3. Supplementary TABLES Vit et al. biblio SBH 2023

Mapping six decades of stingless bee honey research: Chemical quality and bibliometrics

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TABLE SI. Inclusion and exclusion criteria for retrieving the dataset on pot-honey and stingless bee honey research from 1962 to 2022

Inclusion	Exclusion
Documents containing the search words in the title, abstract or keyword	No exclusion
Articles, reviews and book chapters	Other document type
Final publication stage	Article in press
Source type journals and books	Other types of source

TABLE SII. Dataset of publications by P. Vit, top author for stingless bee honey chemical quality using the query string below with the Scopus database, and abstracts of each document, retrieved the 23rd October 2022.

TITLE-ABS-KEY ((pot-honey* OR "stingless bee*" AND honey AND NOT pollinat* AND NOT brood AND NOT caste* AND NOT gene AND NOT pollinat* AND NOT recruitment)) AND PUBYEAR < 2023 AND (LIMIT-TO (SRCTYPE , "j") OR LIMIT-TO (SRCTYPE , "b")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "ch") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (PREFNAMEAUID , "Vit, P.#6604081206"))

No.	Source title	Cited by (No.)	Authors	Document type	Abstracts
1	Rev. Brasileira Farmacognosia 27(3), 384-387 (2017)	7	Vit P., Pedro S.R.M., Vergara C., Deliza R.	Article	Pastaza is the largest and least populated province in Ecuador, with seven native indigenous nationalities. The Kichwas from the Rio Chico community live near to the capital city Puyo, are recognized for their knowledge on stingless honey bees. From the 400 species of Neotropical Meliponini that make honey in cerumen pots, almost 100 thrive in Southern Ecuador, and confer such biodiversity to pot-honey. In this study sensory characteristics of Ecuadorian false and genuine honeys with diverse entomological origin: Apis mellifera – light amber and amber, Geotrigona leucogastra, Melipona grandis and Scaptotrigona sp. (S. ederi np Schwarz) were investigated with Kichwa assessors (four female and four male, aged 18–62 years old). The panel was asked to taste and to identify sensory attributes of honey (appearance, taste, smell, aroma, mouthfeel, other tactile sensations), and to score their intensities in 10 cm unstructured line scales anchored with the words weak and strong, using the Free-Choice Profile methodology The Generalized Procrustes Analysis was used on the data. The first and second dimensions accounted for by 61.1% of the variance. In the descriptive sensory evaluation, darker honeys (amber A. mellifera, false and Geotrigona) were separated from (light amber A. mellifera, Melipona and Scaptotrigona) by the first dimension; whereas thicker honeys (A. mellifera and false) were discriminated from thinner honeys (Geotrigona, Melipona and Scaptotrigona) by the second dimension. The assessors were able to evaluate and differentiate honey types without previous sensory training. Remarkably, two Kichwa ladies immediately spit out the false honey, in contrast to an acceptance study on 18-honeys, where the false honey was scored among the preferred ones by 58 participants of the First Congress on Apiculture and Meliponiculture in Ecuador. Therefore, results

