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[Molecules] Manuscript ID: molecules-1089897 - Submission Received

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Cc: Meinilwita Yulia <meinilwitayulia@polinela.ac.id>

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Journal name: Molecules
Manuscript ID: molecules-1089897
Type of manuscript: Article
Title: The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins
Authors: Diding Suhandy *, Meinilwita Yulia
Received: 11 January 2021
E-mails: diding.sughandy@fp.unila.ac.id, meinilwitayulia@polinela.ac.id
Submitted to section: Analytical Chemistry,
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Patnaree Ratanamongkonkul <patnaree@mdpi.com> Tue, Jan 12, 2021 at 11:14 AM
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To: Diding Suhandy <diding.sughandy@fp.unila.ac.id>
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Dear Dr. Suhandy,

Your manuscript has been assigned to Patnaree Ratanamongkonkul for further processing who will act as a point of contact for any questions related to your paper.

Journal: Molecules
Manuscript ID: molecules-1089897
Title: The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins
Authors: Diding Suhandy *, Meinilwita Yulia

Received: 11 January 2021
E-mails: diding.sughandy@fp.unila.ac.id, meinilwitayulia@polinela.ac.id

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Thank you very much for submitting your manuscript to Molecules:

Journal name: Molecules
Manuscript ID: molecules-1089897
Type of manuscript: Article
Title: The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins
Authors: Diding Suhandy *, Meinilwita Yulia
Received: 11 January 2021
E-mails: diding.sughandy@fp.unila.ac.id, meinilwitayulia@polinela.ac.id
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[Molecules] Manuscript ID: molecules-1089897 - Major Revisions

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Dear Dr. Suhandy,

Thank you for submitting the following manuscript to Molecules:

Manuscript ID: molecules-1089897
Type of manuscript: Article
Title: The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins
Authors: Diding Suhandy *, Meinilwita Yulia
Received: 11 January 2021
E-mails: diding.sughandy@fp.unila.ac.id, meinilwitayulia@polinela.ac.id
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Cc: Meinilwita Yulia <meinilwitayulia@polinela.ac.id>

Dear Dr. Suhandy,

Thank you very much for resubmitting the modified version of the following manuscript:

Manuscript ID: molecules-1089897
Type of manuscript: Article
Title: The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins
Authors: Diding Suhandy *, Meinilwita Yulia
Received: 11 January 2021
E-mails: diding.sughandy@fp.unila.ac.id, meinilwitayulia@polinela.ac.id
Submitted to section: Analytical Chemistry,
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Cc: Meinilwita Yulia <meinilwitayulia@polinela.ac.id>, Molecules Editorial Office <molecules@mdpi.com>

Dear Dr. Suhandy,

Thank you very much for providing the revised version of your paper:

Manuscript ID: molecules-1089897
Type of manuscript: Article
Title: The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian
Honeys According to Botanical and Geographical Origins
Authors: Diding Suhandy *, Meinilwita Yulia
Received: 11 January 2021
E-mails: diding.sughandy@fp.unila.ac.id, meinilwitayulia@polinela.ac.id
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Email: alvina.wu@mdpi.com

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[Molecules] Manuscript ID: molecules-1089897 - Accepted for Publication

Molecules Editorial Office <molecules@mdpi.com> Thu, Feb 4, 2021 at 7:20 PM
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To: Diding Suhandy <diding.sughandy@fp.unila.ac.id>
Cc: Meinilwita Yulia <meinilwitayulia@polinela.ac.id>, Molecules Editorial Office <molecules@mdpi.com>

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Manuscript ID: molecules-1089897
Type of manuscript: Article
Title: The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins
Authors: Diding Suhandy *, Meinilwita Yulia
Received: 11 January 2021
E-mails: diding.sughandy@fp.unila.ac.id, meinilwitayulia@polinela.ac.id
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[Molecules] Manuscript ID: molecules-1089897 - Final Proofreading Before Publication

Molecules Editorial Office <molecules@mdpi.com> Mon, Feb 8, 2021 at 9:10 AM
Reply-To: patnaree@mdpi.com
To: Diding Suhandy <diding.sughandy@fp.unila.ac.id>
Cc: Meinilwita Yulia <meinilwitayulia@polinela.ac.id>, Molecules Editorial Office <molecules@mdpi.com>

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Manuscript ID: molecules-1089897
Type of manuscript: Article
Title: The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins
Authors: Diding Suhandy *, Meinilwita Yulia
Received: 11 January 2021
E-mails: diding.sughandy@fp.unila.ac.id, meinilwitayulia@polinela.ac.id
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Type of manuscript: Article
Title: The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins
Authors: Diding Suhandy *, Meinilwita Yulia
Received: 11 January 2021
E-mails: diding.sughandy@fp.unila.ac.id, meinilwitayulia@polinela.ac.id
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Cc: Meinilwita Yulia <meinilwitayulia@polinela.ac.id>

Dear Dr. Suhandy,

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Authors: Diding Suhandy *, Meinilwita Yulia
Received: 11 January 2021
E-mails: diding.sughandy@fp.unila.ac.id, meinilwitayulia@polinela.ac.id
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Cc: Patnaree Ratanamongkonkul <patnaree@mdpi.com>, Billing Dept <billing@mdpi.com>, Molecules Editorial Office <molecules@mdpi.com>

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University of Lampung
Jl. Prof. Dr. Soemantri Brojonegoro No.1 Bandar Lampung
35145 Bandar Lampung
Indonesia

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Kind regards,
Aleksandra Cuculovic

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Cc: billing@mdpi.com, website@mdpi.com, molecules@mdpi.com, patnaree@mdpi.com

Dear Authors,

We are pleased to inform you that your article "The Use of UV Spectroscopy and SIMCA for the Authentication of Indonesian Honeys According to Botanical, Entomological and Geographical Origins" has been published in Molecules and is available online:

Abstract: https://www.mdpi.com/1420-3049/26/4/915
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DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

[Molecules] Manuscript ID: molecules-1089897; doi: 10.3390/molecules26040915. Paper has been published.

molecules@mdpi.com <molecules@mdpi.com> Wed, Feb 10, 2021 at 1:33 PM
Reply-To: molecules@mdpi.com
To: diding.sughandy@fp.unila.ac.id, meinilwitayulia@polinela.ac.id
Cc: billing@mdpi.com, website@mdpi.com, molecules@mdpi.com, patnaree@mdpi.com

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Manuscript: https://www.mdpi.com/1420-3049/26/4/915/manuscript (available to authors after login)

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Kind regards,

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Journal	Molecules (https://www.mdpi.com/journal/molecules) (ISSN 1420-3049)
Manuscript ID	molecules-1089897
Type	Article
Number of Pages	12
Title	The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins
Authors	Diding Suhandy * , Meinilwita Yulia
Abstract	As a functional food, honey is a food product that is exposed to the risk of food fraud. To mitigate this, the establishment of an authentication system for honey is very important in order to protect both producers and consumers from possible economic losses. This research presents a simple analytical method for authentication and classification of Indonesian honeys according to their botanical and geographical origins using ultraviolet (UV) spectroscopy and SIMCA. The spectral data of a total of 1040 samples, representing six types of Indonesian honey of different botanical and geographical origins, were acquired using a benchtop UV-visible spectrometer (190-400 nm). Three different pre-processing algorithms were simultaneously evaluated; namely a 11-point moving average smoothing, mean normalization and Savitzky-Golay first derivative with 11 points and second order polynomial fitting (ordo 2), in order to improve the original spectral data. Chemometrics methods, including exploratory analysis of PCA and SIMCA classification method was used to classify the honey samples. A clear separation of the six different Indonesian honeys, based on botanical and geographical origins, was obtained using PCA calculated from pre-processed spectra from 250-400 nm. SIMCA classification method provided satisfactory results in classifying honey samples according to their botanical and geographical origins and achieved 100% of accuracy, sensitivity and specificity. Several wavelengths were identified (266, 270, 280, 290, 300, 335, and 360 nm) as the most sensitive for discriminating between the different Indonesian honey samples.

