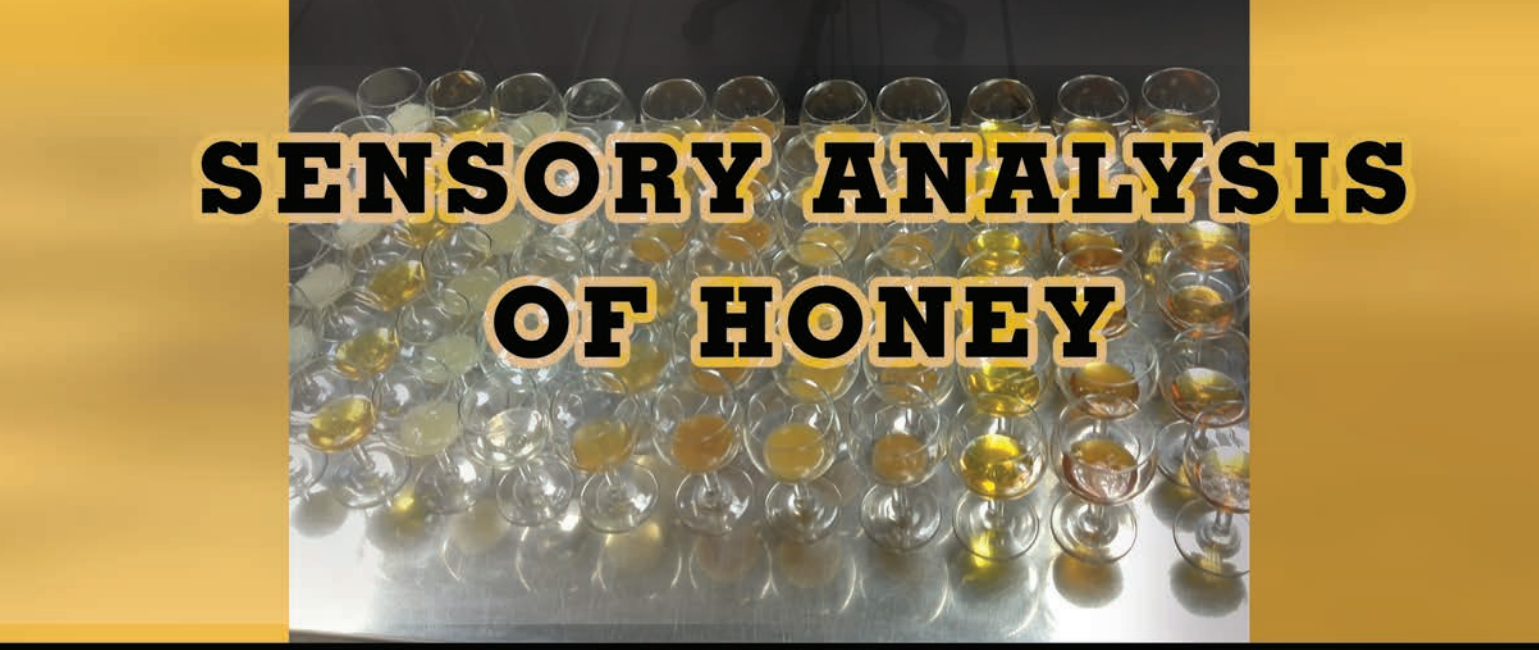


SENSORY ANALYSIS OF HONEY

by SUZANNE RESS
ITALY

When I was in my twenties I had the unexpected fortune of falling in love with an Italian man, and so, inevitably, have had to spend most of my married adult life in Italy.

Having earned degrees in American Literature and Writing, I taught English as a second language to Italians part time while writing and raising our two daughters. One of the things I found to like in Italy was the frequency and variety of outdoor markets. At these, any and nearly all manner of things were for sale, from vegetables and fruit, bread, cheese, salami, olives and oil, grappa, wild mushrooms, fresh and dried fish, to antiques, jewelry, household linens, gadgets, toys, houseplants, clothing, and more.

The Crea-Api research laboratory located in Bologna, Italy.

It was at one such outdoor market, held in the courtyard of a fifth century monastery, where I first came across "the honey man". He was an older gentleman from the Turin area, but I have lost track of his name. At his booth were displayed over twenty different unifloral honeys. Surrounding his table was a large crowd of potential buyers, and as I inched my way to the front, I saw he was offering taste samples of each honey.