					suggest that Ecuadorian native Kichwas keep a sensory legacy of ancestral knowledge with forest products such as honey.
2	Rapid Commun. Mass Spectrom. 29(10), 948-954 (2015)	15	Truchado P., Vit P., Heard T.A., Tomás-Barberán F.A., Ferreres F.	Article	Rationale: Tetragonula carbonaria pot-honeys are highly valued as a food source and for their biological activities in Australia, and there is a growing interest to know its composition. Phenolic metabolites, which could be related to their beneficial properties, have not been studied in depth yet. Methods: Mass spectrometry (MS) coupled to liquid chromatography (LC) is an advanced technique for the study of complex flavonoids present in difficult food matrices that hampers their isolation and purification. This allows the tentative characterization of diglycosides/triglycosides establishing the position of the O-glycosylation on the sugar moiety by the study of the MS data in T. carbonaria pot-honeys from Australia. Results: Their spectra obtained by high-performance liquid chromatography/photodiode-array detection/electrospray ionization ion trap mass spectrometry (HPLC/DAD/ESI-MS^n) revealed for the first time 19 quercetin, kaempferol and isorhamnetin O-glycosides. These compounds were clustered in flavonoid triglycosides, diglycosides and monoglycosides. The first cluster contained one flavonoid trihexoside, two -3-O-(2-hexosyl, 6-rhamnosyl)hexosides and their isomers and two -3-O-(2,6-di-rhamnosyl)hexosides. In the second cluster, eleven flavonoid diglycosides such as three -3-O-(2-hexosyl)hexosides, four -3-O-(2-rhamnosyl)hexosides and one -3-O-(6-rhamnosyl)hexoside as well as two -3-O-(2-pentosyl)hexosides and one tentative -3-O-(3-pentosyl)hexoside were detected. In the monoglycoside group, only one flavonoid -3-O-hexoside was identified. Conclusions: The occurrence of this large number of flavonoid glycosides could be due to the low glucosidase activity previously reported in stingless bee honey.
3	Pot-Honey: A Legacy of Stingless Bees, pp. 349-361 (2013)	9	Deliza R., Vit P.	Book Chapter	Sensory analysis uses the five human senses to evaluate products like stingless bee pot honey. The sensory characteristics of pot honey are presented and discussed, and comparisons between honeys produced by the bees in combs or in pots are considered, as well as the sensory evaluation of fermented honey. Sensory results based on descriptive techniques suggest that new odor-aroma families are needed, and to describe such a product. Preliminary data on acceptance of pot honey produced by different species are shown. The free-choice profile (FCP) method helped to group honeys according to their entomological origin, by untrained panels.
4	Pot-Honey: A Legacy of Stingless Bees pp. 363-373 (2013)	12	Vit P.	Book Chapter	The stingless bee Melipona favosa lives in the plains and coastal areas of Venezuela. It is a gentle bee known locally as erica and maba. This bee commonly nests in trees, walls, fence posts, and is kept in hives by traditional stingless beekeepers. Its honey can ferment inside sealed storage pots of the nest. Therefore, the sensory attribute fermented is interpreted as an ability of Meliponini to process their honey with microorganisms, not as a defect like unripe honey extracted from combs. Fermentation may continue

					after harvest. The honey composition for a set of five honeys from different hives, some biological activities and sensory attributes are discussed from the database of 40 M. favosa honey samples from Venezuela. This type of pot-honey has a distinctive floral smell, sour-sweet taste and light amber color. Odor and aroma of M. favosa honey are more floral-fruity and fermented than that of A. mellifera, with an additional sensory hallmark that is the odor of the hive or nest. Compared to honey standards of A. mellifera, modified reference values may be adopted for M. favosa honey considering: (1) Increased maximum values for water content, sucrose, and free acidity, (2) Decreased minimum value for reducing sugars, (3) Nitrogen content (10.0-100.0 mgN/100 g), and (4) No variation in ash and HMF contents.
5	Pot-Honey: A Legacy of Stingless Bees pp. 481-493 (2013)	6	Vit P., Yu J.Q., Huq F.	Book Chapter	Information obtained from traditional use and scientific studies can help establish the value of honey in cancer treatment. Animal models and clinical trials with honey administered alone or in combination with other natural products or targeted therapy, are often difficult to interpret because honey contains major sugary and watery plant components, polyphenols, organic acids, and other secondary metabolites and structures, collected and/or transformed by the bees from thousands of plants. Similarly, cancer includes over 100 forms of metastitized tumors. Antiproliferative action of pot honey from Frieseomelitta, Melipona, Scaptotrigona, and Tetragonula on human ovarian cancer cell lines, reported here from our recent work, suggests cisplatin resistance in ovarian cancer may be effectively diminished by honey.
6	Pot-Honey: A Legacy of Stingless Bees pp. 409-416 (2013)	6	Ferrufino U., Vit P.	Book Chapter	A meliponiculture project in Amboró National Park, Southeast Bolivia, uses six species of stingless bees: erereú choca Melipona brachychaeta, erereú barcina Melipona grandis, obobosí Scaptotrigona depilis, suro negro Scaptotrigona polysticta, suro choco Scaptotrigona near to xanthotricha, and señorita Tetragonisca fiebrigi. The annual yield of stingless bee products (honey, pollen, propolis) is provided here. We also studied the pot honey produced by these species, chemistry (moisture, ash, pH, free acidity, reducing sugars, sucrose), mineral contents (Ca, Cu, Fe, K, Mg, P, Zn), microbes (mesophilic bacteria, molds, yeasts), human sensory responses to selected components, and networking needed for marketing considerations.
7	J. Chromatogr. A 1218(42), 7601-7607 (2011)	52	Truchado P., Vit P., Ferreres F., Tomas-Barberan F.	Article	The analysis of the phytochemicals present in stingless bee honey samples has been a difficult task due to the small amounts of samples available and to the complexity of the phytochemical composition that often combines flavonoid glycosides and aglycones. Honey samples produced in Venezuela from Melipona species were analyzed using a combination of solid-phase extraction and HPLC-DAD-MSn/ESI methodologies with specific study of the fragment