Author's Reply to the Review Report (Reviewer 1)

Please provide a point-by-point response to the reviewer's comments and either enter it in the box below or upload it as a Word/PDF file. Please write down "Please see the attachment." in the box if you only upload an attachment. An example can be found here (/bundles/mdpisusy/attachments/Author/Example for author to respond reviewer - MDPI.docx?e9a1de4761e1496f).

* Author's Notes to

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Review Report Form

English language and style

( ) Extensive editing of English language and style required
(x) Moderate English changes required
( ) English language and style are fine/minor spell check required
( ) I don't feel qualified to judge about the English language and style

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	( )	(x)	( )	( )
Is the research design appropriate?	(x)	( )	( )	( )
Are the methods adequately described?	(x)	( )	( )	( )
Are the results clearly presented?	(x)	( )	( )	( )
Are the conclusions supported by the results?	(x)	( )	( )	( )

Comments and Suggestions for Authors

Manuscript ID: molecules-1089897 presents a rapid methodology based on spectrometric analysis and chemometri[...] for the authentication of Indonesian honey samples of differe[...] geographical and botanical origins. The study is appropriately designed and the paper is clearly written. The authors, howev[...] must incorporate recent similar studies that highlight the use [...] less-expensive technologies for the authentication of natural products in combination with different chemometric techniques. Studies that will help the authors follow the text sequence:

-*Foods* 2020, *9*(11), 1550; https://doi.org/10.3390/foods9111550

-Foods, 9(8), 1040, 2020.

In addition, the exploratory factor analysis that is in line with PCA must be better defined: European Food Research and Technology, 245(1), 23-39. DOI: 10.1007/s00217-018-3137-x).

Other comments

Title:"...for the authentication...".

The same comment in Abstract and elsewhere.

-Abstract

Line 14."...for the...".

Based on the aforementioned, I suggest a minor revision prior to the article publication.

Submission Date	11 January 2021
Date of this review	15 Jan 2021 10:37:59

Journal	Molecules (https://www.mdpi.com/journal/molecules) (ISSN 1420-3049)
Manuscript ID	molecules-1089897
Type	Article
Number of Pages	12
Title	The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins
Authors	Diding Suhandy * , Meinilwita Yulia
Abstract	As a functional food, honey is a food product that is exposed to the risk of food fraud. To mitigate this, the establishment of an authentication system for honey is very important in order to protect both producers and consumers from possible economic losses. This research presents a simple analytical method for authentication and classification of Indonesian honeys according to their botanical and geographical origins using ultraviolet (UV) spectroscopy and SIMCA. The spectral data of a total of 1040 samples, representing six types of Indonesian honey of different botanical and geographical origins, were acquired using a benchtop UV-visible spectrometer (190-400 nm). Three different pre-processing algorithms were simultaneously evaluated; namely a 11-point moving average smoothing, mean normalization and Savitzky-Golay first derivative with 11 points and second order polynomial fitting (ordo 2), in order to improve the original spectral data. Chemometrics methods, including exploratory analysis of PCA and SIMCA classification method was used to classify the honey samples. A clear separation of the six different Indonesian honeys, based on botanical and geographical origins, was obtained using PCA calculated from pre-processed spectra from 250-400 nm. SIMCA classification method provided satisfactory results in classifying honey samples according to their botanical and geographical origins and achieved 100% of accuracy, sensitivity and specificity. Several wavelengths were identified (266, 270, 280, 290, 300, 335, and 360 nm) as the most sensitive for discriminating between the different Indonesian honey samples.

Author's Reply to the Review Report (Reviewer 2)

Please provide a point-by-point response to the reviewer's comments and either enter it in the box below or upload it as a Word/PDF file. Please write down "Please see the attachment." in the box if you only upload an attachment. An example can be found here (/bundles/mdpisusy/attachments/Author/Example for author to respond reviewer - MDPI.docx?e9a1de4761e1496f).

* Author's Notes to

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Reviewer

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Review Report Form

English language and style
( ) Extensive editing of English language and style required
( ) Moderate English changes required
( ) English language and style are fine/minor spell check required
(x) I don't feel qualified to judge about the English language and style

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	( )	(x)	( )	( )
Is the research design appropriate?	(x)	( )	( )	( )
Are the methods adequately described?	(x)	( )	( )	( )
Are the results clearly presented?	(x)	( )	( )	( )
Are the conclusions supported by the results?	(x)	( )	( )	( )

Comments and Suggestions for Authors

The manuscript entitled: ` The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins` is original article about t[...] application of UV spectroscopy and chemometric techniques fo[...]

TOP

the characterization of honeys of different botanical origin collected in Indonesia. Botanical source of the nectar is crucial for the identification of origin of bee products. Currently, physicochemical and pollen analysis are the most commonly used for determination of botanical sources of nectar that bees use for honey production. Specifically, the pollen analysis is the safest, but it is complicated because only in specialist laboratories can be performed. Therefore, the search for new techniques that are cheaper, fast and without the need for qualified personnel are demanded by the apicultural sector, and appreciated by the scientific community.

The presented manuscript is very interesting, the experiments were well planned and performed. The data processing has a large number of data, and of different botanical and geographical origin (providing quality to the work). The statistical treatment is adequate and the results are good.

Only some appreciations I comment below, and can improve the manuscript:

- In the introduction include a brief description of the predominant vegetation of the sampled geographic area.

- Line 231-240: the text is repeated, rewrite this part.

In my opinion the document is well written article and planned, and presents satisfactory results. Therefore, I recommend its publication in *Molecules* with these few considerations.

Submission Date	11 January 2021
Date of this review	22 Jan 2021 11:04:24

Journal	Molecules (https://www.mdpi.com/journal/molecules) (ISSN 1420-3049)
Manuscript ID	molecules-1089897
Type	Article
Number of Pages	12
Title	The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins
Authors	Diding Suhandy * , Meinilwita Yulia
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Author's Reply to the Review Report (Reviewer 3)

Please provide a point-by-point response to the reviewer's comments and either enter it in the box below or upload it as a Word/PDF file. Please write down "Please see the attachment." in the box if you only upload an attachment. An example can be found here (/bundles/mdpisusy/attachments/Author/Example for author to respond reviewer - MDPI.docx?e9a1de4761e1496f).