Growing up in Ohio and New Jersey, I was fond of the cut comb honey my mother used to buy at the supermarket, and as a teenager learning to bake, I experimented widely with using honey as a substitute for sugar in cake and quick bread recipes. But it had never fully dawned on me that the aroma and taste of honey would vary wildly according to which flowers the bees visited for nectar and pollen.

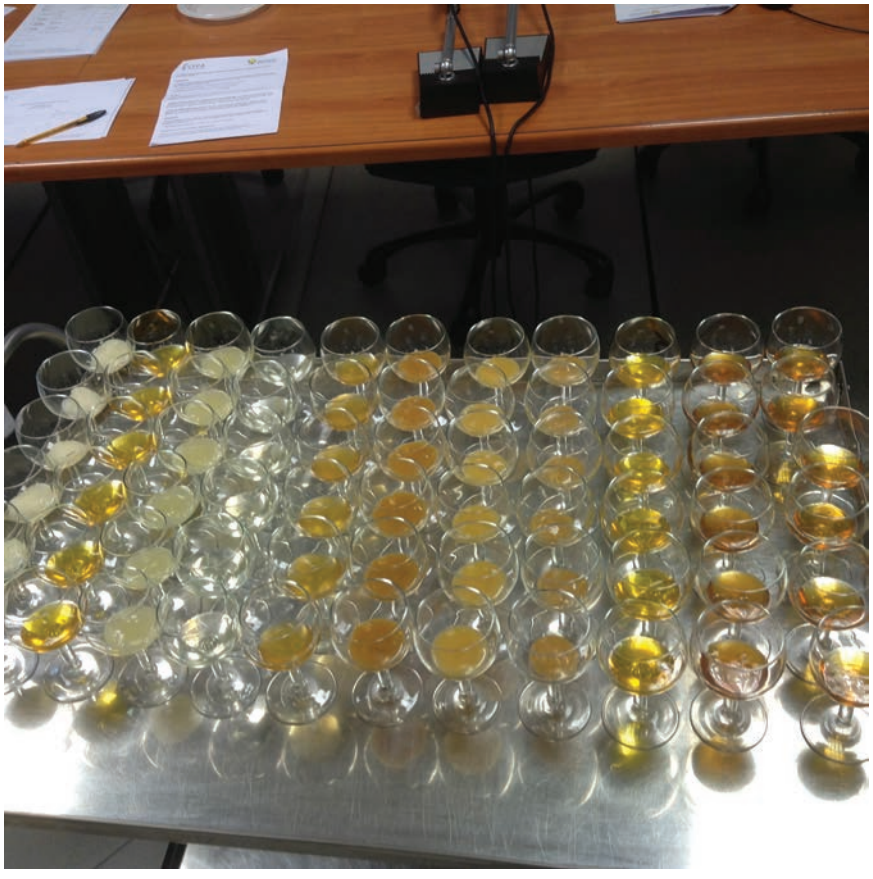
The old gentleman inquired about what sort of honey I would like to try — something delicate? Something strong? A dark liquid honey? A crystallized citrus honey? Or something bitter?

Not quite believing that honey could taste bitter, I chose the last, and he offered me a tiny tasting spoonful of corbezzolo honey.

Corbezzolo, which is *Arbutus unedo*, or strawberry tree, grows all over the Italian island of Sardinia, and, less prolifically in Calabria, Sicily, and southern Tuscany. It is related to the U.S. west coast madrona tree.

The tiny taste of arbutus honey filled my mouth with a burst of fresh green bitter ivy, aromatic and medicinal as Listerine gold, and I loved it. I tried several more of the man's honeys, then purchased a two pound jar of arbutus, and one pound jars of heather and eucalyptus honeys.

Evaluating honey samples in the class. Standing are Gian Luigi Marcazzan and Dario Pozzolo.



Unifloral honey samples ready for taste testing.

I finished that first jar of arbutus honey in a couple of months, and next time there was an outdoor market in the monastery courtyard, I was there bright and early for another big jar of this Sardinian honey I could find in no local shop. (Locally, black locust and chestnut honeys are ubiquitous). The honey man gave me his business card, and after that, whenever I ran out, I telephoned him in Turin, and he mailed me a nicely boxed jar of honey, c.o.d. The honey man was not a producer himself, just a honey connoisseur who purchased high-quality unifloral honeys from producers throughout Italy, and bottled them under his own label.

