Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Manuscript Submission (Suhandy and Yulia 2020)

DIDING SUGHANDY <diding.sughandy@fp.unila.ac.id> Thu, May 7, 2020 at 8:46 PM
To: jestec@taylors.edu.my

Dear Executive Editor of JESTEC,

First let me introduce myself. I am Diding Suhandy, one of the faculty members at the Faculty of Agriculture, University of Lampung, Indonesia.
I graduated from Kyoto University with a PhD degree in 2013. My research is mainly in spectroscopy application in agriculture and biological products. I cooperated with many colleagues from Japan, Malaysia, Bangladesh, China and Indonesia and published several articles in UV, NIR, and THz spectroscopy fields. Currently I am working on authentication of Indonesian specialty coffee by means spectroscopy methods (UV, Visible, NIR, MIR and Fluorescence).

The current result is about the quantification of percentage of adulteration in ground roasted coffee. The final output is a low cost technology based on UV spectroscopy for establishing authentication of Indonesian specialty coffee. I am very glad to send this article to JESTEC, one of the most popular technology journals with a high reputation. I got this information about JESTEC when I attended the AASEC conference in Bandung. One invited lecture of AASEC was from JESTEC.

Herewith I sent you the following documents:
1. Article
2. Copyright
3. CV author and co-author
4. PPR excel file
5. Report of similarity index

I would like to thank you for your support and to consider the publication of this article in the coming JESTEC.

Thank you,

Best regards,

Associate Professor Dr. Agr. Sc. Diding Suhandy, S.TP, M.Agr
University of Lampung

6 attachments

PPR_Suhandy.xlsx
25K

CV Diding Suhandy and Publications (as 20 April 2020).docx
72K

CV Meinilwita Yulia and Publications (as 20 April 2020).docx
89K

Copyright (Suhandy and Yulia 2020).pdf
866K

Report of Similarity Index (Suhandy and Yulia 2020).pdf
2070K

Article JESTEC (Suhandy and Yulia 2020).docx
3779K

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Submission of a Manuscript (OT20080) / First Round of the Review Process

Jestec <Jestec@taylors.edu.my> Tue, May 12, 2020 at 5:06 PM
To: DIDING SUGHANDY <diding.sughandy@fp.unila.ac.id>

Dear Author

Thank you for submitting your research paper to the Journal of Engineering Science and Technology (JESTEC)

Kindly note that we have received the paper entitled

THE USE OF ULTRAVIOLET (UV) SPECTROSCOPY AND CHEMOMETRICS TO QUANTIFY THE PERCENTAGES OF ADULTERATION IN KALOSI GROUND ROASTED SPECIALTY COFFEE

Your paper ID is **OT20080** (*Please quote the above manuscript ID in all future correspondence with us.)*

Soon we will initiate the first round of the review process.

Please be reminded that upon the full acceptance of your paper, publication fee in amount of USD300 must be paid before the article is published in the journal website.

Best regards

JESTEC Editor

http://jestec.taylors.edu.my

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Paper ID OT20080 /Review of a paper, First Round Result/

Jestec <Jestec@taylors.edu.my> Sun, Jul 12, 2020 at 1:35 PM
To: DIDING SUGHANDY <diding.sughandy@fp.unila.ac.id>

Dear Author

The first round of the review process has been completed.

I am glad to advise that your paper has been conditionally accepted for publication with

☐ No modification ☑ Minor corrections ☑ Major modification.

Attached herewith, please find

☐ 1 ☐ 2 ☐ 3 ☑ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 reviewers' reports.

Please notice the following:

1. Address all the concerns/recommendations of the reviewers
2. All amendments made are to be highlighted in red color in the revised paper.
3. Send an outlining following the instructions in the attached file on how did you address each reviewers' concern/recommendations.
4. In order to complete the review process on time, we highly appreciate it if we can receive the revised paper within **three weeks** from today.
5. Please take note that your revised manuscript may be rejected if the corrections and the revision are not satisfactory.
6. In case that you will need more time to complete the revision, please indicate how much time you need via an email so we can get the approval from the Editorial Board.

Please note that the final acceptance of the paper depends on the final decision of the Review Panel and after the paper successfully passed all the review rounds.

Best Regards

JESTEC Editor

http://jestec.taylors.edu.my

6 attachments

outlining of Review Report_v3.docx
75K

Review Report - 3 marked.docx
3783K

Review Report - 3.docx
42K

Review Report - 4.docx
43K

Review Report - 1.docx
43K

Review Report - 2.docx
45K

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Paper ID OT20080 /Review of a paper, First Round Result/

DIDING SUHANDY <diding.sughandy@fp.unila.ac.id> Sun, Jul 19, 2020 at 5:28 PM
To: Jestec <Jestec@taylors.edu.my>

Dear Jestec Editor,

Firstly, I highly appreciate sending us the result of the review of our manuscript.

Herewith I sent you the revised manuscript and list of replies to reviewers comments.
I sent you four files:
1. Outlining Review Report.
2. Revised manuscript with tracking.
3. Revised manuscript with highlights.
4. Certificate of proofreading.

Thank you,

Best regards,

Diding Suhandy-University of Lampung
[Quoted text hidden]

4 attachments

outlining of Review Report_v3 (Suhandy and Yulia 1st round).docx
76K

Copy of Certificate of Proofreading (Suhandy and Yulia).pdf
117K

Article JESTEC (Suhandy and Yulia 2020) Revised (with highlight).docx
1485K

Article JESTEC (Suhandy and Yulia 2020) Revised (with tracking).docx
4325K

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Paper ID OT20080 /Review of a paper, First Round Result/

Jestec <Jestec@taylors.edu.my> Mon, Jul 20, 2020 at 8:47 AM
To: DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Dear Author

Thank you for your email.

We confirmed that we received your email.

We will check your submission and will reply you soon.

Thank you for your patience.

Best Regards

JESTEC Editor

http://jestec.taylors.edu.my

[Quoted text hidden]

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Paper ID (OT20080) Review process is completed

Jestec <Jestec@taylors.edu.my> Fri, Jul 31, 2020 at 12:41 PM
To: "diding.sughandy@fp.unila.ac.id" <diding.sughandy@fp.unila.ac.id>, "diding2004@yahoo.com" <diding2004@yahoo.com>, "meinilwitayulia@polinela.ac.id" <meinilwitayulia@polinela.ac.id>

Dear Author

I am glad to advise that your paper has been accepted for publication without modification. The reviewers have no more comments and they are satisfied with the revised paper.

By this the review process is completed and we kindly ask you to check the format of the paper according to the instructions for authors and JESTEC template (attached).

Special attention to be paid for list of symbols used and the references. Please follow strictly the instructions for citation of the references (attached are instructions) and explain each symbol you used and its SI units. Also refer to this link: http://jestec.taylors.edu.my/instructions.html

You are also kindly required to fill in the JESTEC-Copyright transfer form (use this link to download

http://jestec.taylors.edu.my/Copyright%20transfer%20ver%20190818.doc and send to the journal.

Kindly note that you have only four weeks to submit the above.

Best Regards

JESTEC Editor

http://jestec.taylors.edu.my

2 attachments

JESTEC template (Camera Ready)_new.docx
219K

about formatting the references.docx
15K

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Paper ID (OT20080) Review process is completed

DIDING SUHANDY <diding.sughandy@fp.unila.ac.id> Fri, Jul 31, 2020 at 5:37 PM
To: Jestec <Jestec@taylors.edu.my>

Dear Jestec Editorial team,

I am glad to hear that our paper has been accepted for publication in JESTEC.
I am now preparing our paper based on the format. I will submit the
formatted paper along with the JESTEC-Copyright transfer form soon.

Thank you for your kind support and cooperation.

Best regards,

Diding Suhandy
The University of Lampung
[Quoted text hidden]

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Paper ID (OT20080) Review process is completed

DIDING SUHANDY <diding.sughandy@fp.unila.ac.id> Wed, Aug 12, 2020 at 1:42 PM
To: Jestec <Jestec@taylors.edu.my>

Dear Jestec Editorial Team,

Herewith I sent you JESTEC copyright transfer form along with the final form (camera ready) manuscript.

Thank you,

Best regards,

Diding Suhandy
The University of Lampung

On Fri, Jul 31, 2020 at 12:41 PM Jestec <Jestec@taylors.edu.my> wrote:
>
[Quoted text hidden]

2 attachments

Copyright Transfer Form (Suhandy and Yulia 2020) 12 August 2020.PDF
1097K

JESTEC template (Camera Ready)_new (Suhandy and Yulia 2020).docx
1424K

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Paper ID (OT20080) Review process is completed

Jestec <Jestec@taylors.edu.my> Wed, Aug 12, 2020 at 11:05 PM
To: DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Dear Author

Thank you for your email.
We confirmed that we received your email.
We will check your submission and will reply you soon.
Thank you for your patience.

Best Regards

JESTEC Editor
http://jestec.taylors.edu.my

-----Original Message-----
From: DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>
Sent: Wednesday, August 12, 2020 2:43 PM
To: Jestec <Jestec@taylors.edu.my>
Subject: Re: Paper ID (OT20080) Review process is completed

Dear Jestec Editorial Team,

Herewith I sent you JESTEC copyright transfer form along with the final form (camera ready) manuscript.