					ions produced from flavonoid glycosides. The analyses revealed that flavonoid glycosides were the main constituents. The honey samples analyzed contained a consistent flavonoid pattern composed of flavone-C-glycosides, flavonol-O-glycosides and flavonoid aglycones. The HPLC-DAD-MSn/ESI analysis and the study of the fragment ions obtained allowed the characterization and quantification for the first time of five apigenin-di-C-glycosides, and ten quercetin, kaempferol and isorhamnetin O-glycosides (di- and tri- glycosides), and the aglycones pinobanksin, quercetin, kaempferol and isorhamnetin in the different samples. This is the first report of flavonoid-C-glycosides in honey. The results show that the content of flavonoid-glycosides (mean values of 2712 μg/100. g) in stingless bee honeys is considerably higher than the content of flavonoid aglycones (mean values of 315 μg/100. g). This differs from previous studies on Apis mellifera honeys that consistently showed much higher aglycone content and smaller flavonoid glycoside content. The occurrence of relevant amounts of flavonoid glycosides, and particularly C-glycosides, in stingless bee honeys could be associated with their putative anticataract properties. © 2011 Elsevier B.V.
8	Rev. Brasileira Farmacognosia 21(5), 786-792 (2011)	17	Vit P., Deliza R., Pérez A.	Article	Pot honey is the most abundant honey in the forest, produced by many species of stingless bees (Meliponini) of the Huottuja (Piaroa) community in Paria Grande, Venezuela. However, the commercialization of this honey is low, and false honeys, which are sold in labelled bottles, are easily found in the market. This study has investigated the ability of an untrained panel of Piaroa assessors to differentiate the genuine from the false pot honey using the Free-choice profile. This sensory method allows consumers to use their own words to describe and to quantify sensory attributes of a product. The genuine honeys, light amber Melipona fuscopilosa "isabitto" and dark amber Tetragona clavipes "ajavitte", the false light and dark "angelita" honeys, and the amber Apis mellifera honey, were evaluated. Sensory attributes related to the appearance, color, odor, flavor and mouthfeel were elicited in a qualitative session and were quantified in 10-cm unstructured line scales using individual score sheets. The data were analyzed by Generalized Procrustes Analysis (GPA). The bidimensional plot successfully separated genuine from false pot honeys. The first dimension (39.50%) was represented by the low viscosity, fermented odor and sour taste, whereas the second dimension (24.69%) was related to fruity and honey odor and flavor. Huottuja assessors differentiated the five honey types in terms of the perceived sensory characteristics.
9	Acta Bioquim. Clin. Latinoam. 43(2), 219-226 (2009)	20	Vit P., Gutiérrez M.G.,	Article	Tetragonisca f iebrigi Schwarz 1938 is a stingless bee named yateí in Argentina and Paraguay. As well as other Meliponini species, this native bee