Years passed, our daughters grew up, and we moved to a house surrounded by fruit orchards, pastures, and woods. Passionate about aromatic herbs, I planted an extensive and unusual flowering herb garden, and noticed that some distant neighbors kept bees. That winter, looking through a pamphlet of adult education courses, I was drawn to the course on apiculture (beekeeping), and signed up to start in January of 2007.

It was held at the local beekeeper's association headquarters, taught by the officers and veterinarian of the association, and lasted ten weeks—one two-hour evening course per week.

There were about 20 of us in the course. Some of my fellow students were already beekeepers, but had learned their skills from a family member or mentor and wanted to improve their knowledge and technique. But most of us were new to beekeeping.

By early spring I had acquired all the necessary basic equipment second hand and had it gamma rayed at a nearby factory. A neighbor and fellow beekeeper sold me two colonies.

With each passing year my apiary grew, and, unless the weather was exceptionally uncooperative, I produced more honey.

The bee veterinarian from the association became a friend and occasional visitor, and on one of his visits I proudly showed him a jar of my newly harvested black locust honey.

He said, "It looks very nice, except for those black specks!"

"What black specks?" I said.

"If you entered this honey in a competition, points would be taken off for that."

After he had left I used a magnifying glass and did indeed see a couple of miniscule black specks in my honey.

It was only the following year that I figured out that the black specks were tiny fragments of burnt honey coming off my electric uncapping knife. I scrubbed it to its original splendor with steel wool.

I also discovered later that my friend the bee vet was on the National Registry of Honey Tasting Experts, a pre requisite for Italian honey competition judges.

The following year, having taken care of the black speck problem, and carefully separating my first harvest honey before

uncapping, sometimes even frame by frame, for light colored black locust honey, I believed my product was ready for a competition.

I entered the first edition of the Golden Bee Great Honeys of Lombardy in the fall of 2013. After some weeks had passed, I received a phone call from the president of the Association of Lombardy Beekeepers congratulating me on my honey that had placed ninth with a score of 88.33 (considered "very good"), and inviting me to attend the awards ceremony in Brescia.

When I received my quality certificate, I noted that, under "observations" was written, "Taste/smell—presence of crucifer". In fact, my husband had planted broccoli rabe next to my hives that year.

The next year, I asked him to plant the broccoli rabe somewhere else, and, in the fall of 2014 I again entered my black locust unifloral honey in the second edition of the same contest. There were many more entries that year, so my honey placed lower, even with its higher score or 91.25 (still in the "very good" category), and the visual observation, "slight presence of foam".

In 2015 I double strained all my honey using a regular strainer over an organza bag, and took a risk by entering three different honeys—black locust, wildflower, and chestnut—in the third edition of the contest.

My black locust came in 14th, with an almost "excellent" score of 94.67, my wildflower honey surprised me by placing 6th (thanks in part to my flowering herb gardens), with a score of 94.33, while my chestnut honey, unsurprisingly to me, really bombed, coming in 19th, with a score of 60.50 ("sufficient"). This was because the many chestnut and linden trees where I live are simultaneously in bloom, and it is impossible to separate the two honeys when uncapping. The observation was, "Not conforming well to the category".

Having received expert judgment on my products made me curious as to how people become honey tasters, and, with a web search I found Crea-Api.

Crea-Api is the Italian institute for research in beekeeping and sericulture (silkworm rearing). It is part of the Council for Agricultural Research, and has been in operation, in Bologna, but under different names, for nearly a hundred years.

This is the only institute in the world that offers a three-part course (followed over a period of at least fourteen months) in the sensory analysis of honey. The third and final part of the course, second level expertise, ends with an exam that, if passed, qualifies one to be on the national registry of expert honey tasters. It is a required qualification for Italian honey judges and honey tasting instructors. Each part of the course lasts for an intense 3-4 days, then a period of at least 5-9 months must elapse before moving on to the next level. During those months students are expected to study and practice regularly on their own. The courses are offered at the institute headquarters in Bologna, and, periodically, at various places throughout Italy.

Instructors Dario Pozzolo (left), and Sergio Massi introduce the class to the general principles of sensory analysis.