* Author's Notes to

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Reviewer

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Review Report Form

English language and style

( ) Extensive editing of English language and style required
(x) Moderate English changes required
( ) English language and style are fine/minor spell check required
( ) I don't feel qualified to judge about the English language and style

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	( )	( )	(x)	( )
Is the research design appropriate?	( )	( )	(x)	( )
Are the methods adequately described?	( )	( )	( )	( )
Are the results clearly presented?	( )	( )	(x)	( )
Are the conclusions supported by the results?	( )	( )	(x)	( )

Comments and Suggestions for Authors

The manuscript is related to the use of UV spectroscopy and SIMCA for authentication of Indonesian honeys according to botanical and geographical origins.

TOP

There are several major concerns regarding the manuscript

In the first time the use of UV spectroscopy for the authentication of food products even is coupled with data analysis is not enough for success.

The samples are in good number but another variable is not taken into account, the bee types. The differentiation of samples according geographical or botanical origin is not feasible because there are samples of different botanical origin but in the same time are from different regions. What is the main criteria?

The data registered by UV spectroscopy presented in the Figure 2 A are not registered in agreement with the Lambert-Beer law, the maximum of absorbance passing the value 2. Furthermore, the spectra of several samples have a lot of noise and it is not acceptable and is related to absorbance higher than 2.

Elimination of a portion from the UV spectra because of noise is not acceptable. Furthermore, in this part of the spectra are important absorbance processes. The information between 320 and 400 nm seems to be not relevant.

The spectra pre-processing is not explained and the curves obtained after pre-processing presented in the Figure 2 B shown similar features. The spectra could be analyzed without further treatments.

Taken into account these major problem the data analysis is not relevant, in my opinion.

Regarding the PCA, why 3D scores plot is presented even the 3rd PC explain only 1% from the variance?

The description of the SIMCA models building is not clear and it must be improved.

Submission Date	11 January 2021
Date of this review	22 Jan 2021 13:52:30

Response to Reviewer 1 Comments

Point 1: Manuscript ID: molecules-1089897 presents a rapid methodology based on spectrometric analysis and chemometrics for the authentication of Indonesian honey samples of different geographical and botanical origins. The study is appropriately designed and the paper is clearly written. The authors, however, must incorporate recent similar studies that highlight the use of less-expensive technologies for the authentication of natural products in combination with different chemometric techniques. Studies that will help the authors follow the text sequence:

-Foods 2020, 9(11), 1550; https://doi.org/10.3390/foods9111550

-Foods, 9(8), 1040, 2020.

Response 1: The authors agree to revise this part.

The following reference has been added in the revised article:

[17] Karabagias, I.K. Advances of spectrometric techniques in food analysis and food authentication implemented with chemometrics. *Foods* **2020**, *9(11)*, 1550. https://doi.org/10.3390/foods9111550.

Point 2: In addition, the exploratory factor analysis that is in line with PCA must be better defined: European Food Research and Technology, 245(1), 23-39. DOI: 10.1007/s00217-018-3137-x

Response 2:
The authors agree to revise this part.

The following reference has been added in the revised article:

[11] Karabagias, I.K.; Nikolaou, C.; Karabagias, V.K. Volatile fingerprints of common and rare honeys produced in Greece: in search of PHVMs with implementation of the honey code. *Eur. Food Res. Technol*. **2019**, *245*, 23–39. https://doi:10.1007/s00217-018-3137-x.

Point 3: Other comments

Title:"...for the authentication...".

Response 3: Yes. The authors agree to revise this part. The phrase "…. for authentication…" has been replaced by phrase "…. for the authentication….".

Therefore, the following parts have been modified:

Revision List					
No.	Page	Line	Section	Original	Revised
1.	1	2-4	Title	The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins	The Use of UV Spectroscopy and SIMCA for the Authentication of Indonesian Honeys According to Botanical, Entomological and Geographical Origins
2.	1	13	Abstract	This research presents a simple analytical method for authentication and classification of Indonesian honeys according to their botanical and geographical origins using ultraviolet (UV) spectroscopy and SIMCA.	This research presents a simple analytical method for the authentication and classification of Indonesian honeys according to their botanical, entomological and geographical origins using ultraviolet (UV) spectroscopy and SIMCA.
3.	2	87	Introduction	UV spectroscopy utilizes the wavelength range from 200-400 nm and has been used for authentication of expensive Sidr Yemeni honey with acceptable results	UV spectroscopy utilizes the wavelength range from 200-400 nm and has been used for the authentication of expensive Sidr Yemeni honey with acceptable results [26] and

				[19] and further validated by Ansari et al. [8].	further validated by Ansari et al. [7].
4.	11	361	Conclusions	The subsequent evaluation of these models demonstrated that this UV spectroscopy along with chemometrics can be used as a simple, chemical-free (no toxic waste) and low-cost analytical method for authentication of Indonesian honeys from differing botanical and geographical origins	The subsequent evaluation of these models demonstrated that this UV spectroscopy along with chemometrics can be used as a simple, chemical-free (no toxic waste) and low-cost analytical method for the authentication of Indonesian honeys from differing botanical, entomological and geographical origins.

Point 4: The same comment in Abstract and elsewhere.

-Abstract

Line 14."...for the...".

Response 4:
Yes. The authors agree to revise this part. The phrase "…. for authentication…" has been replaced by phrase "…. for the authentication….".

Revision List					
No.	Page	Line	Section	Original	Revised
1.	1	2-4	Title	The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins	The Use of UV Spectroscopy and SIMCA for the Authentication of Indonesian Honeys According to Botanical,

					Entomological and Geographical Origins
2.	1	13	Abstract	This research presents a simple analytical method for authentication and classification of Indonesian honeys according to their botanical and geographical origins using ultraviolet (UV) spectroscopy and SIMCA.	This research presents a simple analytical method for the authentication and classification of Indonesian honeys according to their botanical, entomological and geographical origins using ultraviolet (UV) spectroscopy and SIMCA.
3.	2	87	Introduction	UV spectroscopy utilizes the wavelength range from 200-400 nm and has been used for authentication of expensive Sidr Yemeni honey with acceptable results [19] and further validated by Ansari et al. [8].	UV spectroscopy utilizes the wavelength range from 200-400 nm and has been used for the authentication of expensive Sidr Yemeni honey with acceptable results [26] and further validated by Ansari et al. [7].
4.	11	361	Conclusions	The subsequent evaluation of these models demonstrated that this UV spectroscopy along with chemometrics can be used as a simple, chemical-free (no toxic waste) and low-cost analytical method for authentication of Indonesian honeys from differing	The subsequent evaluation of these models demonstrated that this UV spectroscopy along with chemometrics can be used as a simple, chemical-free (no toxic waste) and low-cost analytical method for the authentication of Indonesian honeys from differing botanical,

				botanical and geographical origins	entomological and geographical origins.

Response to Reviewer 2 Comments

Point 1: The manuscript entitled: `The Use of UV Spectroscopy and SIMCA for Authentication of Indonesian Honeys According to Botanical and Geographical Origins` is original article about the application of UV spectroscopy and chemometric techniques for the characterization of honeys of different botanical origin collected in Indonesia. Botanical source of the nectar is crucial for the identification of origin of bee products. Currently, physicochemical and pollen analysis are the most commonly used for determination of botanical sources of nectar that bees use for honey production. Specifically, the pollen analysis is the safest, but it is complicated because only in specialist laboratories can be performed. Therefore, the search for new techniques that are cheaper, fast and without the need for qualified personnel are demanded by the apicultural sector, and appreciated by the scientific community.