			Rodríguez-Malaver A.J., Aguilera G., Fernández-Díaz C., Tricio A.E.		stores honey in pots with acidity and moisture higher than the Apis mellifera L. honey standards. Sixteen T. fiebrigi honey samples produced in the county of Misiones, Argentina, and Itapuá department, Paraguay were compared according to their Trolox equivalent antioxidant capacity (TEAC) by the method of the radica cation ABTS+, flavonoid with aluminium chloride and tota polyphenols contents with the Folin-Ciocalteu reagent. The properties between honeys from Argentina and Paraguay varied as follows in color (107.18±19.40 and 100.40±15.47 mm Pfund), moisture (23.89±1.74 and 23.68±0.78 g water/100 g honey), flavonoids (14.37±11.11 and 12.66±4.82 mg QE/100 g honey), poliphenols (240.74±94.05 and 148.29±17.75 mg GAE/100 g honey), and TEAC (160.15±60.50 and 120.91 ±38.67 ¡Trolox equivalents/100 g honey). The color, moisture, flavonoid and polyphenol contents did not vary significantly according to the geographical origin, but the TEAC was higher in the honeys from Argentina than in those from Paraguay. This characterization of yateí honey is a contribution to suggest its quality standards.
10	Nat. Pro. Comm. 4(9), 1221-1226 (2009)	39	Rodríguez-Malaver A.J., Rasmussen C., Gutiérrez M.G., Gil F., Nieves B., Vit P.	Article	Honey produced by ten stingless bee species (Melipona crinita, M. eburnea, M. grandis, M. illota, Nannotrigona melanocera, Partamona epiphytophila, Ptilotrigona lurida, Scaptotrigona polystica, Scaura latitarsis, and Tetragonisca angustula) from Peru has been characterized according to traditional physicochemical standards (color and moisture), biochemical components (flavonoids, polyphenols, nitrites, proteins), and bioactive properties (antibacterial activity, antioxidant capacity). Analytical data are also provided for a sample of Apis mellifera and an artificial honey control. For stingless bees, honey color varied between 26 and 150 mm Pfund. M. illota produced the lightest honey, while N. melanocera and T. angustula were the darkest. Moisture varied between 20.8 and 45.8 g water/100 g, confirming higher moisture for stingless bee honey than the A. mellifera honey standard of 20 g water/100 g. Flavonoids varied from 2.6 to 31.0 mg quercetin equivalents/100g, nitrites from 0.30 to 2.88 µmoles nitrites/100 g, polyphenols from 99.7 to 464.9 mg gallic acid equivalents/100g, proteins from 0.75 to 2.86 g/100 g, and the antioxidant capacity from 93.8 to 569.6 µmoles Trolox equivalents/100 g. The minimal inhibitory concentration (MIC) was slightly lower against Staphylococcus aureus (12.5 -50 g/100 mL) than Escherichia coli (50 g/100 mL).
11	J. Med. Food 11(4), 789-794 (2008)	84	Oddo L.P., Heard T.A., Rodríguez-Malaver A., Pérez R.A.,	Article	Stingless bees (Tribe Meliponini) are a diverse group of highly eusocial bees distributed throughout the tropics and subtropics. Trigona carbonaria honey, from Australia, was characterized by traditional physicochemical parameters (acidity, sugars, diastase, electrical conductivity, hydroxymethylfurfural,