In addition, the Crea-Api research laboratory, located in the institute building, is fully accredited to perform physiochemical analysis (refraction, crystallization, density, hydroscopicity, electric conduction, viscosity, specific rotation, color, plus presence of sugars, water, ph, minerals, amino acids, HMF), palynologic analysis (types and quantity of pollen), biometric analysis (how the sample compares sensorially to the established standard for that honey), and of course, sensory analysis, on honey samples brought or sent in.

I wondered how the standard for a unifloral honey was decided. The standard for a black locust honey, for example, allows extreme variability in quantity of black locust pollen, although, in general, it should contain not less than 15% of this plant's pollen. On the other hand, chestnut honey's

A view of the basic chemical lab at the Crea-Api Center in Bologna. Other labs at the center include the Analytical Lab, Microscopy Lab and Sensory Lab.

Laboratory analysis at Crea Api.

standard for chestnut pollen is 90% or more. Apparently, more than fifteen years ago, when the standards were being developed, many samples of each unifloral honey were gathered from all over Italy, and, initially relying only on sensory analysis, composite profiles were created according to what tasted consistent and "right".

I decided to register for the introductory honey sensory analysis course held in January 2016, in Bologna.

It was a four-day course, so I booked a hotel room and took the high-speed train from Milan, arriving in central Bologna in one hour, just in time to catch the 27b bus from the train station to the research center, and start class at 9 a.m. Monday.

There were about 20 of us, many beekeepers, but some were not. There were professional tasters, olive oil producers, biologists, cosmetics manufacturers, and someone interested in opening a unifloral honey shop.

The first morning, the instructors, researcher Raffaele Dall'Olio and technician Roberto Colombo, introduced us to the general principles of sensory analysis, which is a series of techniques using the sensory organs that enables you to reliably measure your perceptions.

The history of the sensory analysis of honey began by following the basic tenets of the traditional expert methods described in the 1965 book, "Principles of Sensory Evaluation of Food" (by Amerine, M.A., Prangborn, M.R.; Roessler. E.B., Academic Press, New York, Food Science and Technology). These principles included a laboratory physiochemical analysis, a sensory panel analysis, and statistical means.

The first course in sensory analysis of honey was held in France in 1978, by Michel Gonnet and Gabriel Vache, These two then collaborated on the book, "Le Gout du Miel: l'Analyse Sensorielle et les Applications d'une Méthode d'Evaluation de le Qualité des Miels" (Ed. U.N.A.F., Paris, 1985).

In 1979 Gonnet was invited to hold the first introductory course in Italy.

In 1984, advanced courses were introduced in Italy, open to those who had already attended the introductory course.

In 1988 the National Registry of Experts in Sensory Analysis of Honey was born, but not until 1999 was the Registry officially recognized with a ministerial decree.

There are about 260 people in the Registry, most of them Italians, but, as of 2015, there is one American, C. Marina Marchese, who I'll bring up again later.

In the afternoon of the first day we got down to business. Samples of unifloral honey in unlabelled small rounded wine glasses were wheeled in on a metal cart. Every group of three or four people were given one sample at a time to inhale, warm up the wine bowl with the palm of the hand and inhale deeply again, stir the honey with a small plastic spoon and inhale ever more profoundly, and begin to take mental and written notes of perceived aromas.

Yes, it smelled good, and it smelled like honey, but what other aromas could you pick up? If the honey were sunflower, maybe it smelled a little like cooked carrot, or cardboard. If it were citrus honey, it smelled flowery, perhaps fruity, too, like fruit gelée slices, and a tiny bit metallic.

The further we went with this exercise the more apparent it became that each unifloral honey had a distinctive, definable aroma unlike any of the others.

By the second day we were allowed to taste the honey samples—after identifying each aroma, a tiny bit of honey on a plastic spoon, let it spread all over the tongue and inhale a little air over the tongue to open up the flavor.

Sure, it tasted sweet, but on further thought, it was so much more than just sweet.

The sunflower honey that smelled of cardboard and carrot blossomed on the tongue to a wonderful flavor of dried tomato, raisins, and pollen. And the citrus honey's flavor, very like its aroma, reminded me of springtime in Naples when the orange flowers are in bloom.

The first couple times we smelled and tasted the samples we were told of what botanical origin each was, but thereafter we were expected to recognize the unmarked honeys by using our senses and our notes.