Thank you,

Best regards,

Diding Suhandy
The University of Lampung

On Fri, Jul 31, 2020 at 12:41 PM Jestec <Jestec@taylors.edu.my> wrote:
>
> Dear Author
>
>
>
> I am glad to advise that your paper has been accepted for publication without modification. The reviewers have no more comments and they are satisfied with the revised paper.
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> By this the review process is completed and we kindly ask you to check the format of the paper according to the instructions for authors and JESTEC template (attached).
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> Special attention to be paid for list of symbols used and the
> references. Please follow strictly the instructions for citation of
> the references (attached are instructions) and explain each symbol you
> used and its SI units. Also refer to this link:
> https://apc01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fjeste
> c.taylors.edu.my%2Finstructions.html&data=01%7C01%7CJestec%40taylo
> rs.edu.my%7C51628dbf442f41149dd708d83e8af37b%7C0a39ee135c27420cb0af8e6
> 5c6929055%7C0&sdata=JMAufj9rUUMOp7qO5N9A1o6TA12yFtcf0JEhLXaxNiw%3D
> &reserved=0
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>
> You are also kindly required to fill in the JESTEC-Copyright transfer
> form (use this link to download
>
> https://apc01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fjestec.taylors.edu.my%2FCopyright%2520transfer%2520ver%2520190818.doc&data=01%7C01%7CJestec%40taylors.edu.my%7C51628dbf442f41149dd708d83e8af37b%7C0a39ee135c27420cb0af8e65c6929055%7C0&sdata=AQG8XrGWdove8wHKDiC2bc7PDhw6tZeYBIX6%2F%2FA96zc%3D&reserved=0 and send to the journal.
>
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> Kindly note that you have only four weeks to submit the above.
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> Best Regards
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>
> JESTEC Editor
>
> https://apc01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fjeste
> c.taylors.edu.my%2F&data=01%7C01%7CJestec%40taylors.edu.my%7C51628
> dbf442f41149dd708d83e8af37b%7C0a39ee135c27420cb0af8e65c6929055%7C0&amp
> ;sdata=soeWQYmtnm%2BlqA0YOArEoh9hRpKEhILERWSG%2BniGdZU%3D&reserved
> =0
>
>

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Review process is completed paper (EE20080) /formatting, proofreading, payment/

Jestec <Jestec@taylors.edu.my> Thu, Aug 13, 2020 at 11:04 PM
To: DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Dear Author (s)

Thank you for your email and sending your modified paper. We found that the paper still contains some formatting mistakes.

We would like to inform you that your paper has been scheduled to be published in **February 2021, Volume 16 Issue 1**

Attached please find the acceptance letter.

Please send us up-to-date copyright transfer form. Download from here JESTEC-Copyright transfer form (CRTF)

Payment of the publication is needed before the paper is published online.

Kindly refer to the attached sample of the invoice and amend it (Red text only) according to your up-to-date and accurate information for the purpose of the payment. Once submitted we will send you an official invoice with all details to make safe payment.

We thank you very much for your interest in JESTEC and looking forward for new contribution.

Best regards

Assoc. Prof. Dr. Abdulkareem Sh. Mahdi Al-Obaidi, CEng MIMechE

Executive Editor, Journal of Engineering Science & Technology

http://jestec.taylors.edu.my

2 attachments

20_124.docx
21K

124 LoA_16_1_21 DIDING SUHANDY and MEINILWITA YULIA.pdf
56K

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Publication Fees for publication in a regular issue in JESTEC 2020 - Invoice No. 3055/20 of RM 1320.00 (Ref. No. 20_124)

5 messages

Jestec <Jestec@taylors.edu.my> Sun, Sep 6, 2020 at 11:54 AM
To: "diding.sughandy@fp.unila.ac.id" <diding.sughandy@fp.unila.ac.id>

Dear Author,

Greetings

Please refer to the attached invoice and do update us once the payment is made.

Please take note of the following:

- The only payment method is via Telegraphic Transfer (outside Malaysia) or Online Transfer (inside Malaysia).
- Banking details are provided in the invoice that will be sent to you.
- You have option to pay either in USD or RM.
- In either case the net amount to be received is exactly as stated in the invoice.
- The journal will not accept any bank charges associated with the transfer of money or currency exchange charges. Authors should bear all these service charges.

Thank you.

Best Regards

JESTEC Editor

http://jestec.taylors.edu.my

20_124 IN000003055.pdf
144K

Jestec <Jestec@taylors.edu.my> Sun, Sep 6, 2020 at 12:17 PM
To: "diding.sughandy@fp.unila.ac.id" <diding.sughandy@fp.unila.ac.id>
Cc: "vckhoo@graduate.utm.my" <vckhoo@graduate.utm.my>

[Quoted text hidden]

20_124 IN000003055.pdf
144K

KHOO VOON CHING ERS182003 <vckhoo@graduate.utm.my> Sun, Sep 6, 2020 at 12:47 PM
To: Jestec <Jestec@taylors.edu.my>

Cc: "diding.sughandy@fp.unila.ac.id" <diding.sughandy@fp.unila.ac.id>

Hi
I believe you sent the invoice to the wrong person as I already paid the fees.

Pls confirm?
[Quoted text hidden]

DIDING SUHANDY <diding.sughandy@fp.unila.ac.id> Mon, Sep 7, 2020 at 4:27 PM
To: Jestec <Jestec@taylors.edu.my>

Dear Jestec Editorial Office,
I confirmed to you that the payment for Invoice No. 3055 (Publication Fees for publication in a regular issue in JESTEC 2020) has been made.
I sent you the proof of payment in the attachment file.

Please if you have an official receipt for the payment, would you please send it to me?

Thank you,

Best regards,

Diding Suhandy
The University of Lampung
[Quoted text hidden]

proof of payment for JESTEC (Suhandy and Yulia 2020).pdf
573K

Jestec <Jestec@taylors.edu.my> Tue, Sep 8, 2020 at 1:38 PM
To: DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>
Cc: Vidya Ramalingam <Vidya.Ramalingam@taylors.edu.my>

Dear Author
Thank you for submitting the evidence of payment.
My colleague will update you once the payment is received.
Best regards
JESTEC Editor
http://jestec.taylors.edu.my
[Quoted text hidden]
> https://apc01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fjeste
> c.taylors.edu.my%2F&data=01%7C01%7CJestec%40taylors.edu.my%7Ca6810
> 4623b04465efaa208d8531050e2%7C0a39ee135c27420cb0af8e65c6929055%7C0&amp
> ;sdata=lrdJIFcjX9tDB8COFkYu9I8z7u74KWxToALv3H4U0c0%3D&reserved=0

20_124 EoP.pdf
573K

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Payment Receipt for publication in JESTEC

1 message

Jestec <Jestec@taylors.edu.my> Wed, Sep 30, 2020 at 1:10 PM
To: DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Dear Author,

Greetings

We confirmed that the payment is received. Please refer to the attached payment receipt.

Thank you for publishing with JESTEC and we are looking for your new submission.

Best Regards

JESTEC Editor

http://jestec.taylors.edu.my

20_124 Receipt.pdf
13K

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Your paper to publish in Volume 16 Issue 1/confirmation/

3 messages

Jestec <Jestec@taylors.edu.my> Thu, Dec 24, 2020 at 9:16 PM

Dear Author(s)

Your paper is scheduled to be published in the coming issue, **Issue 1, Volume 16, February 2021.**

Currently, we are editing your paper to prepare and later upload it online in or before **February 2021**.

This email is to notify you and also to get your confirmation that you agree to publish your paper in the said issue.

Also, to kindly request you to stay stand by in case we find any mistakes which may require your immediate action.

Please reply before or latest by **31/12/2020.**

In case of no reply from you by the above-stated date, the publication of your paper will be postponed to **Volume 16 Issue 3 June 2021.**

Thank you for your immediate reply and cooperation.

Best Regards

JESTEC Editor

http://jestec.taylors.edu.my

DIDING SUHANDY <diding.sughandy@fp.unila.ac.id> Thu, Dec 24, 2020 at 9:22 PM
To: Jestec <Jestec@taylors.edu.my>

Yes, please proceed. I agree to publish our paper in Issue 1, Volume 16, February 2021.

Thank you,

Best regards,

DS

[Quoted text hidden]

DIDING SUHANDY <diding.sughandy@fp.unila.ac.id> Sat, Dec 26, 2020 at 8:40 AM

To: Jestec <jestec@taylors.edu.my>

[Quoted text hidden]

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Your paper to publish in Volume 16 Issue 1/checking the title and authors' name/

3 messages

Jestec <Jestec@taylors.edu.my> Mon, Jan 25, 2021 at 11:21 PM

Dear Authors

Thank you for the confirmation.

During the coming days, you may expect an email to correct your papers if issues are found.

At the moment your paper titles with authors' names are now available online but the content remains inaccessible until we finalise the camera-ready of the online version of your papers.