			Fernández-Muiño M., Sancho M.T., Sesta G., Lusco L., Vit P.		invertase, nitrogen, and water content) and other compositional factors (flavonoids, polyphenols, organic acids, and water activity), as well as total antioxidant capacity and radical scavenging activity. For the Australian T. carbonaria, the traditional analytical parameters were similar to those previously reported for neotropical stingless bee honey and confirm that honeys produced by Meliponini bees possess several physicochemical properties that are distinctly different from Apis mellifera honey, with higher values of moisture (26.5 ± 0.8 g of water/100 g of honey), water activity (0.74 ± 0.01), electrical conductivity (1.64 ± 0.12 mS/cm), and free acidity (124.2 ± 22.9 mEq/kg of honey) and a very low diastase activity (0.4 ± 0.5 diastase number) and invertase activity (5.7 ± 1.5 invertase number). The sugar spectrum was quite different from that of A. mellifera honey, with 20.3 ± 2.9 g of maltose/100 g of honey. The values of pH (4.0 ± 0.1), lactonic acidity (4.7 ± 0.8 mEq/kg of honey), sucrose (1.8 ± 0.4 g/100 g of honey), and fructose/glucose ratio (1.42 ± 0.13) fell in the same ranges as those of A. mellifera honey. Citric (0.23 ± 0.09) and malic (0.12 ± 0.03) acid concentrations (in g/kg of honey) of T. carbonaria honeys were in the range described for A. mellifera honey. D-Gluconic was more concentrated (9.9 ± 1.3 g/kg of honey), in the range of Italian Castanea, Thymus, Arbutus, and honeydew honeys. Flavonoid content was 10.02 ± 1.59 mg of quercetin equivalents/100 g of honey, and polyphenol contents were 55.74 ± 6.11 mg of gallic acid equivalents/100 g of honey. The antioxidant activity, expressed as percentage of 2,2′-azinobis-(3- ethylbenzothiazoline-6-sulfonic acid) cation (ABTS.+) decolorization, was 233.96 ± 50.95 μM Trolox equivalents, and free radical 1,1-diphenyl-2-picrylhydrazyl (DPPH.) depletion was 48.03 ± 12.58 equivalents of ascorbic acid. All reported values are averages ± standard deviation. The antioxidant activity can represent an important added value for T. carbonaria honey, to initiate a medicinal approach for both nutritional and pharmaceutical applications, besides further physicochemical characterization. © 2008 Mary Ann Liebert, Inc.
12	J. Health Sci. 54(2), 196-202 (2008)	12	Vit P., Jacob T.J.	Article	Stingless bee (Meliponini) honey is a bioresource used to treat cataracts in traditional medicine. The anticataract activity of twenty flavonoids was explored in an osmotic cataract model, to find a probable link between the putative anti-cataract properties of stingless bee honey eyedrops and their flavonoids. Osmotic cataracts were induced in ovine lenses to produce a model to test anti-cataract drugs in cultured lenses by digital image analysis. Digital images were taken every 4 hr to monitor progressive opacification by measurements of grey level. In 24 hr. the opacification was stable. Osmotic cataracts were induced by incubating ovine lenses in 45% hypotonic HBS for

					24 hr to test the anticataract action of twenty synthetic flavonoids at a concentration of 10-5 M. Luteolin tetramethyl ether, luteolin 4′-glucoside, luteolin 3′-7-diglucoside and orientin, significantly inhibited cataracts induced in ovine lenses incubated in 45% hypotonic HBS for 24 hr. Different degrees of opacification were produced by hypotonic stress in ovine lenses. The significant inhibition of cataracts caused by four derivatives of luteolin in vitro may be considered as a preliminary evidence for the putative anticataract properties of stingless bee honeys.
13	Interciencia 31(12), 867-875 (2006)	128	Souza B., Roubik D., Barth O., Heard T., EnrÍquez E., Carvalho C., Villas-Bôas J., Marchini L., Locatelli J., Persano-Oddo L., Almeida-Muradian L., Bogdanov S., Vit P.	Article	Compositional data from 152 stingless bee (Meliponini) honey samples were compiled from studies since 1964, and evaluated to propose a quality standard for this product. Since stingless bee honey has a different composition than Apis mellifera honey, some physicochemical parameters are presented according to stingless bee species. The entomological origin of the honey was known for 17 species of Meliponini from Brazil, one from Costa Rica, six from Mexico, 27 from Panama, one from Surinam, two from Trinidad & Tobago, and seven from Venezuela, most from the genus Melipona. The results varied as follows: moisture (19.9-41.9g/100g), pH (3.15-4.66), free acidity (5.9-109.0meq/Kg), ash (0.01-1.18g/100g), diastase activity (0.9-23.0DN), electrical conductivity (0.49-8.77mS/cm), HMF (0.4-78.4mg/Kg), invertase activity (19.8-90.1IU), nitrogen (14.34-144.00mg/100g), reducing sugars (58.0-75.7g/100g) and sucrose (1.1-4.8g/100g). Moisture content of stingless bee honey is generally higher than the 20% maximum established for A. mellifera honey. Guidelines for further contributions would help make the physicochemical database of meliponine honey more objective, in order to use such data to set quality standards. Pollen analysis should be directed towards the recognition of unifloral honeys produced by stingless bees, in order to obtain standard products from botanical species. A honey quality control campaign directed to both stingless beekeepers and stingless bee honey hunters is needed, as is harmonization of analytical methods. © 2007 Asociación Interciencia.
14	Bee World 85(1), 2-5 (2004)	114	Vit P., Medina M., Enríquez M.E.	Review	Beekeeping with stingless bees (meliponiculture) is practiced in Guatemala, Mexico and Venezuela. In this article we review the medicinal uses of stingless bee honeys in these countries. We include honeys from 23 stingless bee species, review their use in the treatment of ocular cataracts and pterygium, fatigue, gastritis, ulcers, lung weakness, coughs, wounds and bruises; their use as laxatives and fertility enhancers, and their nutritional value. A proposal on quality standards for stingless bee honey is considered a contribution for further regulations.
15	Eur. Food Res. Technol. 206(4), 288-293 (1998)	11	Vit P., Tomás-Barberán F.A.	Article	Honey was collected from 24 stinglessbee nests in Venezuela. The flavonoid compounds in the phenolic extracts were analysed and related to the