Response 1:
Yes. The authors fully agree with this part.

Point 2: The presented manuscript is very interesting, the experiments were well planned and performed. The data processing has a large number of data, and of different botanical and geographical origin (providing quality to the work). The statistical treatment is adequate and the results are good.

Response 2:
Thank you for your appreciation.

Point 3: Only some appreciations I comment below, and can improve the manuscript:

- In the introduction include a brief description of the predominant vegetation of the sampled geographic area.

Response 3:
The authors agree to revise this part. The authors included a brief description of the predominant vegetation of each geographical origin of the honey used in this study.

The following sentences have been added in the revised article (inserted from line 110 until line 123):

Apis mellifera honey of Rubber tree and Longan samples were harvested from a relatively homogeneous plantation of *Hevea brasiliensis* and *Euphorbia longan* in Batang, Central Java, Indonesia. All *Apis dorsata* honey samples were collected from forest in Sumatera island, Indonesia. In Sumatera there are five types of forest bioregion: protected forest, conservation forest, limited production forest, permanent production forest, and conversion forest. Monofloral Acacia in Riau was harvested from a limited production forest bioregion with predominant vegetation of *Acacia mangium*, *Acacia crassicarpa*, and *Eucalyptus sp*. In Jambi and Muara Enim, multifloral honey samples were collected from protected forest with various big vegetations such as *Koompassia excelsa*, *Bouea macrophylla Griffith*, *Lansium parasiticum* and several small vegetation such as *Imperata cylindrica*. Monofloral Durian honey from Jambi were harvested from conversion forest. In this forest, farmers planted several fruity vegetations such as *Durian (Durio zibethinus*), oil palm (*Elaeis guineensis*), and Longan (*Euphorbia longan*) and woody vegetations such as *Hevea brasiliensis* and *Tectona grandis L.f.*

Point 4: - Line 231-240: the text is repeated, rewrite this part.

Response 4:
The authors agree to revise this part. The authors inserted this revision from line 294 until line 302.

Original sentences:
It should be noted that a model distance larger than 3 indicates good class separation and that the models are significantly different [33]. As can be seen in Table 3, model distances were larger than 3 for all classes, indicating that the developed SIMCA models were significantly different between the six honey types collected. To evaluate the most influential wavelength for discriminating between the models, discrimination power (dp) values of the SIMCA models were also plotted against wavelength (Figure 6). In general, according to previous reported work [34–35], a discrimination power value greater than 3 is considered important for overall classification. For the spectra data from 250-400 nm, the discrimination power was greater than 3.

Revised sentences:
It should be noted that a model distance and discrimination power (dp) larger than 3 indicates good class separation and that the models are significantly different with a low risk of misclassification in the model [43-45]. As can be seen in Table 4, model distances were larger than 3 for all classes, indicating that the developed SIMCA models were significantly different between the six honey types collected. To evaluate the most influential wavelength for discriminating between the models, discrimination power values of the SIMCA models were also plotted against wavelength (Figure 6). For the spectra data from 250-400 nm, the discrimination power was greater than 3.

Point 5: In my opinion the document is well written article and planned, and presents satisfactory results. Therefore, I recommend its publication in Molecules with these few considerations.

Response 5:
Thank you for your appreciation.

Response to Reviewer 3 Comments

Point 1: In the first time the use of UV spectroscopy for the authentication of food products even is coupled with data analysis is not enough for success.

Response 1:

The authors agree with this part. In the first time the use of UV spectroscopy for the authentication of food products even is coupled with data analysis is not enough for success However, the development of more powerful chemometrics has helped a numerous application of UV spectroscopy for food authentication. UV spectroscopy as mentioned in the article has several advantages: being simple, relatively fast, requiring little or no sample preparation, and the use of relatively inexpensive equipment. Recently, several previous works reported a satisfactory application of using UV spectroscopy for food authentication with aid of chemometrics. Souto et al. [1] utilized UV spectral data in the interval of 225-353 nm to classify Brazilian ground roast coffee with respect to type (caffeinated/decaffeinated) and conservation state (expired and non-expired shelf-life) using two classification methods (SIMCA and LDA) with a promising result. Suhandy and Yulia [2] used UV spectral data in the interval of 190-400 nm combined with SIMCA and PLS-DA for authentication of ground roasted peaberry coffee with 100% correct classification. In the recent work, Suhandy and Yulia [3] showed a potential application of UV spectroscopy for classification of ground roasted *Lampung robusta* specialty coffee according to differences in cherry processing methods.

In this present study, we demonstrated appropriate application of UV spectroscopy and chemometrics for the authentication of Indonesian honeys according to botanical, entomological and geographical origins.

References:

[1] Souto, U.T.C.P.; Pontes, M.J.C.; Silva, E.C.; Galvão, R.K.H.; Araújo, M.C.U.; Sanches, F.A.C.; Cunha, F.A.S.; Oliveira, M.S.R. UV–Vis spectrometric classification of coffees by SPA–LDA. *Food Chem.* **2010**, *119(1)*, 368–371. https://doi:10.1016/j.foodchem.2009.05.078.

[2] Suhandy, D.; Yulia, M. Peaberry coffee discrimination using uv-visible spectroscopy combined with SIMCA and PLS-DA. *Int. J. Food Prop*. **2017**, *20(sup1)*, S331–S339. https://doi.org/10.1080/10942912.2017.1296861.

[3] Suhandy, D.; Yulia, M. Classification of Lampung robusta specialty coffee according to differences in cherry processing methods using uv spectroscopy and chemometrics. *Agric*. **2021** (accepted publication).

Point 2: The samples are in good number but another variable is not taken into account, the bee types. The differentiation of samples according geographical or botanical origin is not feasible because there are samples of different botanical origin but in the same time are from different regions. What is the main criteria?

Response 2:
The authors agree to revise this part. In fact, the information of two type of honeybees of *Apis dorsata* and *Apis mellifera* were also included in the model development. Therefore, the authors revised the article to highlight the main criteria used in this study. The authors revised the title to consider the three-origin used in this study: botanical, entomological and geographical origins.

At first, our study mainly followed previous reported studies for botanical and geographical origin determination in honey authentication. Most reported works on honey authentication mainly focused on floral type (botanical origin) and geographical origins, and less frequently on entomological origins [1-5]. Few reported works have been reported on the honey authentication based on entomological origins [6-7]. However, there is no reported studies on the honey authentication which incorporates together three different origins: botanical, entomological and geographical origins. In Indonesia two types of honeybee of *Apis dorsata* and *Apis mellifera* are becoming popular and available in the honey market. *Apis dorsata* honey in general is more expensive than *Apis mellifera* honey due to its rare production and massive deforestation.

The following references have been added in the revised article:

[10] Anklam, E. A review of the analytical methods to determine the geographical and botanical origin of honey. *Food Chem*. **1998**, *63(4)*, 549–562. https://doi:10.1016/s0308-8146(98)00057-0.

[11] Karabagias, I.K.; Nikolaou, C.; Karabagias, V.K. Volatile fingerprints of common and rare honeys produced in Greece: in search of PHVMs with implementation of the honey code. *Eur. Food Res. Technol*. **2019**, *245*, 23–39. https://doi:10.1007/s00217-018-3137-x.