Also, notice that the order of the papers as appear are random and not final, also there is no page number.

Meanwhile, we kindly request you to check the title of your paper and the authors' names using this link
http://jestec.taylors.edu.my/V16Issue1.htm

Please immediately inform us if any mistakes are found.

Thank you for your patience

Best Regards

JESTEC Editor

http://jestec.taylors.edu.my

DIDING SUHANDY <diding.sughandy@fp.unila.ac.id> Tue, Jan 26, 2021 at 9:38 PM
To: Jestec <Jestec@taylors.edu.my>

Yes, everything is correct.
[Quoted text hidden]

Jestec <Jestec@taylors.edu.my> Tue, Jan 26, 2021 at 9:39 PM
To: DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Good

Best regards
JESTEC Editor
http://jestec.taylors.edu.my

-----Original Message-----
From: DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>
Sent: Tuesday, January 26, 2021 10:39 PM
To: Jestec <Jestec@taylors.edu.my>
Subject: Re: Your paper to publish in Volume 16 Issue 1/checking the title and authors' name/

Yes, everything is correct.

On Mon, Jan 25, 2021 at 11:21 PM Jestec <Jestec@taylors.edu.my> wrote:
>
> Dear Authors
>
> Thank you for the confirmation.
>

> During the coming days, you may expect an email to correct your papers if issues are found.
>
> At the moment your paper titles with authors' names are now available online but the content remains inaccessible until we finalise the camera-ready of the online version of your papers.
>
> Also, notice that the order of the papers as appear are random and not final, also there is no page number.
>
> Meanwhile, we kindly request you to check the title of your paper and the authors' names using this link https://apc01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fjestec.taylors.edu.my%2FV16Issue1.htm&data=04%7C01%7CJestec%40taylors.edu.my%7Cf59fb1672e53488a712d08d8c2081999%7C0a39ee135c27420cb0af8e65c6929055%7C0%7C0%7C637472687365741462%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=vZl6M39Fzcv5C4B%2BNbx8Kw%2BIoAI%2Bij5BkJX2e96WbBg%3D&reserved=0
>
> Please immediately inform us if any mistakes are found.
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> Thank you for your patience
>
> Best Regards
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> JESTEC Editor
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> https://apc01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fjestec.taylors.edu.my%2F&data=04%7C01%7CJestec%40taylors.edu.my%7Cf59fb1672e53488a712d08d8c2081999%7C0a39ee135c27420cb0af8e65c6929055%7C0%7C0%7C637472687365741462%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=vXnCIJf0dB5w5M00iRGyO%2FynOqjTy%2BeSmuk%2FyGoEXTY%3D&reserved=0

Gmail DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Your paper is now available online in Volume 16 Issue 1/Check and Proofread/

2 messages

Jestec <Jestec@taylors.edu.my> Sat, Feb 20, 2021 at 10:50 PM
To: DIDING SUHANDY <diding.sughandy@fp.unila.ac.id>

Dear Author,

I am glad to inform you that your papers are currently available online in Issue 16 Volume 1 (February 2021).

Please access your paper using this link http://jestec.taylors.edu.my/V16Issue1.htm for final proofreading and checking if there are any mistakes/changes.

Please reply before or latest by Sunday, 21/2/2021, 12 p.m. (Malaysia local time).

After this date, no changes will be allowed.

Thank you for publishing with JESTEC.

Regards,

JESTEC Editor,

http://Jestec.taylors.edu.my

DIDING SUHANDY <diding.sughandy@fp.unila.ac.id> Sun, Feb 21, 2021 at 10:33 AM
To: Jestec <Jestec@taylors.edu.my>

Dear Jestec,

Thank you for your email.

I sent you 1 file containing some minor correction of the paper.

Thank you,

Best regards,

DS

[Quoted text hidden]

Minor corrections (Suhandy and Yulia).pdf
64K

Journal of Engineering Science and Technology
Vol. XX, No. Y (Year) PPP - QQQ

THE USE OF ULTRAVIOLET (UV) SPECTROSCOPY AND CHEMOMETRICS TO QUANTIFY THE PERCENTAGES OF ADULTERATION IN KALOSI GROUND ROASTED SPECIALTY COFFEE

Abstract

The purpose of this study is to analyse the use of ultraviolet (UV) spectroscopy with chemometrics to quantify the percentages of adulteration of Kalosi ground roasted specialty coffee. A total of 220 mixtures of coffee samples adulterated with different percentages of skins ranging from 0 to 90% were prepared at low (0-20% w/w), middle (30-50% w/w), and high adulteration (60-90% w/w). Each sample was extracted and diluted using hot, distilled water. All spectral data were measured in transmittance mode employing a UV-Visible benchtop spectrometer called Genesys™ 10S manufactured by Thermo Scientific, USA, and assembled with a monochromator as well as a xenon flash lamp, in the range of 200-450 nm with a 1 nm resolution. The principal component analysis (PCA) was applied to the preprocessed and original spectral data, with the percentages of adulteration quantified by using a multivariate calibration model in accordance with the partial least squared (PLS) regression method. The preprocessed spectral data was used to determine 98% data variance of PCA score plot of PC1 and PC2 with the samples separated into three clusters, namely low, middle, and high percentages of adulteration. The best calibration model was achieved using the preprocessed spectral data with an R^2 value of 0.995 for calibration and validation, respectively. The prediction result showed that the percentages of adulteration are accurately calculated using R^2=0.977, bias = -1.415~~4799~~%, and SEP=3.892~~341~~%.

Keywords: Authentication, Adulteration, PCA, PLS regression, Ultraviolet spectroscopy.

1. Introduction

In 2018, Indonesia produced approximately 13.5% of the world's robusta coffee [1]. This production was mainly carried out in Java, Sumatera, Bali, Sulawesi, and Papua Islands, using special techniques, which lead to unique characteristics such as different flavour complex, aroma, acidity, body, and mouth feel. Approximately 314,400 tons of coffee are consumed by Indonesian [2]. Recently, due to the increase in customer demand for coffee diversification, there is a rise in differentiation based on geographical origin, also known as specialty coffee, which significantly influences cup profile. Therefore, in 2008 the Indonesian government initiated the law of intellectual property in accordance with geographic indications of origin (GIs) as legal protection, which allows producers to explain the link between a product's quality and origin to clients and consumers [3~~2~~].

The continuous increase of consumer demand for authentic single-origin specialty coffees and its limited supply ~~is~~ are the main reason associated with the risk of fraud adulteration [~~3~~4]. For this reason, GIs has significant points to protect Indonesian specialty coffee from fraud adulteration. In terms of producers and customers, the policy contributes to establishing fair trading, customer royalty, and increased international market competitiveness [~~2~~3]. By March 2020, there were a total of 91 types of Indonesian products with GIs certification, and this included the Arabica Kalosi Enrekang (Kalosi) coffee from South Sulawesi. The product was awarded GIs with certificate number ID G 000000018 since 15 February 2013 [~~4~~5]. Kalosi coffee is regarded as a specialty with superior taste and aroma available in both domestic and international markets. This coffee seed is planted in podzolic soil in a highland area of approximately 1000-2000 meters above sea level on the slopes of the Latimojong Mountains, which covers the five districts of Bungin, Baraka, Buntu Batu, Baroko and Masalle in the Enrekang regency [~~4~~5].

The adulteration is both frequent and diversified in the form of ground roasted coffee [6~~5~~]. Coffee adulteration may be performed by changing the quality of beans or adding other low-cost coffee and non-coffee materials as described by previous reported studies: robusta coffee [7], inferior quality of arabica coffee [8], mixed of four materials (coffee husks, spent coffee ground, barley, and corn) [9], wheat, corn, and chickpea [10], soybeans, green mung beans and spent coffee grounds [11] and coffee husks, soybean, corn, barley, rice, and wheat [12]. Mostly Kalosi green bean coffee was processed using dry method resulted in huge amounts of coffee skins as one of coffee by-products. For this reason, in real situation the adulteration of ground roasted Kalosi involved the intentional addition of fine grinded coffee skins. In addition, ground roasted coffee is the most difficult form of coffee adulteration, and visually, very hard to discriminate the specialty, GIs, and normal coffee (non-GIs) with samples of roasted and ground coffee [13-16]. Similarly, the conventional method using visual assessment (VA) to discriminate between roasted fine grinded coffee skin and ground roasted coffee is difficult and easily exposed to human error due to the dependency of the technique on human visual skill [16-17]. ~~In addition, ground roasted coffee is the most difficult form of coffee adulteration, and visually, very hard to discriminate the specialty, GIs, and normal coffee (non-GIs) with samples of roasted and ground coffee [6-9]. Similarly, it is~~

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~~also difficult to differentiate between fine grinded coffee skin and the ground roasted type by visual inspection [10].~~ Therefore, the microscopy method is commonly used to evaluate the adulteration in ground roasted coffee. However, the dark colour and small particle size make it difficult to detect the roasted adulterants in the original sample. Several advance analytical methods are available for coffee authentication, which includes the quantification of adulterant in ground roasted coffee blends [6~~5~~, 19~~1~~]. High-performance liquid chromatography (HPLC) and its derivative have been used to detect and quantify coffee adulterated by roasted soybean and wheat as sources of fraud [2012~~12~~-2113~~13~~]. Furthermore, HPLC with fluorescence detection, ultraviolet adsorption (UV), diode array and mass spectrometry were also used to determine the coffee adulteration [169~~9~~, 2214~~14~~]. Although chromatographic techniques are very accurate, they are time-consuming, and use expensive devices, with the extensive preparation of chemical-based samples [2315~~15~~].

