. Dr. Jonathan Lundgren is a pioneer in these studies and the need for Regenerative Agriculture. As the complex systems of bacteria, fungi, nutrients have been stressed, the quantity of nectar produced by trees, flowers, and fruits which are the source of the world's most attractive honeys has declined.

This new variable is particularly relevant to countries suffering from toxic land, water and atmospheric pollution. Earlier we noted the anomaly that in 2022 China and India suffered extreme environmental stress, and yet exported large quantities of "honey." That anomaly is compounded by the fact that India and China suffer the most toxic and contaminated earth, water and atmospheric conditions of any nations.

The phenomenon of food fraud involves not merely the physical adulteration of honey through modes of illicit production but fraud in labelling. That includes the attempt of sellers of products deceptively labelled as "vegan" or "synthetic" honey. The executive of the startup producing "vegan honey" stated that there is more honey in the world market than can be produced by bees. Time magazine wrote: "The Best Inventions of 2021. MeliBio takes bees out of the supply chain."

Apimondia is releasing a document regarding its position on "vegan" and "synthetic" honey. To use those terms is deceptive. It deceives consumers and harms beekeepers. In harming beekeepers it jeopardizes pollination, global food security and ecological sustainability, all of which are concerns to the human community.

New horizons in the food and honey industries

During the meeting of the AHPA in December, at which I spoke, there were discussions of the consolidation in industries such as grocery retailers which is resulting in centralized purchasing of foods. Grocery chains Kroger and Albertsons are expected to merge. Medium sized honey packers are changing ownership and in some cases merging or being purchased by large corporations.

The geopolitical and macroeconomic perspective of dramatic change characterizing the 21st century is the acquisition of global strategic resources by China. The acquisitions are direct and indirect through surrogates for mines, agricultural lands, high technology, intellectual property, energy resources and logistic assets in locations such as Europe, South America, Asia, Africa, North America, Oceania and Russia. China's New Silk Road is extending into the heart of Russia's resource-rich regions. These acquisitions by China, the largest exporter of "honey," have already expressed themselves within the international honey industry.

A study in Environmental Health Perspectives estimated the impact of pollination loss in terms of global health, and saw a 3-5% decrease in fruit, vegetable and nut production directly related to a reduction in pollination which correlated to increases in loss of human life. The report conclusion stressed the importance of implementing pollinator

policies, increasing flower abundance, reducing pesticide use and restoring natural habitats.

Bees' significance to agricultural production and ecological sustainability around the world and the important contributions of authentic honey, with sweet flavor varieties, to a healthy diet are important themes for honey marketing. Health benefits pertain only to authentic honey, and there remains enormous potential to use good science to better understand those benefits. There are many cultures which revere honey and see bees as performing a sacred service in enhancing the biodiversity within natural systems of botanical and zoological life.

I would like to express appreciation to many friends in the honey industry who shared observations and information which contributed greatly to this report.

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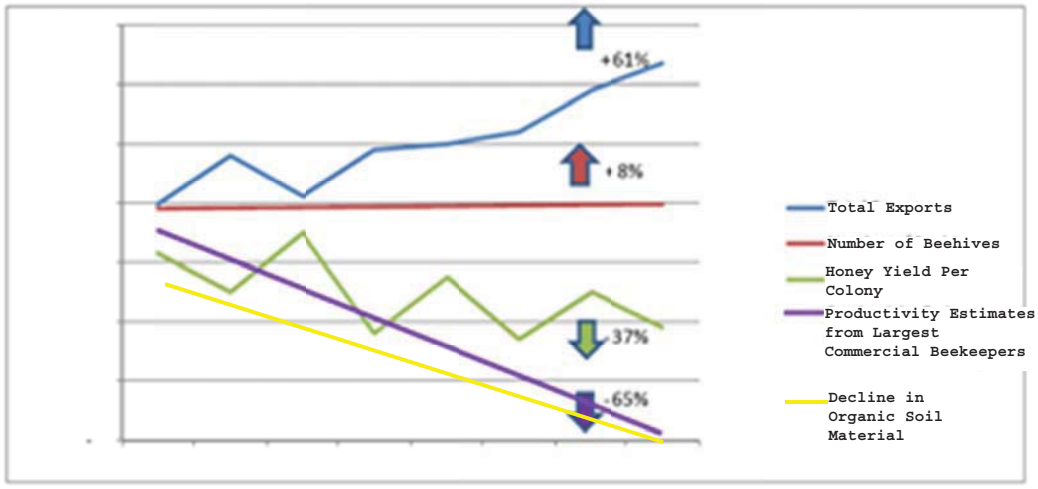
He has been invited to lecture in Europe on an "Infinite, Open and Integrated Universe within which is the Perpetual Flux of Potentialities."