					botanical, geographical and entomological origin of the honey. Honeys produced in savannas were richer in flavonoids compared with honeys from the forests. It was found that phenolic extracts of honey of the same geographical origin had similar flavonoid profiles, whereas the same could not be said of honeys of the same entomological origin, although the botanical origin of the samples was variable. It is proposed that analysis of stinglessbee honey eyedrops in terms of their flavonoid content can be used as a basis of authenticating and controlling for their geographical origin. © Springer-Verlag 1998.
16	Apidologie 29(5), 377-389 (1998)	47	Vit P., Oddo L.P., Marano M.L., De Mejias E.S.	Article	Stingless bee honey samples collected from 27 nests in Venezuela, were analysed for ten compositional factors (acidity, ash, electrical conductivity, diastase activity, hydroxymethylfurfural, invertase activity, nitrogen, reducing sugars, sucrose and water). The entomological origin of the honeys based on these factors was explored using three methods of multivariate analysis. Clustering was adequate to separate the honey samples into two stingless bee tribes with the exception of honeys from one genus of Trigonini. Principal component analysis confirmed these findings and grouped the honeys to species level. Although discriminant analysis of the ten quality factors under consideration positioned all the samples in their respective entomological group, lowering the number of variables to reducing sugars, sucrose and diastase activity was still satisfactory for a correct classification. A fourth variable that could be used to assign correct membership was either acidity or nitrogen content.
17	Z. Lebensm.Unters. For. 206(4), 288-293	14	Vit P., Tomás-Barberán F.A.	Article	Honey was collected from 24 stingless bee nests in Venezuela. The flavonoid compounds in the phenolic extracts were analysed and related to the botanical, geographical and entomological origin of the honey. Honeys produced in savannas were richer in flavonoids compared with honeys from the forests. It was found that phenolic extracts of honey of the same geographical origin had similar flavonoid profiles, whereas the same could not be said of honeys of the same entomological origin, although the botanical origin of the samples was variable. It is proposed that analysis of stingless bee honey eyedrops in terms of their flavonoid content can be used as a basis of authenticating and controlling for their geographical origin. © Springer-Verlag 1998.
18	J. Appl. Entomol. 122(1), 5-8 (1998)	17	Vit P., Fernandez-Maeso M.C., Ortiz-Valbuena A.	Article	Stingless bee honeys were extracted from 27 nests in the West and South of Venezuela and analysed by HPLC for sugar content. The concentration and ratios of the three frequently occurring sugars, fructose, glucose and maltose, were related to the entomological origin of the samples. The fact that an unusual high maltose content was characteristic for Trigonini honeys was