NIR spectroscopy was used with PLS regression to quantify corn adulteration in Brazilian coffee [24]. Assis ~~*et al.*~~ [25] used mid-infrared spectroscopy and PLS regression to determine 40 meshes of robusta-arabica coffee blends in the analytical range of 0.0 to 33.0% w/w. Nuclear magnetic resonance (NMR) spectroscopy was used to monitor robusta coffee adulteration in Brazilian arabica coffee and to quantify 16-O-methylcafestol (16-OMC) [26]. Fourier transform infrared (FTIR) is one of the important analytical techniques and quite popular for characterizing samples [27]. FTIR has been used for quantification of robusta coffee in arabica coffee blends in ground roasted coffee [28].~~NIR spectroscopy was used with PLS regression to quantify corn adulteration in Brazilian coffee [16]. Assis *et al.* (2018) used mid-infrared spectroscopy and PLS regression to determine 40 meshes of robusta-arabica coffee blends in the analytical range of 0.0 to 33.0% w/w [17]. Nuclear magnetic resonance (NMR) spectroscopy was used to monitor robusta coffee adulteration in Brazilian arabica coffee and to quantify 16-O-methylcafestol (16-OMC) [18].~~ Furthermore, there were reports on the quantification of arabica and robusta concentration in coffee blends using synchronous fluorescence spectroscopy [2919~~19~~]. These spectroscopic methods are attractive, provide accurate quantification, fast measurement~~,~~ with very little or no sample preparation~~and do not need simple sample preparation~~. However, those spectroscopic methods involved the use of expensive devices (spectrometers).

Comparing to other spectroscopic methods (NIR, mid-infrared, NMR and fluorescence spectroscopy) or conventional methods (HPLC and its derivative), spectroscopy in UV region has several advantages: spectrometer in this region is relatively low cost and it is available to most standard laboratories, a green technology without chemical waste during sample extraction and simple in sample preparation. Several qualitative studies have been reported using UV spectroscopy for authentication of Indonesian specialty coffee [14, 30]. However, authentication of Indonesian specialty coffee in the term of quantification of adulterant or degree of adulteration is very limited. Therefore, this research aims to determine the possible application of UV spectroscopy and chemometrics method for ground roasted Kalosi coffee authentication both in qualitative (classify the samples into low, middle and high degree of adulteration) and quantitative studies (quantify the

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percentage of adulteration in Kalosi ground roasted coffee). This proposed method can be used as a routine analysis for final quality inspection of ground roasted Kalosi coffee before packing.~~Regardless, the application of low-cost spectroscopic method based on UV spectroscopy for quantification of adulteration in Indonesian specialty coffee with GIs is limited. Presently, there is no research on the use of UV spectroscopy coupled with chemometrics for ground roasted Kalosi coffee authentication. Therefore, this research aims to determine the possible application of UV spectroscopy and chemometrics method to quantify the percentage of adulteration in Kalosi ground roasted coffee.~~

2. Materials and Methods

2.1. Kalosi coffee samples

Kalosi coffee green bean samples were directly collected from trusted farmers in Enrekang, South Sulawesi, Indonesia, as shown in Fig. 1. The coffee samples were subjected to medium roasting at 200°C for 10 minutes using a home machine. Approximately 500 grams of roasted coffee beans were mechanically grounded using a home grinder. This study utilized a particle size of 420 μm to sieve all ground roasted coffee samples with mesh number of 40 on a Meinzer II sieve shaker (CSC Scientific Company, Inc., USA) for 10 minutes. Approximately 220 mixtures of Kalosi coffee samples adulterated with different percentages of coffee skins were prepared. In this study, to provide a wide range of adulteration, the ratio between ground roasted Kalosi coffee and coffee skins is 0 to 90% (w/w) in increment of 10% from low (0-20% w/w), middle (30-50% w/w) and high degree of adulteration (60-90% w/w) for calibration, validation and prediction.~~, ranging from 0 to 90% with low (0-20% w/w), middle (30-50% w/w), and high adulteration (60-90%w/w) of 10%.~~ 1 gram of each sample was weighed and placed in a glass beaker. It was extracted, distilled and diluted using hot distilled water based on sample preparation procedure described in previous works [13-15]~~Each sample weighed 1 gram and was extracted further distilled and diluted using hot distilled water [6-8]~~. For multivariate analysis, the samples were divided into three sets, namely calibration (111 samples), validation (73 samples), and prediction sets (36 samples) using the random sample method. Table 1 showed the descriptive statistic of the samples used in this research, which are statistically similar.

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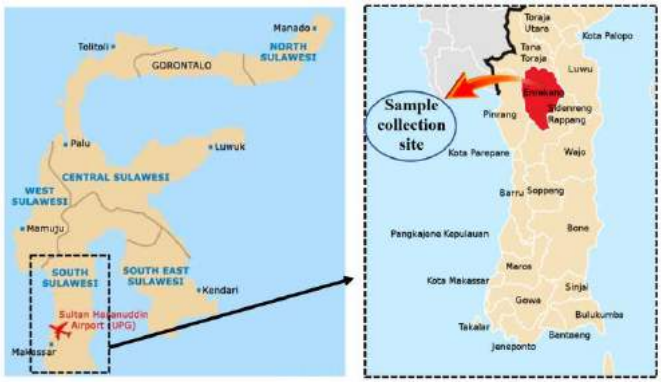

Fig. 1. Site for sample collection in Enrekang, South Sulawesi, Indonesia.

Table 1. The descriptive statistic of calibration, validation, and prediction sample set used in this study.

	Calibration set	Validation set	Prediction set
Number of samples	111	73	36
Minimum	0	0	0
Maximum	90	90	90
Mean	45.2253	45.753	45.556
SD	27.793	27.483	27.302
Unit	% (w/w)	% (w/w)	% (w/w)

2.2. Extraction of coffee samples

The extraction of each coffee sample was performed according to previously reported works [136-158], with the procedure shown in Fig. 2.

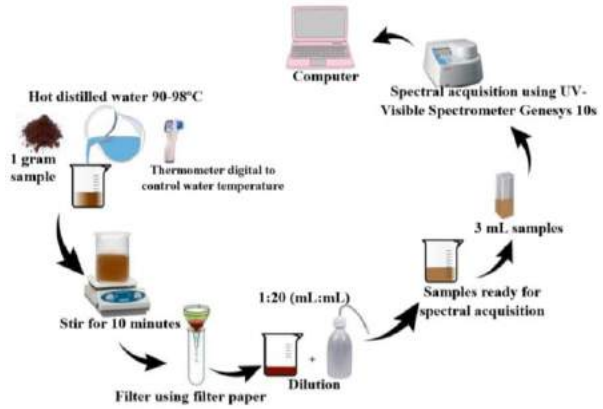

Fig. 2.: Extraction procedure of Kalosi coffee samples for UV spectral acquisition [13-15].

2.3. Spectral data acquisition

A 3 mL of aqueous coffee samples were placed in the 10 mm of quartz cell, using distilled water. All the UV spectral data were acquired by means of a dual-beam UV-Visible benchtop spectrometer (Genesys 10s UV-Vis, Thermo Scientific Inc., Madison, WI), equipped with a high-intensity xenon lamp and dual Silicon photodiodes as a detector. Spectra were measured between 200 and 450 nm with a resolution of 1 nm. The absorbance of samples (*A*) was calculated using Eq. (1), with two spectral measurements and averaged for each sample. The original spectra were modified by applying three preprocessing algorithms, namely, moving average smoothing with 5 segments, standard normal variate (SNV), and Savitzky-Golay (SG) 1st derivative with segments and polynomial order value of 5 and 2. In general, smoothing was used to reduce the noise and improve the signal-to-noise ratio (SNR). SNV and derivative are frequently used mathematical preprocessing methods for scatter correction, linear baseline drifts removal, and enhancing the resolution of overlapped peaks [31-20].

$$A(\lambda) = -\log_{10}\left(\frac{I_s(\lambda)}{I_o(\lambda)}\right) \quad (1)$$

Where: $A(\lambda)$ is the absorbance of the sample at wavelength λ

$I_s(\lambda)$ is the intensity of light passed through the sample at wavelength λ

$I_o(\lambda)$ is the intensity of light passed through the reference at wavelength λ

2.4. Statistical analysis of multivariate

PCA was used as unsupervised pattern recognition to reduce data dimensionality and transform the original highly correlated data into new uncorrelated variables (called principal components or PCs) [32-21]. The two-dimensional scores plot of