[12] Maione, C.; Barbosa, F.; Barbosa, R.M. Predicting the botanical and geographical origin of honey with multivariate data analysis and machine learning techniques: A review. *Comput. Electron. Agric*. **2019**, *157*, 436–446. https://doi:10.1016/j.compag.2019.01.020.

[13] Gerginova, D.; Simova, S.; Popova, M.; Stefova, M.; Stanoeva, J.P.; Bankova, V. NMR profiling of north Macedonian and Bulgarian honeys for detection of botanical and geographical origin. *Molecules* **2020**, *25*, 4687. https://doi.org/10.3390/molecules25204687.

[14] Ciulu, M.; Oertel, E.; Serra, R.; Farre, R.; Spano, N.; Caredda, M.; Malfatti, L.; Sanna, G. Classification of unifloral honeys from Sardinia (Italy) by ATR-FTIR

spectroscopy and random forest. *Molecules* **2021**, *26*, 88. https://doi.org/10.3390/molecules26010088.
[15] Wang, X.; Rogers, K.M.; Li, Y.; Yang, S.; Chen, L.; Zhou, J. Untargeted and targeted discrimination of honey collected by *Apis cerana* and *Apis mellifera* based on volatiles using HS-GC-IMS and HS-SPME-GC-MS. *J. Agric. Food Chem*. **2019**, *67(43)*, 12144–12152. https://doi:10.1021/acs.jafc.9b04438.
[16] Zuccato, V.; Finotello, C.; Menegazzo, I.; Peccolo, G.; Schievano, E. Entomological authentication of stingless bee honey by ^{1}H NMR-based metabolomics approach. *Food Control*, **2017**, *82*, 145–153. https://doi:10.1016/j.foodcont.2017.06.024.

Therefore, the following parts have been modified:

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3.	1	16	Abstract	The spectral data of a total of 1040 samples, representing six types of Indonesian honey of different botanical	The spectral data of a total of 1040 samples, representing six types of Indonesian honey of different botanical,

				and geographical origins, were acquired using a benchtop UV-visible spectrometer (190-400 nm).	entomological, and geographical origins, were acquired using a benchtop UV-visible spectrometer (190-400 nm).
4.	1	22	Abstract	A clear separation of the six different Indonesian honeys, based on botanical and geographical origins, was obtained using PCA calculated from pre-processed spectra from 250-400 nm. SIMCA classification method provided satisfactory results in classifying honey samples according to their botanical and geographical origins and achieved 100% of accuracy, sensitivity and specificity. Several wavelengths were identified (266, 270, 280, 290, 300, 335, and 360 nm) as the most sensitive for discriminating between the different Indonesian honey samples.	A clear separation of the six different Indonesian honeys, based on botanical, entomological, and geographical origins, was obtained using PCA calculated from pre-processed spectra from 250-400 nm. SIMCA classification method provided satisfactory results in classifying honey samples according to their botanical, entomological and geographical origins and achieved 100% of accuracy, sensitivity and specificity. Several wavelengths were identified (266, 270, 280, 290, 300, 335, and 360 nm) as the most sensitive for discriminating between the different Indonesian honey samples.
5.	1	29	Keywords	Keywords: UV spectroscopy; authentication; botanical origin; geographical origin; Indonesian honey	Keywords: UV spectroscopy; authentication; botanical origin; geographical origin;

					Indonesian honey; entomological origin

Point 3: The data registered by UV spectroscopy presented in the Figure 2 A are not registered in agreement with the Lambert-Beer law, the maximum of absorbance passing the value 2. Furthermore, the spectra of several samples have a lot of noise and it is not acceptable and is related to absorbance higher than 2.

Response 3:
The authors agree to revise this part. More descriptions have been included in the revised article.

The typical feature of original or raw UV spectral data is highly noisy with very high absorbance (more than 2) especially in the interval of 190-250 nm (high frequency noise). This raw spectral data is rich in unrelated information such as background information and systematic noise coming from the influences of light scattering, different in path length, sample particle size, and other factors [1]. The similar results were reported for UV spectral data of ground roasted coffee from Brazil [2] and ground roasted coffee from Indonesia [3-4] with absorbance intensity more than 2. Dankowska et al. [5] also reported UV-Vis absorption spectra of aqueous extracts of the genuine Arabica and Robusta coffee samples and their mixtures in the range 190–700 nm. Diniz et al. [6] obtained absorbance spectra of the simple tea infusions in the range of 190-800 nm with very high absorbance of more than 2 was observed in the range of 190-240 nm.

As it can be seen in Figure 2 for raw UV spectra of 6 types of honey samples, a large variation in the absorbance spectra was observed among different type of flora/botanical (monofloral versus multiflora), among different geographical origin of honey samples (Sumatera versus Java) as well as different type of honeybees (*Apis dorsata* versus *Apis mellifera*). It was difficult to extract significant information from the raw spectra. For this reason, we improve the quality of spectral data by applying spectral pre-processing. Mean-normalization (MN) was performed as one of spectral pre-processing in this study. As it was mentioned by Xing et al. [7], mean-normalization is one of the most classical normalization methods. It is equivalent to replacing the raw absorbance values by a profile centred on unity: only the relative absorbance values are used to describe the sample, and the information carried by their absolute levels is dropped. Savitzky-Golay first derivative with a second-order polynomial and a window size of 11 points (SG 1d) was used to cancel the baseline drifts and to enhance small spectral differences [8]. Due to similarity in honeybees (entomological), geographical and botanical origin especially for *Apis dorsata* multiflora from Jambi and *Apis dorsata* monofloral from Jambi, it was expected that the spectral difference within those honey samples was small. This is the main reason to use SG 1d: to enhance those small spectral differences. However, at the same time, as a consequence of derivation, the noises were also enhanced. To avoid this, the spectra were first smoothed using 11 points of moving averaging smoothing pre-processing (MAS) as recommended by previous work [8]. Therefore, in this present study we utilized three sequentially spectral pre-processing: MAS, MN and SG 1d (MAS+MN+SG 1d). Similar approach was previously used by Shawky and Selim [1] and Zhang et al. [8]. Therefore, in order to achieve an acceptable result, in this present study for further chemometrics calculation we utilized a relatively low noise spectral data using pre-processed spectral data in the interval of 250-400 nm.

References:

[1] Shawky, E; Selim, D.A. NIR spectroscopy-multivariate analysis for discrimination and bioactive compounds prediction of different Citrus species peels. Spectrochim. *Acta A Mol. Biomol. Spectrosc*. **2019**, *219*, 1–7. https://doi:10.1016/j.saa.2019.04.026.

[2] Souto, U.T.C.P.; Pontes, M.J.C.; Silva, E.C.; Galvão, R.K.H.; Araújo, M.C.U.; Sanches, F.A.C.; Cunha, F.A.S.; Oliveira, M.S.R. UV–Vis spectrometric classification of coffees by SPA–LDA. *Food Chem*. **2010**, *119(1)*, 368–371. https://doi:10.1016/j.foodchem.2009.05.078.