					further explored to propose its use as a predictor of entomological origin. A dendrogram with normalized values of maltose was successfully used to cluster honeys of the same stingless bee tribe, except for Scaptotrigona spp. Three maltose ratios were calculated and all of them were distinctive for Meliponini, Trigonini and the intermediate Scaptotrigona spp. honeys. The hexoses-to-maltose ratio is the proposed predictor because differences at the tribe level are easily observed without further statistical analysis; in the present set of honeys, Scaptotrigona spp. presented values between 11 and 12, other Trigonini were lower than 3 and Meliponini were higher than 15.
19	Eur. Food Res. Technol. 204(1), 43-47 (1997)	15	Vit P., Soler C., Tomás-Barberán F.A.	Article	Profiles of flavonoid compounds of Apis mellifera and Melipona spp. honeys from Venezuela were analysed to evaluate entomological-dependent differences. The presence of ellagic acid was a characteristic of A. mellifera honeys from Venezuela, but its presence was variable in Melipona spp. samples. The number of flavonoid types present in individual samples did not exceed six and occasionally only one phenolic type was present. The diversity of flavonoid compounds in tropical honeys from Venezuela was lower than that previously measured in temperate honeys. Flavonoids such as myricetin, an unidentified chalcone and a flavonol glycoside were only found in Melipona honeys but not in all the samples; therefore, they cannot be foreseen as entomological markers to differentiate between the Apis and Melipona honeys under study. A preliminary discussion is made regarding flavonoids present in Melipona honeys and their probable link with the putative anticataract action of stingless beehoneys. © Springer-Verlag 1997.
20	Z. Lebensm.Unters. For. 204(1), pp. 43-47 (1997)	24	Vit P., Soler C., Tomás-Barberán F.A.	Article	Profiles of flavonoid compounds of Apis mellifera and Melipona spp. honeys from Venezuela were analysed to evaluate entomological-dependent differences. The presence of ellagic acid was a characteristic of A. mellifera honeys from Venezuela, but its presence was variable in Melipona spp. samples. The number of flavonoid types present in individual samples did not exceed six and occasionally only one phenolic type was present. The diversity of flavonoid compounds in tropical honeys from Venezuela was lower than that previously measured in temperate honeys. Flavonoids such as myricetin, an unidentified chalcone and a flavonol glycoside were only found in Melipona honeys but not in all the samples; therefore, they cannot be foreseen as entomological markers to differentiate between the Apis and Melipona honeys under study. A preliminary discussion is made regarding flavonoids present in Melipona honeys and their probable link with the putative anticataract action of stingless bee honeys. © Springer-Verlag 1997.
21	Apidologie 27(6), 445-450 (1996)	38	Bogdanov S., Vit P.,	Article	The HPLC sugar profiles and the conductivity of 42 stingless bee honey samples from Venezuela were determined. Three of

			Kilchenmann V.		the honey types were produced by Melipona species (n = 24), while the rest belonged mainly to five Trigona species. The main sugars of the Melipona honeys were fructose and glucose, with an average of 36.7 g/100 g. The Trigona (Frieseomelitta) honeys had a completely different sugar spectrum. There the principal sugar was a disaccharide with the retention time of maltose with an average content of 32.3 g/100 g, while fructose and glucose had smaller concentrations: 24.4 and 18.1 g/100 g respectively. The Melipona honeys contained also small quantities of maltose and only traces of oligosaccharides, while the Trigona honeys had small but measurable amounts of turanose, trehalose and erlose. The conductivity values of the Melipona honeys varied from 0.32 to 0.44 mS/cm and were significantly lower than those of the non-Melipona ones with minimum and maximum values of 1.04 and 1.07 mS/cm.
22	J. Apic. Res. 35(2), 57-62 (1996)	30	Vit P., Pulcini P.	Article	Twenty-seven stingless bee honeys from the west and south of Venezuela were examined for diastase (α and ß-amylase) and invertase (α-glucosidase) activity Diastase activity (g starch hydrolysed/100 g honey/h) was very low in Meliponini and Scaptotrigona spp. honeys (2.6–3.5 diastase number), and much higher in other Trigonini honeys (6.6–35.6). Invertase activity (µmoles p-nitrophenyl glucopyranoside/kg honey/min) varied from 9.6 to 169.1 in Meliponini and from 15.9 to 214.3 in Trigonini honey, and was not statistically different in both groups. The correlation between diastase and invertase was very low, but both enzymes produced a dendrogram with two distinctive clusters for Meliponini and Trigonini honeys, excluding Scaptotrigona spp. The results suggest that the quality standards for stingless bee honeys will require a different approach for diastase activity. The use of diastase activity as an indicator of freshness, as is common practice for Apis mellifera honeys, is not applicable for Meliponini and Scaptotrigona spp. honeys, which are lacking in diastase. © 1996 International Bee Research Association.
23	J. Apic. Res. 33(3), 145-154 (1994)	18	Vit P., Ricciardelli d'Albore G.	Article	Pollen spectra were obtained for honey samples taken from the nests of 48 Melipona spp. and 20 other stingless bee species at 23 locations in Venezuela from 1987 to 1989. The order of abundance for dominant pollens in Melipona spp. honeys was: Mimosa pudica gr., Scrophulariaceae, Machaerium gr., Avicennia, Myrtaceae, Mimosa scabrella gr., Cassia, Myrcia, Piper, Philoxerus, Xanthoxylum, Alternanthera and Astragalus. Pollens of Trema, Triumfetta, Avicennia, Palmae, Fagara, Hyptis gr., Rhamnaceae, Xanthoxylum and Acalypha were dominant in the non-Melipona samples. The abundance of dominant pollens from nectarless plants, such as Mimosa pudica gr., Mimosa scabrella gr., Alternanthera, Piper and Trema, considerably reduces the list of major nectar sources found for the stingless bees studied; their presence