Honey Exports, Beehives, Yield 2007 to 2014



JRC Publications Report 3/22/2023

Abstract:

In the frame of the EU coordinated action 15 EU Member States (BE, BG, CZ, DE, DK, EL, ES, FR, HU, IE, IT, LT, PL, RO, SE) plus CH and NO randomly sampled 320 honey consignments originating from 20 exporting countries, which were sent to JRC for analysis to detect the presence of exogenous sugar syrup in honey.

Of the 320 samples received from the competent authorities of the participating countries, 147 (46 %) were suspicious of being non-compliant with the provisions of the EU Honey Directive 2001/110/EC.

The suspicion rate was considerably high in comparison to an earlier EU-wide coordinated control plan conducted in 2015-17, where 14 % of the analysed samples did not comply with established benchmark criteria to assess honey authenticity. However, a different set of methods with improved

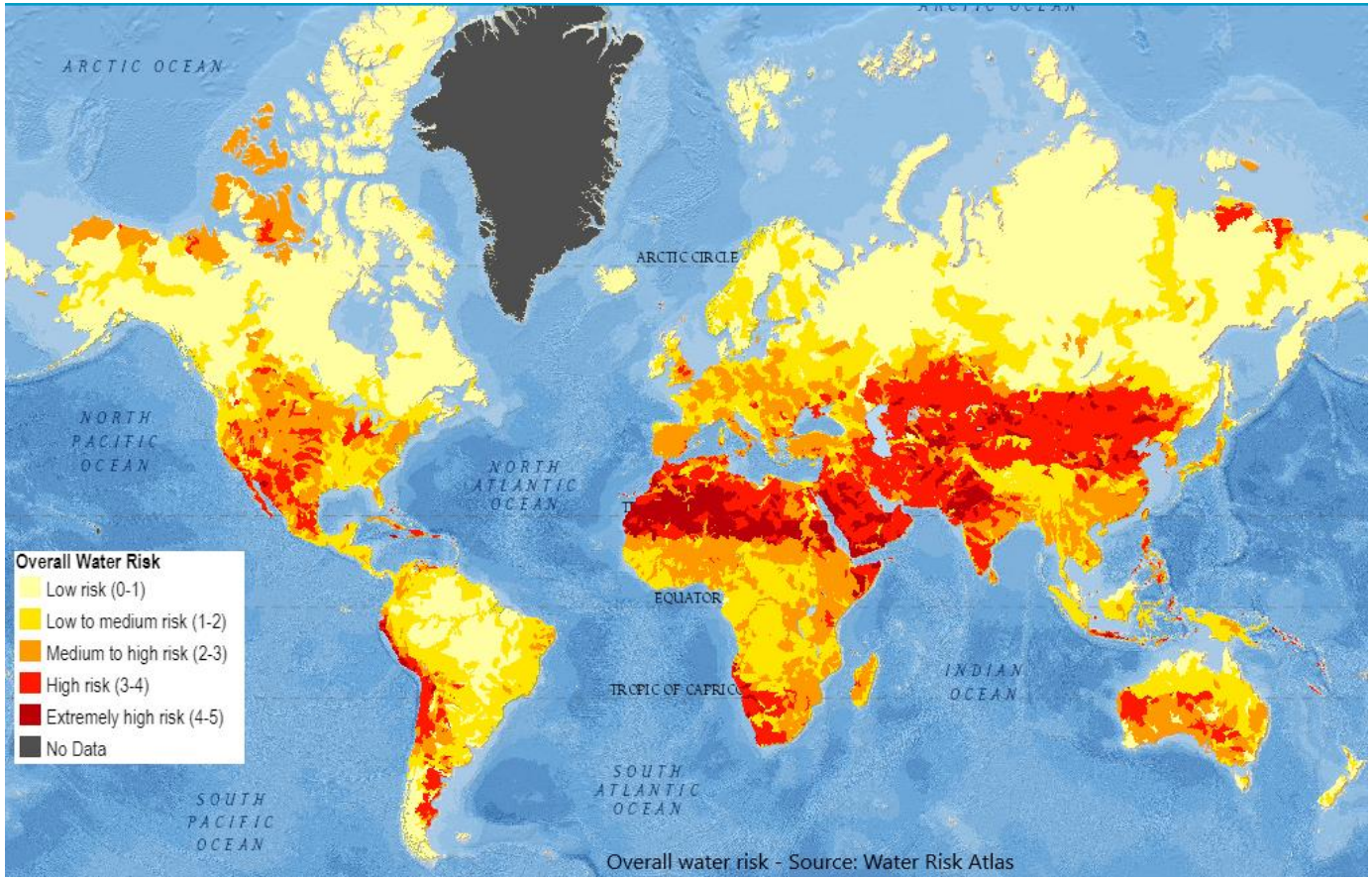
The highest absolute number of suspicious consignments originated from China (66 out of 89), although honey originating from Turkey (14 out of 15) had the highest relative proportion of suspicious samples. Honey imported from the United Kingdom had an even higher suspicion rate (10 out of 10). However, the available traceability information suggests that this could be the result of honey produced in other countries and further processed in the United Kingdom before its re-export to the EU.