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the first two PCs (PC1xPC2) were used to present the sample distribution clustering and outlier detection. ~~The *x* loadings of PC1 and PC2 were used to plot the important wavelengths.~~ The quantification percentages of adulteration were predicted through the development of a calibration model using partial least square (PLS) regression using original and preprocessed spectra over the range of 200-400 nm. The optimum number of PLS components was~~is~~ analysed by the lowest root to mean square error cross-validation (RMSECV). The quality of the final PLS model was also evaluated by using the determining coefficient of calibration and validation (R^2_{cal} and R^2_{val}), root means square error (RMSEC and RMSEV), and bias [33~~2~~-34~~2~~]. The structure of developed PLS regression model was evaluated by plotting X-loadings versus wavelengths [35]. The wavelengths with a higher value in the X-loadings of a latent variable (LV) (local maxima or minima) could be considered more important than other wavelengths. Four parameters were used, to evaluate the performance of prediction, namely coefficient of determination of prediction (close to 1), bias (close to 0), ratio prediction to deviation (RPD) (higher than 3.0), RER (ratio error range) (higher than 10.0), standard error of prediction (SEP), and low root mean square error of prediction (RMSEP) [36~~23~~-37~~24~~]. Suhandy *et al's* method were used to calculate the RPD and RER [37~~24~~]:

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$$\text{RPD} = \frac{\text{SD}}{\text{SEP}} \quad (2)$$

$$\text{RER} = \frac{(\text{maximum} - \text{minimum})_{\text{reference value at prediction set}}}{\text{SEP}} \quad (3)$$

Limit of detection (LOD) and limit of quantification (LOQ) were calculated to evaluate the smallest concentration reliably measured by the developed calibration model [38~~25~~]. In general, LOD is described as the lowest concentration of an analyte that is detectable from a sample [39~~26~~]. Meanwhile, LOQ is the smallest concentration of an analyte quantifiable with acceptable precision and accuracy. The LOD and LOQ in multivariate calibration are the most questioned and not adequately defined concentration. However, several works have proposed more precise calculations for this parameter [39~~26~~]. In this work, the LOD and LOQ were computed using standard deviations of the residual between actual and predicted or standard error of prediction (SEP), and slopes of the regression line (*s*) based on the following formulas [~~27~~40-41~~28~~].

$$\text{LOD} = \frac{3.3 \times \text{SEP}}{s} \quad (4)$$

$$\text{LOQ} = \frac{10 \times \text{SEP}}{s} \quad (5)$$

All chemometrics calculations, including spectral preprocessing, PCA, and PLS regression, were performed by using The Unscrambler X version 10.4 (64-bit) (Camo Software AS, Oslo, Norway).

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3. Results and Discussion

3.1. Spectral analysis of Kalosi coffee with different degree of adulteration

Figures 3 and 4 show the original average and preprocessed spectral data of Kalosi coffee samples with three degrees of adulteration, namely low, middle, and high in the range of 200-450 nm. Figure 4 shows a clear intensity of absorbance decrease in line with an increase in the degree of adulteration. This result is in line with the previous study on coffee authentication [19]. Several peaks were observed both in original and preprocessed spectra. The peak at approximately 275 nm was related to the maximum absorption of caffeine [7, 19]. At 290 nm and 320 nm, the peaks were associated with the presence of chlorogenic acids and trigonelline [7, 19]. The intensity at the spectral window of 400-450 nm was very low therefore, at 200-400 nm, it was selected for further analysis.

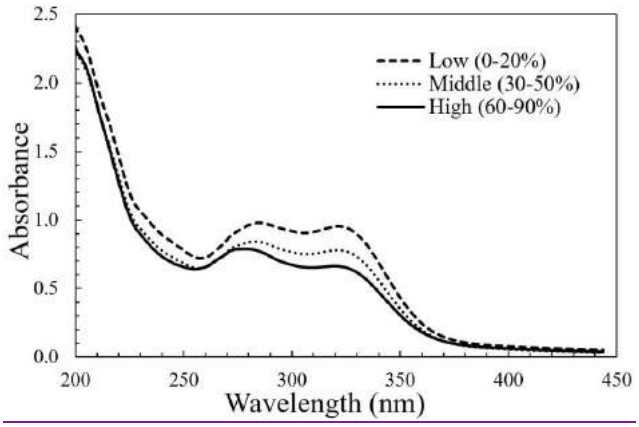


Fig. 3. The average original Kalosi spectral data with different percentage of adulteration in the range of 200-450 nm.

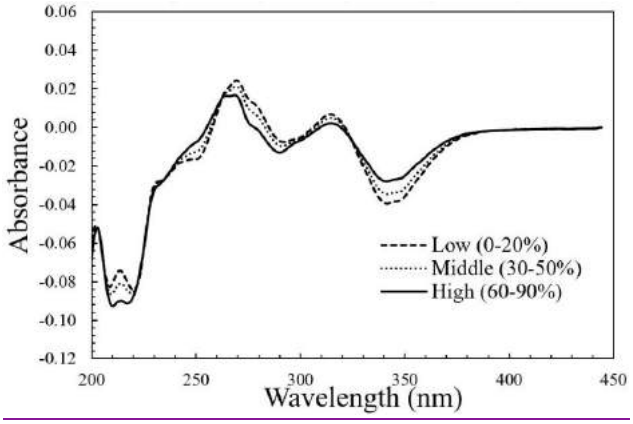
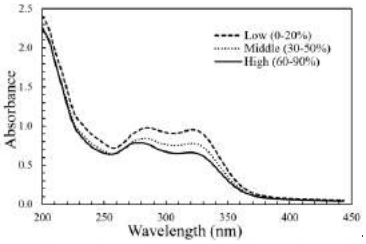
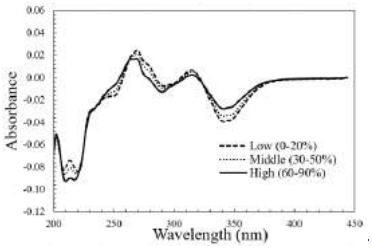


Fig. 4. The average preprocessed Kalosi spectral data with different percentage of adulteration in the range of 200-450 nm.



~~Fig. 3. The average original Kalosi spectral data with different percentage of adulteration in the range of 200-450 nm.~~



~~Fig. 4. The average preprocessed Kalosi spectral data with different percentage of adulteration in the range of 200-450 nm.~~

3.2. PCA results

First, PCA was calculated using original spectral data in ranges of 200-400 nm with the result plotted in Fig. 5. The variance obtained 89% for PC1 and 10% for PC2. Furthermore, Figure~~.~~ 5 shows that the separation of Kalosi coffee samples with different percentages of adulteration were not established, especially along the PC1 axis (*x*-axis). Therefore, a new PCA calculation was performed using preprocessed spectral data, and the result was demonstrated in Fig. 6. The first two PCs obtained a total explained variance of 98% (PC1 94% and PC2 4%). Figure~~.~~ 6 shows a clear separation of Kalosi coffee samples with different percentages of adulteration achieved along the PC1 axis. All samples with a low percentage of adulteration were in the positive PC1 (PC1>0), while those with high percentages were located at negative PC1 (PC1<0). It means that the selected spectral preprocessing method effectively enhanced the spectral difference due to the percentage of adulteration. Previous studies performed by Suhandy and Yulia [14], showed that UV-visible spectroscopy, coupled with PCA, allowed the estimation of authenticity in Indonesian peaberry coffee ~~[7]~~.

~~Fig. 7 shows a plot of wavelengths versus *x* loadings for PC1 used to identify important wavelengths that are responsible for the separation of samples and to plot PCA. Wavelengths with high *x* loadings were observed at 215 nm, 230 nm, 250 nm, 278 nm, 315 nm, and 350 nm. These wavelengths had a great contribution to discrimination coffee samples according to differences in the percentage of adulteration and are related to the absorbance of some chemical components of ground roasted coffee [7, 19].~~ Another important plot from PCA was Hotelling's T^2 versus Q-residual plot used to check the possible occurrence of an outlier in the data set. The Hotelling's T^2 is the variation within the PCA model, while Q-residual is used to measure the dimensional data in the model [42~~29~~]. For guidance, a sample

was considered as an outlier assuming the Hotelling's T^2 and Q-residual values are greater than the 95% confidence interval (red dotted line). Figure 7~~8~~ shows that all samples were located in the left lower part of the plot, and the Hotelling's T^2 and Q-residual values were lower than the 95% confidence interval (red dotted line). Therefore, no outlier was detected, and this led to the use of all 220 samples for further analysis.

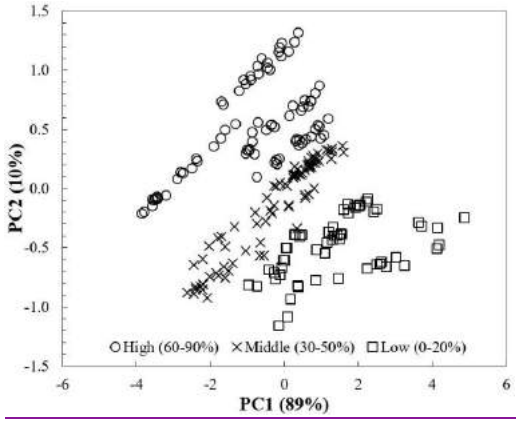


Fig. 5. PCA score plot of Kalosi coffee samples with different percentages of adulteration calculated using original spectra in the range of 200-400 nm.