The seventeen unifloral Italian honeys studied were: black locust, citrus, paradise tree, thistle, chestnut, canola, arbutus, heather, eucalyptus, sunflower, fir tree honeydew, metcalf honeydew, rhododendron, sulla, dandelion, linden, and thyme, plus coriander and ivy.

At the end of the four days I had a folder full of sensory notes to recognize each honey, and was awarded a finisher's diploma. This meant that, the following October, I could go on to the first level advanced course, a three-day course held at the Bologna center.

Fortunately I managed to find a genuine jar of each type of honey either in a nearby supermarket or organic foods shop, or through a mail order honey connoisseur in Trento.

At first I practiced regularly, but as spring came I got too busy with other things and

(l) 2015 Biomel Organic Honey Competition Judges (r) Antonio sniffing

tapered off, so that by fall my sensory analysis abilities had become somewhat rusty. Never mind, I dug out my notes, booked a room, and jumped on the high-speed train back to Bologna in October, 2016.

I had thought the advanced course would have fewer pupils, but again it was a full house of about 20. Many of these were the same people from the introductory course, but several were new, having taking the introductory course at a different time or location. Among the new people were a professional taster, a chef, and a food journalist.

The instructors were beekeeper Dario Pozzolo, technician Sergio Massi, and researcher Gian Luigi Marcazzan. We started right in with a review of the aromas and flavors of all 17 honeys. The rhythm of sensorial analysis picked up pace, it seemed we always held a goblet of honey to our noses.

Besides identifying the unlabelled uniflorals, we had several tests of recognizing a small amount of unifloral honey mixed into a mild base honey such as sulla (French honeysuckle), several triangular tests, where two unmarked samples are the same (but perhaps one is crystallized and one liquid), and one is very slightly different. These could be the same unifloral honeys from two different producers, for example, or two very slightly different blends of 2 or 3 honeys.

Another test was to rank five unmarked samples according to what percentage of it was monofloral (in a mild base). For example, the high might be 80% citrus honey with 20% sulla, ranging down to 10% citrus in 90% sulla, and we were to arrange them from low to high.

By the end of the first day, my sensorial analysis abilities had returned in full force.

On the afternoon of the third day we formed four panels of five people, and judged samples of the same unifloral honey from five different producers. Judging was based on appearance, aroma, consistency, taste type correctness, with points taken off for any defects such as black specks, presence of wax, etc. Each group then tallied and averaged each sample's score and ranked them from best to worst.

At the end of the course we were awarded finishers' diplomas and advised to continue our study and practice until March, 2017, when the second level expert course and exam will be held.

So far (until March, anyway) only one American has completed all three courses, passed the exam, and been awarded a place on the Registry. C. Marina Marchese, of Weston, Connecticut, completed her course work in March of 2015, and currently offers, through the American Honey Tasting Society, introductory courses in honey tasting. She is usually assisted by Raffaele Dall'Olio.

Some of the honeys analyzed in Marchese's courses are the standard Italian ones, for which profiles exist, and others are North American uniflorals, for which, as yet, no standard profiles exist. This makes sensory analysis more difficult. AHTS recently started a program called "Project: Flavor and Floral Mapping". Most recently, samples of American citrus honeys were called for from producers. In order to begin to set up a standard profile for a unifloral honey many samples of (raw) honey are needed.

Marchese also collaborated with Kim Flottum on the 2013 introductory honey tasting book, "The Honey Connossieur" (Black Dog & Leventhal Pubs., New York), an excellent starting place.

On the west coast, the Honey and Pollination Center at the Robert Mondavi Institute, which created a handy and inexpensive Honey Flavor and Aroma Wheel, in 2014, offers honey tasting courses. The Center has plans to analyze 5 American unifloral honeys—Florida tupelo, Midwestern sweet clover, California orange blossom, California star thistle, and Hawaiian lehua, in order to begin establishing profiles. The problem is that all of the necessary preliminary sensory analyses, and the following laboratory work, require honey tasting experts, palyntologists, researchers and technicians in an equipped laboratory, and money.

These two programs are still in their early stages, and, hopefully, within a number of years, the sensory analysis of unifloral honeys in North America will be greatly appreciated by American honey producers for the prestige and customer appreciation it will ultimately bring to the product.

Suzanne Ress

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