Although a substantially high number of honey consignments imported into the internal market was tested, the obtained results represent the situation during the sampling period and shall not be extrapolated to other situations.

https://www.apiservices.biz/en/articles/sort-by-date-up-online/2951-fraudulent-practices-honey

WORLDWIDE DROUGHT

- Many countries are facing water scarcity (colored in red on the world map)
- 2 billion people threatened by water shortage
- With the existing climate change scenario, almost half the world's population will be living in areas of high water stress by 2030



Overall water risk - Source: Water Risk Atlas

Table 1.

	STEP 1												STEP 2
Samples	**Analysis Reference**	**Sugar Profile**			**Enzymatic Activity**		**HMF**	**Humidity**	**pH**	**Botanical and Geographical Origin**	**SCIRA Test**	**Sensory Analysis**	**Proline**	**EALC – IRMS – C3C4**
		Glucose g/100 g	Fructose g/100 g	Psicose %	Diastase Min 8	Sucrase Min 20	Max 40%	Max 20 %	3.4 – 6.1	Region		Organoleptic Comply	Min 180	<2.5 dC13/C12
The COOP Clear Honey	12557816022	39.3	39.2	0.15%	3.1	0	34.4	17	4.4	Vietnam/China	Negative	Not comply	64	Negative
ASDA Set Pure Honey	12557802021 & 12557802025	38.8	40.1	0.42%	0	0	29.6	18.8	4.41	Asia	Negative	Not comply	89	Negative
ROWSE Honey	12557798021 & 12557798024	38	38.8	0.17%	6	0	41.4	18.1	3.94	Asia/ South America	Negative	Not comply	105	Negative
ALDI Grandessa Squeezy Honey	12557784021 & 12557784024	36.3	38.2	0.39%	2.5	0	34.2	18.5	4.34	Asia	Negative	Not comply	52	Negative
MORRISONS Pure Clear Honey	12557770021 & 12557770025	36.7	39.6	0.26%	3.3	0	44.1	18.4	4.3	Asia	Negative	Not comply	62	Negative
TESCO Set Honey	12557767020 & 12557767023	36.3	35.4	0.32%	2.7	0	50.8	18.7	4.15	Asia	Negative	Not comply	47	Negative
MORRISONS Savers Clear Honey	12557753020 & 12557753024	37.3	39.2	0.13%	5	0	26.2	18.1	4.25	Asia	Negative	Not comply	140	Negative
ESSENTIAL WAITROSE Pure Clear Honey	12557722020 & 12557722023	36.8	37.1	0.06%	6.6	0	56.4	19.1	4.13	Maybe China, Asia	Negative	Not comply	50	Negative
HIGHGATE FAYRE Clear Honey	12557736020 & 12557736024	35.5	37.7	0.05%	9.6	0	58.2	17.9	4.06	Asia/ South America	Negative	Not comply	136	Negative
Sweet & Mild by SAINSBURY'S	12557719020 & 12557719023	35.8	36.4	0.19%	4.6	0	39.8	18.5	4.03	China	Negative	Not comply	60	Negative
POUNDLAND	12557705020	37.2	39.9	0.41%	5.7	0	25.6	18.4	4.43	Asia	Negative	Not comply	21	Negative