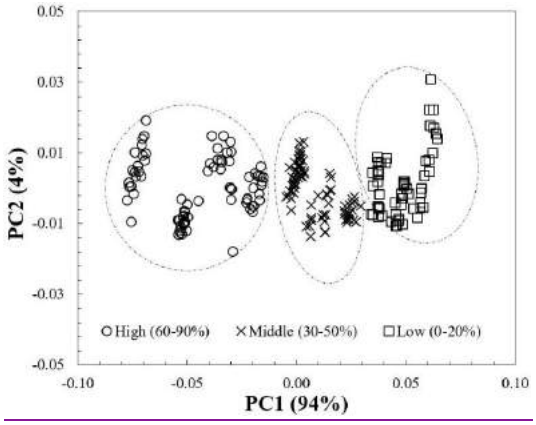


Fig. 6. PCA score plot of Kalosi coffee samples with different percentages of adulteration calculated using preprocessed spectra in the range of 200-400 nm.

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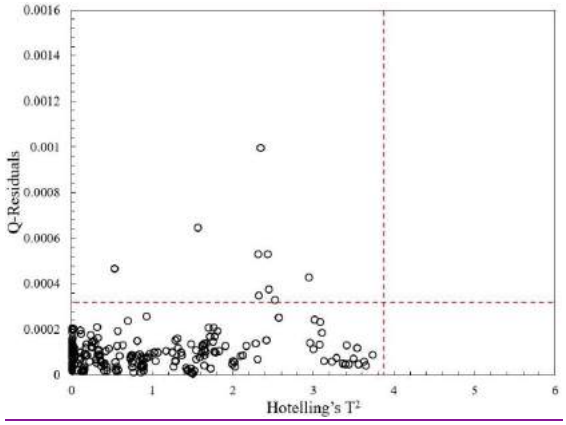

Fig. 7. Hotelling's T^2 versus Q-residual plot of coffee samples from PCA calculated using preprocessed spectral data in the range of 200-400 nm. The red dotted line (---) represents a 95% confidence interval.

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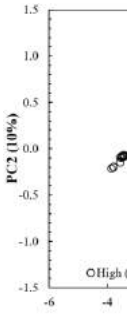
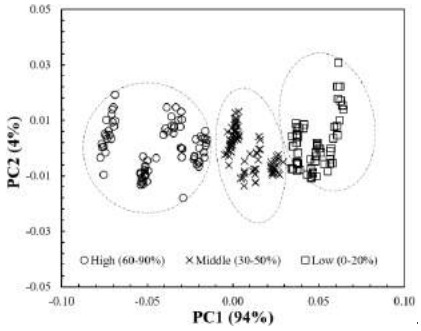
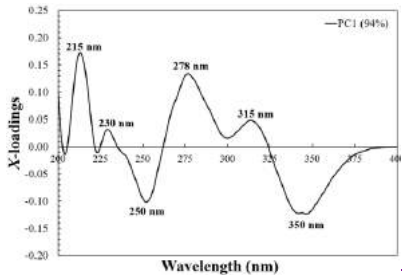


~~**Fig. 5: PCA score plot of Kalosi coffee samples with different percentages of adulteration**~~

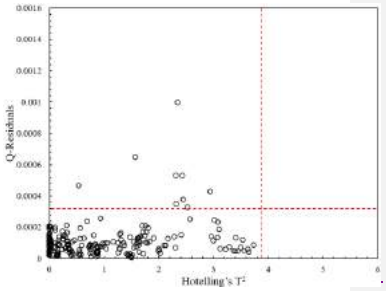


~~**Fig. 6: PCA score plot of Kalosi coffee samples with different percentages of adulteration calculated using preprocessed spectra in the range of 200-400 nm.**~~

~~calculated using original spectra in the range of 200-400 nm.~~



~~Fig. 7: *X*-loadings plot of the first principal components (PC1) calculated using preprocessed spectral data in the range of 200-400 nm.~~



~~Fig. 8: Hotelling's T^2 versus Q-residual plot of coffee samples from PCA calculated using preprocessed spectral data in the range of 200-400 nm. The red dotted line (- -) represents a 95% confidence interval.~~

3.3. The quantification of adulteration percentage using PLS regression

The calibration model was developed for original and preprocessed spectral data, as shown in Table 2. The number of factors was 11 and 6 in the original and preprocessed calibration model, which led to the lowest RMSEV. The developed calibration models were good at R^2_{cal} and R^2_{val} and close to 1 with low RMSEC and RMSEV for the original and preprocessed calibration model. The preprocessed calibration model fitted correctly with RMSEC and close to RMSEV. The preprocessed calibration model fitted correctly with RMSEC and close to RMSEV. Figure 8 shows a plot of wavelengths versus X-loadings for the first latent variables (LV1) used to identify important wavelengths that are responsible for the quantification of degree of adulteration in ground roasted Kalosi coffee samples. Wavelengths with high X-loadings were observed at 215 nm, 230 nm, 250 nm, 278 nm, 315 nm, and 350 nm. These wavelengths had a great contribution to quantification of the percentage of adulteration and are related to the absorbance of some important chemical components of ground roasted coffee [14, 22]. The peak at 250 nm is closely related to the absorbance of vanillic acid. The peak at 278 nm

is related to the absorbance of caffeine and the peak at 315 nm is closely related to the absorbance of caffeic acid [14].

Table 2. The calibration model development using original and preprocessed spectral data.

	Original	Preprocessed
R^2_{cal}	0.995	0.995
R^2_{val}	0.987	0.995
$Slope_{cal}$	0.995	0.995
$Slope_{val}$	1.000	0.994
SEC	1.872	1.959
RMSEC	1.864	1.950
SEV	3.085	1.900
RMSEV	3.065	1.888
Bias	-0.080	0.066
Factor	11	6

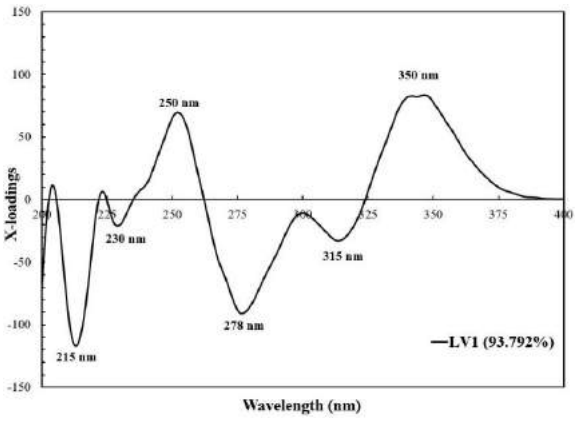


Fig. 8. X-loadings plot of the first latent variables (LV1) calculated using preprocessed spectral data in the range of 200-400 nm.

The prediction was applied using 36 samples for original and preprocessed calibration models, as shown in Figs. 9 and 10. Both prediction results were acceptable in terms of high R^2_{pred}, with bias close to 0 and low to RMSEP with the RPD high in both models. The standard deviation of the prediction samples set (SD) is 27.302% (w/w), as shown in Table 1. Figures 9 and 10 showed that the SEP was 4.079239% (w/w) for original and 3.892341% (w/w) for preprocessed calibration model, respectively, as calculated in Eq. (2). The values of RPD were 6.693 for original and 7.015 for preprocessed calibration models. Similarly, Equation (3), was used to obtain RER of 22.064 and 23.124 for the original and preprocessed spectra.

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Table 2: The calibration model development using original and preprocessed spectral data.

	Original	Preprocessed
R^2_{cal}	0.995	0.995
R^2_{val}	0.987	0.995
$Slope_{cal}$	0.995	0.995
$Slope_{val}$	1.000	0.994
SEC	1.872331	1.959260
RMSEC	1.863878	1.950415
SEV	3.085470	1.900131
RMSEV	3.065315	1.888239
Bias	-0.080291	0.066395
Factor	11	6

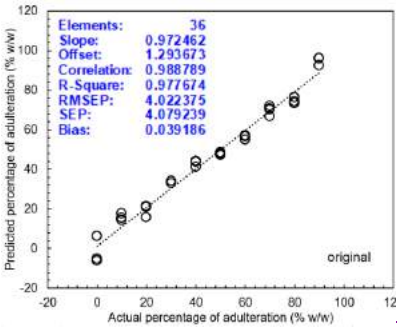

Fig. 9: Score plot between actual and predicted percentage of adulteration calculated using original spectral data in the range of 200-450 nm.