[3] Suhandy, D.; Yulia, M. Peaberry coffee discrimination using uv-visible spectroscopy combined with SIMCA and PLS-DA. *Int. J. Food Prop*. **2017**, *20(sup1)*, S331–S339. https://doi.org/10.1080/10942912.2017.1296861.

[4] Suhandy, D.; Yulia, M. The use of partial least square regression and spectral data in uv-visible region for quantification of adulteration in Indonesian palm civet coffee. *Int. J. Food Sci*. **2017**, *2017*, 1–7. https://doi.org/10.1155/2017/6274178.

[5] Dankowska, A.; Domagała, A.; Kowalewski, W. Quantification of coffea arabica and coffea canephora var. robusta concentration in blends by means of synchronous fluorescence and uv-vis spectroscopies. *Talanta* **2017**, *172*, 215–220. https://doi.org/10.1016/j.talanta.2017.05.036.

[6] Diniz, P.H.G.D.; Barbosa, M.F.; de Melo Milanez, K.D.T.; Pistonesi, M.F.; de Araújo, M.C.U. Using uv–vis spectroscopy for simultaneous geographical and varietal classification of tea infusions simulating a home-made tea cup. *Food Chem*. **2016**, *192*, 374–379. https://doi.org/10.1016/j.foodchem.2015.07.022.

[7] Xing, J.; Guyer, D.; Ariana, D.; Lu, R. (2008). Determining optimal wavebands using genetic algorithm for detection of internal insect infestation in tart cherry. *Sens. & Instrumen. Food Qual*. **2008**, *2(3)*, 161–167. https://doi:10.1007/s11694-008-9047-z.

[8] Zhang, Z.; Wang, Y.; Yan, H.; Chang, X.; Zhou, G.; Zhu, L.; Liu, P.; Guo, S.; Dong, T.T.X.; Duan, J. Rapid geographical origin identification and quality assessment of angelicae sinensis radix by FT-NIR spectroscopy. *J Anal Methods Chem*. **2021**, *2021*, 1–12. https://doi.org/10.1155/2021/8875876.

Herewith the authors would like to show visually several reported UV spectral data showing a relatively high absorbance (more than 2) around in the interval of 190-250 nm).

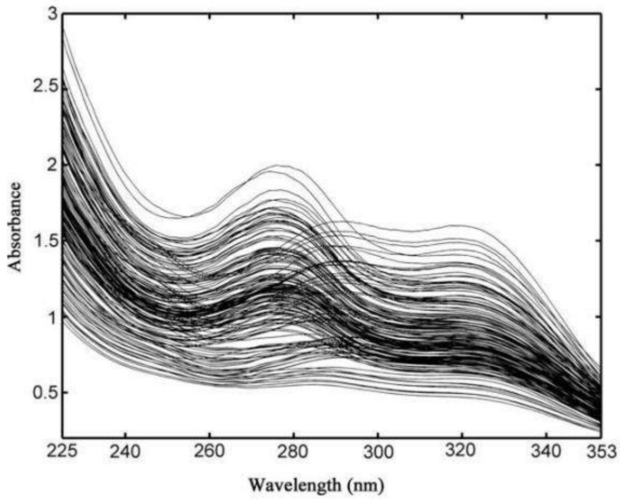

Fig. 1. UV–Vis spectra of the 175 coffee samples.

UV spectral data from Souto et al. [2].

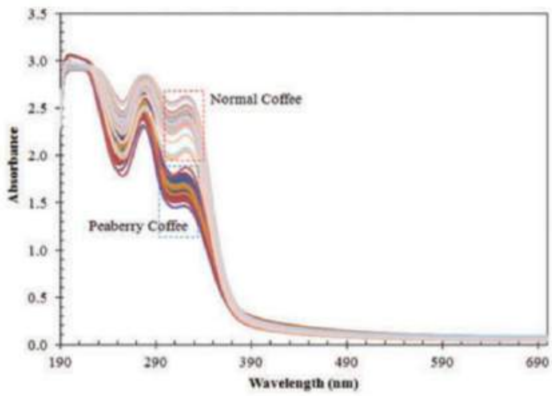

Figure 1. Original spectra of peaberry and normal coffee samples in ultraviolet-visible region (190–700 nm).

UV spectral data from Suhandy and Yulia [3].

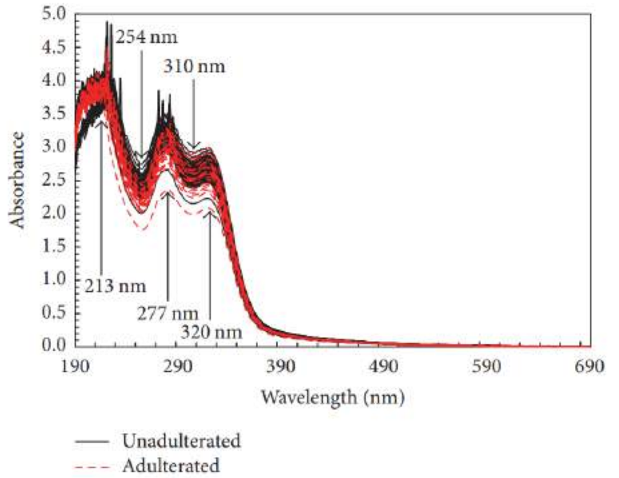

FIGURE 1: Original spectra of unadulterated and adulterated coffee samples in the UV-Vis region.

UV spectral data from Suhandy and Yulia [4].

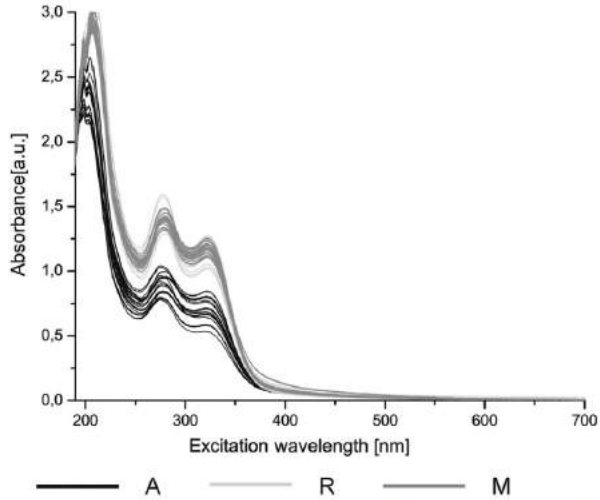

Fig. 2. UV-Vis spectra of *Coffea arabica*, *Coffea robusta*, and their mixtures (diluted 1:120 v/v in water) (A - *Coffea arabica*, R - *Coffea robusta*, M - mixtures of *Coffea arabica* and *Coffea robusta*).

UV spectral data from Dankowska et al. [5].