					could be due to mixing of the honey with pollen pots inside the nest. © 1994 International Bee Research Association.
24	Apidologie 25(3),A278, 278-288 (1994)	46	Vit P., Bogdanov S., Kilchenmann V.	Article	Forty stingless-bee and 21 Apis mellifera honeys from Venezuela were analysed for their essential composition. The stingless bees comprised 3 Melipona and 5 Trigona species. The moisture content of the honeys from the different stingless-bee species was significantly higher than that of the A mellifera honeys. Generally, the stingless-bee honeys had a higher acidity than the A mellifera honeys. The honeys from the Melipona species had lower diastase activity than the Trigona species. There were also differences in the acidity and the ash and nitrogen content of the honeys of the different stingless-bee species, but these differences might also be due to a different floral origin. While the A mellifera honeys fulfilled the quality requirements set by the Codex Alimentarius, the honeys from the stingless bees failed to do so for several parameters, especially the quality factors such as water content, reducing sugars, acidity, and ash content.

TABLE SIII. Top-ten most active institutions in pot-honey or stingless bee honey research (1962-2022)

Ranking	Affiliations of authors	NP[1]
1	Universiti Putra Malaysia	49
2	Universidade de São Paulo	39
3	Universidad de Los Andes	25
4	Universiti Malaysia Terengganu	22
5	Universiti Sains Malaysia	18
6	Universiti Teknologi Malaysia	14
7	Universidade Federal de Santa Catarina	13
8	Universidade Federal do Reconcavo da Bahia	13
9	Universiti Sains Malaysia, Health Campus	13
10	Universitas Gadjah Mada	13

[1]NP number of publications

TABLE SIV. Number of documents on pot-honey or stingless bee honey research (1962-2022) per top-ten countries

Ranking	Stingless Bees	
	Country	NP[1]
1	Brazil	149
2	Malaysia	142
3	Mexico	39
4	United States of America	36
5	Indonesia	28
6	Venezuela	25
7	United Kingdom	22
8	Australia	21
9	Germany	17
10	Thailand	16

[1]NP number of publications

TABLE SV. Top-ten most relevant source titles on chemical quality of pot-honey or stingless bee honey research (1962-2022).

Ranking	Book (B) Journal (J)	Source title (h index, quartile, impact score)[1]	NP[2]
1	J	Journal of Apicultural Research (h 61, Q2, 2.33)	31
2	B	Pot Honey. A Legacy of Stingless Bees	24
3	J	Apidologie (h 89, Q1, 2.20)	18
4	J	Food Chemistry (h 281, Q1, 8.69)	13
5	J	Sociobiology (h 39, Q3, 1.00)	11
6	J	Molecules (h 171, Q1, 4.67)	10
7	B	Stingless Bee's Honey from Yucatan Culture Traditional Uses and Nutraceutical Potential	10
8	J	Food Research International (h 177, Q1, 7.10)	9
9	J	Grana (h 41, Q3, 0.97)	9
10	J	Food Research (h 10, Q3, 1.00)	8

[1]Available at https://www.resurchify.com. Retrieved: 23rd October 2022.
[2]NP number of publications