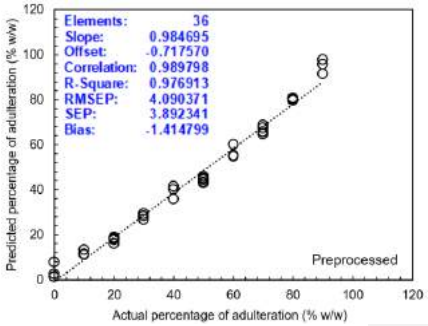

Fig. 10: Score plot between actual and predicted percentage of adulteration calculated using preprocessed spectral data in the range of 200-450 nm.

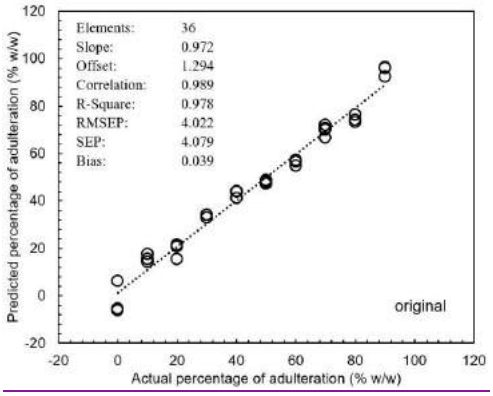

Fig. 9. Score plot between actual and predicted percentage of adulteration calculated using original spectral data in the range of 200-450 nm.

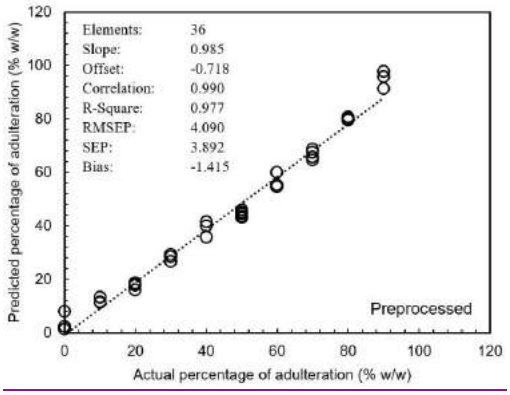

Fig. 10. Score plot between actual and predicted percentage of adulteration calculated using preprocessed spectral data in the range of 200-450 nm.

3.4. The calculation of LOD and LOQ

Figures, 9 and 10, shows that the standard deviation of the difference between actual and predicted percentage of adulteration or SEP was 4.0798% (w/w) for original and 3.892% (w/w) for preprocessed calibration model. The slope of prediction plot (*s*) was 0.972 for the original and 0.985 for preprocessed. Using EEquations (4) and (5) the percentages of LOD and LOQ were obtained at 13.8485% (w/w) and 41.9658% (w/w) for the original calibration model. Similarly, the LOD and LOQ for the preprocessed calibration model were 13.039% (w/w) and

39.513~~49~~% (w/w). This result was less accurate compared to previous work by Correia *et al.* [43]~~,~~ which stated that the quantification of robusta in arabica coffee blends using ATR-FTIR spectroscopy with LOD and LOQ of 1.3 (wt%) and 4.3 (wt%) ~~[30]~~. Daniel *et al.* [44] stated that a simple voltammetric electronic tongue for the analysis of coffee adulterations obtained LOD and LOQ percentages of 0.9% and 2.7% ~~[31]~~. However, the use of UV spectroscopy showed that an effective quantification is performed for percentages above 41.965~~8~~% (w/w), which is sufficient for economically motivated adulteration in Indonesian specialty coffee. The affordable cost of a UV spectrometer is also another advantage for the development of an analytical method used for the authentication of Indonesian specialty coffee. However, to realize a routine authentication analysis of ground roasted Kalosi coffee using UV spectroscopy, several improvements should be considered. For example, it is highly desired to develop a more rapid analysis by cancelling the laborious sample preparation of sieving. It can be achieved by developing robust PLS regression model which is less sensitive to the influence of particle size variation on the authentication of ground roasted Kalosi coffee. It is also recommended to develop robust PLS regression model using selected spectrum with several fewer important wavelengths instead of using full spectrum.

4. Conclusions

This study demonstrated the potential use of UV spectroscopy with chemometrics to perform simple and affordable authentication of Indonesian Kalosi ground roasted coffee. The samples were separated using preprocessed spectra over the range of 200-400 nm to determine their various adulteration percentages. Furthermore, the quantification percentages of adulteration were achieved using the original and preprocessed spectra with a high coefficient of calibration and validation. The prediction was satisfactory with high RPD and RER for preprocessed spectra, which led to acceptable LOD and LOQ that are sufficient for economically motivated adulteration in Indonesian specialty coffee.

Acknowledgments

The authors are grateful to the Ministry of Research and Technology/National Agency for Research and Innovation, the Republic of Indonesia, for their financial support (Basic Research Grant 2020-2022).

Nomenclatures

A	Absorbance
$I_o(\lambda)$	Intensity of light passed through the reference at wavelength λ
$I_s(\lambda)$	Intensity of light passed through the sample at wavelength λ
s	Slopes of the regression line

Greek Symbols

λ	Wavelength

Abbreviations

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GIs	Geographic Indication
HPLC	High-Performance Liquid Chromatography
LOD	Limit of Detection
LOQ	Limit of Quantification
NIR	Near Infrared
NMR	Nuclear Magnetic Resonance
PC	Principal Component
PCA	Principal Component Analysis
PLS	Partial Least Square
RER	Ratio Error Range
RMSEC	Root Mean Square Error of Calibration
RMSECV	Root Mean Square Error Cross-Validation
RMSEV	Root Mean Square Error of Validation
RPD	Ratio Prediction to Deviation
SD	Standard Deviation
SEP	Standard Error of Prediction
SG	Savitzky-Golay
SNR	Signal-to-Noise Ratio
SNV	Standard Normal Variate
UV-VIS	Ultraviolet-Visible

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OUTLINING HOW THE ISSUES ARE ADDRESSED

Title of paper: THE USE OF ULTRAVIOLET (UV) SPECTROSCOPY AND CHEMOMETRICS TO QUANTIFY THE PERCENTAGES OF ADULTERATION IN KALOSI GROUND ROASTED SPECIALTY COFFEE

1. Address all the concerns/recommendations of the reviewers.
2. All amendments made are to be highlighted in red color in the revised paper.

Reviewer # 1

Final Recommendation	**Accepted without modification**	**Accepted with minor corrections**	**Accepted with major modification**	**Rejected**
Please tick	☐	☐	☑	☐

Comments	**Addressed (Y/N)**	**Reply/Action taken**
• English must be revised	Yes. The authors agree to revise this part.	The manuscript has been sent for English proof reading before submission. The certificate of English proof was enclosed.
• Authors should add 1 paragraph in the introduction to show what is original	Yes. The authors agree to revise this part.	The authors agree to add one paragraph in the introduction to show the originality of the article. The following paragraph has been added into manuscript: Comparing to other spectroscopic methods (NIR, mid-infrared, NMR and fluorescence spectroscopy) or conventional methods (HPLC and its derivative), spectroscopy in UV region has several advantages: spectrometer in this region is relatively low cost and it is available to most standard laboratories, a green technology without chemical waste during sample extraction and simple in sample preparation. Several qualitative studies have been reported using UV spectroscopy for authentication of Indonesian specialty coffee [14, 30]. However, authentication of Indonesian specialty coffee in the term of quantification of adulterant

		or degree of adulteration is very limited. Therefore, this research aims to determine the possible application of UV spectroscopy and chemometrics method for ground roasted Kalosi coffee authentication both in qualitative (classify the samples into low, middle and high degree of adulteration) and quantitative studies (quantify the percentage of adulteration in Kalosi ground roasted coffee). The following references has been added in the manuscript: [14] Suhandy, D.; and Yulia, M. (2017). Peaberry coffee discrimination using UV-visible spectroscopy combined with SIMCA and PLS-DA. *International Journal of Food Properties*, 20(sup1), S331–S339. [30] Yulia, M.; and Suhandy, D. (2019). Authentication of organic Lampung robusta ground roasted coffee by UV-visible spectroscopy and PLS-DA method. *Journal of Physics: Conference Series*, 1341, 022006.
• Add FTIR analysis. Authors must refer to Indonesian Journal of Science and Technology, 2019, 4(1), 97-118. Indonesian Journal of Science and Technology, 2019, 4(2), 188-195.	Yes. The authors agree to revise this part.	The authors add FTIR analysis in the article in introduction part. **Original sentence:** NIR spectroscopy was used with PLS regression to quantify corn adulteration in Brazilian coffee [16]. Assis *et al.* (2018) used mid-infrared spectroscopy and PLS regression to determine 40 meshes of robusta-arabica coffee blends in the analytical range of 0.0 to 33.0% w/w

		[17]. Nuclear magnetic resonance (NMR) spectroscopy was used to monitor robusta coffee adulteration in Brazilian arabica coffee and to quantify 16-O-methylcafestol (16-OMC) [18]. **Revised sentence:** NIR spectroscopy was used with PLS regression to quantify corn adulteration in Brazilian coffee [24]. Assis *et al.* [25] used mid-infrared spectroscopy and PLS regression to determine 40 meshes of robusta-arabica coffee blends in the analytical range of 0.0 to 33.0% w/w. Nuclear magnetic resonance (NMR) spectroscopy was used to monitor robusta coffee adulteration in Brazilian arabica coffee and to quantify 16-O-methylcafestol (16-OMC) [26]. Fourier transform infrared (FTIR) is one of the important analytical techniques and quite popular for characterizing samples [27]. FTIR has been used for quantification of robusta coffee in arabica coffee blends in ground roasted coffee [28]. The following two references have been added in the manuscript: [27] Nandiyanto, A.B.D.; Oktiani, R.; and Ragadhita, R. (2019). How to read and interpret FTIR spectroscope of organic material. *Indonesian Journal of Science & Technology*, 4(1), 97–118. [28] Correia, R.M.; Loureiro, L.B.; Rodrigues, R.R.T.; Costa, H.B.; Oliveira, B.G.; Filgueiras, P.R., Thompson, C.J.; Lacerda, V.; and Romão, W. (2016).