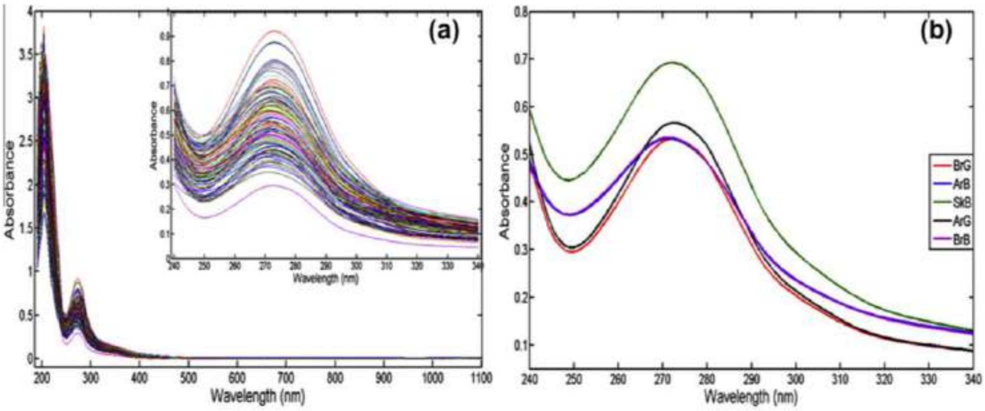

Fig. 1. (a) Raw UV–Vis spectra of all studied tea samples. (b) Mean spectra of the five studied tea classes. Argentinean green (ArG, ▬), Brazilian green (BrG, ▬), Argentinean black (ArB, ▬), Brazilian black (BrB, ▬), and Sri Lankan black (SkB, ▬).

UV-vis spectral data of tea samples from Diniz et al. [6]

Therefore, the following parts have been modified:

Revision List					
No.	Page	Line	Section	Original	Revised
1.	3	139	2.2. UV Spectra Data Acquisition	Three different pre-processing algorithms namely, 11 points of moving average smoothing, mean normalization and Savitzky-Golay first derivative with 11 points and second order polynomial fitting (ordo 2) were used to improve the obtained spectral data.	Three different pre-processing algorithms namely, 11 points of moving average smoothing (MAS), mean normalization (MN) and Savitzky-Golay first derivative with 11 points, and second-order polynomial fitting (ordo 2) (SG 1d) were simultaneously used in sequence to improve the obtained spectral data.
2.	5	185	3.1. Analysis of UV Spectra	Figure 2 shows the averaged original (a) and pre-processed spectra (b) of Indonesian honey of different botanical and geographical origins.	Figure 2 shows the averaged original or raw (a) and pre-processed spectra (b) of Indonesian honey of different botanical, entomological, and geographical origins. As it can be seen in Figure 2 for raw UV

					spectra of 6 types of honey samples, a large variation in the absorbance spectra was observed among different type of flora/botanical (monofloral versus multiflora), among different geographical origin of honey samples (Sumatera versus Java) as well as different type of honeybees (*Apis dorsata* versus *Apis mellifera*). It was difficult to directly extract significant information from the raw spectra. For this reason, we improve the quality of the raw spectral data by applying spectral pre-processing. Mean-normalization (MN) was performed as one of spectral pre-processing in this study. As it was mentioned by Xing et al. [38], mean-normalization is one of the most classical normalization methods. It is equivalent to replacing the raw absorbance values by a profile centered on unity: only the relative absorbance values are used to describe the sample, and the information carried by their absolute levels is dropped. Savitzky-Golay first derivative with a second-order polynomial

					and a window size of 11 points (SG 1d) was used to cancel the baseline drifts and to enhance small spectral differences [39]. Due to similarity in honeybees (entomological), geographical and botanical origin especially for *Apis dorsata* multiflora from Jambi and *Apis dorsata* monofloral from Jambi, it was expected that the spectral difference within those honey samples was small. This is the main reason to use SG 1d: to enhance those small spectral differences. However, at the same time, as a consequence of derivation, the noises were also enhanced. To avoid this, the spectra were first smoothed using 11 points of moving averaging smoothing pre-processing (MAS) as recommended by previous work [39]. Therefore, in this present study we utilized three sequentially spectral data pre-processing: MAS, MN and SG 1d (MAS+MN+SG 1d). A similar approach was previously used by Zhang et al. [39] and Shawky and Selim [40].

3.	5	217	3.1. Analysis of UV Spectra	Spectral data in the 190-250 nm region was very noisy. This may have resulted from low lamp intensity at the start of spectral acquisition	The typical feature of original or raw UV spectral data is highly noisy with very high absorbance (more than 2) especially in the interval of 190-250 nm (high frequency noise). This raw spectral data is rich in unrelated information such as background information and systematic noise coming from the influences of light scattering, different in path length, sample particle size, low lamp intensity at the start of spectral acquisition, and other factors [38].
4.	5	222	3.1. Analysis of UV Spectra	For this reason, the spectral window between 250-400 nm was selected for further analysis.	Therefore, in order to achieve an acceptable result, in this present study for further chemometrics calculation we utilized a relatively low noise spectral data using pre-processed spectral data in the interval of 250-400 nm.
5.	6	226	3.1. Analysis of UV Spectra	Figure 2. The average original (a) and pre-processed (b) spectra of the Indonesian honey with different botanical and geographical origins over the range of 190-400 nm.	Figure 2. The average original (a) and pre-processed (b) spectra of the Indonesian honey with different botanical, entomological, and geographical origins over the range of 190-400 nm.

The following references has been added in the revised article.

References:

[38] Xing, J.; Guyer, D.; Ariana, D.; Lu, R. Determining optimal wavebands using genetic algorithm for detection of internal insect infestation in tart cherry. *Sens. & Instrumen. Food Qual*. **2008**, *2(3)*, 161–167. https://doi:10.1007/s11694-008-9047-z.

[39] Zhang, Z.; Wang, Y.; Yan, H.; Chang, X.; Zhou, G.; Zhu, L.; Liu, P.; Guo, S.; Dong, T.T.X.; Duan, J. Rapid geographical origin identification and quality assessment of angelicae sinensis radix by FT-NIR spectroscopy. *J Anal Methods Chem*. **2021**, *2021*, 1–12. https://doi.org/10.1155/2021/8875876.

[40] Shawky, E; Selim, D.A. NIR spectroscopy-multivariate analysis for discrimination and bioactive compounds prediction of different Citrus species peels. *Spectrochim. Acta A Mol. Biomol. Spectrosc*. **2019**, *219*, 1–7. https://doi:10.1016/j.saa.2019.04.026.

Point 4: Elimination of a portion from the UV spectra because of noise is not acceptable. Furthermore, in this part of the spectra are important absorbance processes. The information between 320 and 400 nm seems to be not relevant.

Response 4:

In this study, we used selected interval of 250-400 nm. As it has been explained in previous response (Response 3), the pre-processed spectral data in the interval of 250-400 nm has a relatively low noise. We have revised this part to highlight the reason of using selected interval of 250-400 nm for further chemometrics calculation.

In chemometrics, a more robust model with high measurement accuracy can be developed with properly selected variables (specific interval) that contain only the important and relevant information to the target variables [1]. The use of a specific interval (not full spectrum) for model development was a common approach as reported by previous several works [1-3]. Diniz et al. [2] obtained the absorbance spectra of the simple tea infusions in the range of 190–800 nm. Six classification methods of KNN, CART, SIMCA, PLS-DA, PCA-LDA and SPA-LDA then were developed using spectral data in two different intervals namely the entire UV-Vis spectral range (190-800 nm) as well as the selected interval of 251–490 nm. Rahman et al. [3] developed calibration models based on UV-visible spectroscopy and interval partial least squares (iPLS) regression method for determination of K value for fish flesh. Different intervals were used including intervals of 280-330 nm, 400-420 nm, 430-450 nm, 530-560 nm and 570-580 nm.

References:

[1] Suhandy, D., Yulia, M., Ogawa, Y., Kondo, N. Prediction of L-Ascorbic acid using FTIR-ATR terahertz spectroscopy combined with interval partial least squares (iPLS) regression. *Eng. Agric. Environ. Food* **2013**, *6(3)*, 111–117. https://doi.org/10.11165/eaef.6.111.
[2] Diniz, P.H.G.D.; Barbosa, M.F.; de Melo Milanez, K.D.T.; Pistonesi, M.F.; de Araújo, M.C.U. Using uv–vis spectroscopy for simultaneous geographical and varietal classification of tea infusions simulating a home-made tea cup. *Food Chem.* **2016**, *192*, 374–379. https://doi.org/10.1016/j.foodchem.2015.07.022.
[3] Rahman, A.; Kondo, N.; Ogawa, Y.; Suzuki, T.; Kanamori, K. Determination of K value for fish flesh with ultraviolet–visible spectroscopy and interval partial least squares (iPLS) regression method. *Biosyst. Eng.* **2016**, *141*, 12–18. https://doi:10.1016/j.biosystemseng.2015.10.004.

Point 5: The spectra pre-processing is not explained and the curves obtained after pre-processing presented in the Figure 2 B shown similar features. The spectra could be analyzed without further treatments.

Response 5:
The authors agree to revise this part. More explanation on spectra pre-processing has been added in the revised article. As it has been explained in Response 3, the typical feature of original or raw UV spectral data is highly noisy with a very high absorbance (more than 2) especially in the interval of 190-250 nm (high frequency noise). Therefore, we need spectra pre-processing to improve the quality of raw spectral data.

Therefore, the following parts have been modified:

Revision List					
No.	Page	Line	Section	Original	Revised
1.	3	139	2.2. UV Spectra Data Acquisition	Three different pre-processing algorithms namely, 11 points of moving average smoothing, mean normalization and Savitzky-Golay first derivative with 11 points and second order polynomial fitting (ordo 2) were used to improve the	Three different pre-processing algorithms namely, 11 points of moving average smoothing (MAS), mean normalization (MN) and Savitzky-Golay first derivative with 11 points and second order polynomial fitting (ordo 2) (SG 1d) were simultaneously used in

				obtained spectral data.	sequence to improve the obtained spectral data.
2.	5	217	3.1. Analysis of UV Spectra	Spectral data in the 190-250 nm region was very noisy. This may have resulted from low lamp intensity at the start of spectral acquisition	The typical feature of original or raw UV spectral data is highly noisy with very high absorbance (more than 2) especially in the interval of 190-250 nm (high frequency noise). This raw spectral data is rich in unrelated information such as background information and systematic noise coming from the influences of light scattering, different in path length, sample particle size, low lamp intensity at the start of spectral acquisition, and other factors [38].
3.	5	222	3.1. Analysis of UV Spectra	For this reason, the spectral window between 250-400 nm was selected for further analysis.	Therefore, in order to achieve an acceptable result, in this present study for further chemometrics calculation we utilized a relatively low noise spectral data using pre-processed spectral data in the interval of 250-400 nm.

Point 6: Taken into account these major problems the data analysis is not relevant, in my opinion.

Response 6:

As it has been explained in previous responses, spectra pre-processing is necessary to remove irrelevant information due to high noise. The authors included the explanation on spectra pre-processing to support this necessity. Several changes have been made regarding this issue as described in Response 3-5.

Point 7: Regarding the PCA, why 3D scores plot is presented even the 3rd PC explain only 1% from the variance?

Response 7:
The authors agree to revise this part.
We removed 3D PCA scores plot (PC1xPC2xPC3) for original and pre-processed spectral data. We have inserted 2D PCA scores plot (PC1xPC2) for original and pre-processed spectral data.

Therefore, the following parts have been modified:

Revision List					
No.	Page	Line	Section	Original	Revised
1.	6	229	3.2. PCA Analysis	Figure 3 shows the results of PCA analysis in a three-dimensional score plot of the first three PCs (PC1xPC2xPC3), which account for 99% of the variation in the original UV spectra of the honey samples (a) and of completed pre-processed spectra (b). PCA was calculated using 1020 honey samples (including all spectra) from both the original and pre-processed spectral data (250-400 nm). The cumulative informative variance (CIV) for the three PCs was 99% and 100% for original and pre-processed spectra, respectively. This indicates that most of the	Figure 3 shows the results of PCA analysis in a two-dimensional score plot of the first two PCs (PC1xPC2) in the original UV spectra (a) and pre-processed UV spectra of the honey samples (b). PCA was calculated using 1040 honey samples (including all spectra) from both the original and pre-processed spectral data (250-400 nm). The cumulative informative variance (CIV) for the two PCs was 98% and 97% for original and pre-processed spectra, respectively. This indicates that most of

				variance in the original dataset were contained in these three principal components.	the variance in the original dataset were contained in these two principal components.
2.	6	245	3.2. PCA Analysis	Therefore, further chemometrics analysis of SIMCA was performed by using the pre-processed spectra (250-400 nm) to classify the Indonesian honey samples according to their botanical and geographical origins.	Therefore, further chemometrics analysis of SIMCA was performed by using the pre-processed spectra (250-400 nm) to classify the Indonesian honey samples according to their botanical, entomological, and geographical origins.
3.	6	248	Results and Discussion	3D PCA score plot	2D PCA score plot
4.	6	249	Results and Discussion	Figure 3. The score plot of the first three PCs (PC1xPC2xPC3) for both the original (a) and pre-processed spectra (b) between 250-400 nm for the six different types of honey collected.	Figure 3. The score plot of the first two PCs (PC1xPC2) for both the original (a) and pre-processed spectra (b) between 250-400 nm for the six different types of honey collected.

Point 8: The description of the SIMCA models building is not clear and it must be improved.

Response 8:
The authors agree to revise this part.
We add more description on how SIMCA models were developed for each honey types (each class).

The following sentences and Table 2 have been added in the revised article (The authors inserted these sentences and Table 2 from line 269 until line 280).

SIMCA model for each class was created using calibration and validation samples as shown in Table 2 (total 868 samples for 6 classes). The optimum number of principal components (PCs) used for each class was determined by using a leave-one-out cross validation method. As seen in Table 2, SIMCA model for each class was constructed with a different number of optimum PCs. Three PCs were used to construct class Rubber tree, Longan, Jambi and Acacia SIMCA models with the obtained CIV in calibration of 99.489, 99.520, 99.113, and 99.059%, respectively. Two PCs were used to developed class Durian and Muara Enim SIMCA models with the obtained CIV in calibration of 98.054, and 98.667%, respectively.

Table 2. The result of SIMCA model development for each class using calibration and validation sample sets

SIMCA Model	Number of calibration and validation samples	Number of Principal Components (PCs)	The cumulative informative variance CIV (%)	
			Calibration	Validation
Rubber tree	100	3	99.489	98.893
Longan	100	3	99.520	98.962
Durian	167	2	98.054	98.155
Jambi	167	3	99.113	99.279
Muara Enim	167	2	98.667	98.910
Acacia	167	3	99.059	98.441