		Chemical profiles of Robusta and Arabica coffee by ESI(−)FT-ICR MS and ATR-FTIR: a quantitative approach. *Analytical Methods*, 8(42), 7678–7688. The authors agree to revise the introduction part. **Original sentence:** In 2018, Indonesia produced approximately 13.5% of the world's robusta coffee [1]. This production was mainly carried out in Java, Sumatera, Bali, Sulawesi, and Papua Islands, using special techniques, which lead to unique characteristics such as different flavour complex, aroma, acidity, body, and mouth feel. Recently, due to the increase in customer demand for coffee diversification, there is a rise in differentiation based on geographical origin, also known as specialty coffee, which significantly influences cup profile. **Revised sentence:** In 2018, Indonesia produced approximately 13.5% of the world's robusta coffee [1]. This production was mainly carried out in Java, Sumatera, Bali, Sulawesi, and Papua Islands, using special techniques, which lead to unique characteristics such as different flavour complex, aroma, acidity, body, and mouth feel. Approximately 314,400 tons of coffee are consumed by Indonesian [2]. Recently, due to the increase in customer demand for coffee diversification, there is a rise in differentiation based on geographical origin, also known as

		specialty coffee, which significantly influences cup profile. The following reference has been added in the manuscript: [2] Sumarji, S.; Ridha, F.; Dwilaksana, D.; Syuhri, A.; and Raihaan, R. (2019). The effect of particle dispersion due to mixing speed on spent coffee ground composites. *Indonesian Journal of Science & Technology*, 4(2), 188–195.
• Add references from Journal of Engineering Sci and Technology (JESTEC) to ensure that this paper is fit and has relations to JESTEC	Yes. The authors agree to revise this part.	The following two references from JESTEC have been added in the manuscript: **Original sentence:** Similarly, it is also difficult to differentiate between fine grinded coffee skin and the ground roasted type by visual inspection [10]. **Revised sentence:** Similarly, the conventional method using visual assessment (VA) to discriminate between roasted fine grinded coffee skin and ground roasted coffee is difficult and easily exposed to human error due to the dependency of the technique on human visual skill [16-17]. The following reference has been added in the manuscript: [17] Hashim, N.; Janius, R.B.; Rahman, R.A.; Osman, A.; Shitan, M.; and Zude, M. (2014). Changes of backscattering parameters during chilling injury in bananas. *Journal of Engineering Science and Technology*, 9(3), 314–325.

		Original sentence: The quality of the final PLS model was also evaluated by using the determining coefficient of calibration and validation (R^2_{cal} and R^2_{val}), root means square error (RMSEC and RMSEV), and bias [22]. **Revised sentence:** The quality of the final PLS model was also evaluated by using the coefficient of determination of calibration and validation (R^2_{cal} and R^2_{val}), root means square error (RMSEC and RMSEV), and bias [33-34]. The following reference has been added in the manuscript: [34] Ali, M.M.; Janius, R.B.; Nawi, N.M.; and Hashim, M. (2018). Prediction of total soluble solids and ph in banana using near infrared spectroscopy. *Journal of Engineering Science and Technology*, 13(1), 254–264.
• Figures are unclear. Add clear figure. 1 figure 1 column, not make 2 figure in 1 line (in two column).	Yes. The authors agree to revise this part.	The clear figures 3, 4, 5, 6, 7, 8, and 9 have been added. Each figure in 1 column.

(Please add more rows if needed)

Reviewer # 2

Final Recommendation Please tick	**Accepted without modification**	**Accepted with minor corrections**	**Accepted with major modification**	**Rejected**
	☐	☐	☑	☐

Comments	**Addressed (Y/N)**	**Reply/Action taken**
• In the introduction part the authors should make clear about following points: Why knowing the degree of adulteration is important? Don't you think that more important to	Yes. The authors agree to revise this part.	In the present study we demonstrated both qualitative and quantitative studies for Kalosi coffee authentication. As explained by Burns and Walker (2020),

categorized the sample as original and adulterated one rather than predict the degree of adulteration?		authentication can be a qualitative or quantitative study or both. In qualitative study we are interested to know the membership of a sample belong to genuine (authentic) or adulterated (fake) class or belongs to several degree of adulteration (low, middle and high). In quantitative study we determine the degree of dilution or adulteration (Burns and Walker 2020). Both qualitative and quantitative studies are important to be investigated (Forchetti *et al.* 2020; Flores-Valdez *et al.* 2020). For authentication of Indonesian specialty coffee, several qualitative studies have been reported (Suhandy and Yulia 2017a; Yulia and Suhandy 2019). However, authentication of Indonesian specialty coffee in the term of quantification of adulterant or degree of adulteration is very limited. That is why in the present study we evaluate the potential application of UV spectroscopy for ground roasted Kalosi coffee authentication both in qualitative and quantitative studies. **Original sentence:** Therefore, this research aims to determine the possible application of UV spectroscopy and chemometrics method to quantify the percentage of adulteration in Kalosi ground roasted coffee. **Revised sentence:** Several qualitative studies have been reported using UV spectroscopy for authentication of Indonesian specialty coffee [14, 30]. However, authentication of Indonesian specialty coffee in the term of quantification of adulterant or

		degree of adulteration is very limited. Therefore, this research aims to determine the possible application of UV spectroscopy and chemometrics method for ground roasted Kalosi coffee authentication both in qualitative (classify the samples into low, middle and high degree of adulteration) and quantitative studies (quantify the percentage of adulteration in Kalosi ground roasted coffee). **References:** Burns, D.T.; and Walker, M.J. (2020). Critical review of analytical and bioanalytical verification of the authenticity of coffee. *Journal of AOAC INTERNATIONAL*, 103(2), 283–294. Forchetti, D.A.P.; and Poppi, R.J. (2020). Detection and quantification of adulterants in roasted and ground coffee by NIR hyperspectral imaging and multivariate curve resolution. *Food Analytical Methods,* 13, 44–49. Flores-Valdez, M.; Meza-Márquez, O.G.; Osorio-Revilla, G.; and Gallardo-Velázquez, T. (2020). Identification and quantification of adulterants in coffee (coffea arabica l.) using FT-MIR spectroscopy coupled with chemometrics. *Foods*, 9, 851. The following references has been added in the manuscript: [14] Suhandy, D.; and Yulia, M. (2017). Peaberry coffee discrimination using UV-visible spectroscopy combined with SIMCA and PLS-DA. *International*

		Journal of Food Properties, 20(sup1), S331–S339. [30] Yulia, M.; and Suhandy, D. (2019). Authentication of organic Lampung robusta ground roasted coffee by UV-visible spectroscopy and PLS-DA method. *Journal of Physics: Conference Series*, 1341, 022006.
• In the introduction part the authors should make clear about following points: Comparison of the method proposed in this research and other recent technology for coffee authentication has not been discussed well in the introduction.	Yes. The authors agree to revise this part.	Yes. The authors agree to highlight the advantages of this current method (UV spectroscopy) comparing to other recent technologies for coffee authentication. Comparing to other spectroscopic methods (NIR, mid-infrared, NMR and fluorescence spectroscopy) or conventional methods (HPLC and its derivative), spectroscopy in UV region has several advantages: spectrometer in this region is relatively low cost and it is available to most standard laboratories, a green technology without chemical waste during sample extraction and simple in sample preparation. **Original sentence:** Regardless, the application of low-cost spectroscopic method based on UV spectroscopy for quantification of adulteration in Indonesian specialty coffee with GIs is limited. **Revised sentence:** Comparing to other spectroscopic methods (NIR, mid-infrared, NMR and fluorescence spectroscopy) or conventional methods (HPLC and its derivative), spectroscopy in UV region has several advantages:

		spectrometer in this region is relatively low cost and it is available to most standard laboratories, a green technology without chemical waste during sample extraction and simple in sample preparation. Several qualitative studies have been reported using UV spectroscopy for authentication of Indonesian specialty coffee [14, 30]. However, authentication of Indonesian specialty coffee in the term of quantification of adulterant or degree of adulteration is very limited. Therefore, this research aims to determine the possible application of UV spectroscopy and chemometrics method for ground roasted Kalosi coffee authentication both in qualitative (classify the samples into low, middle and high degree of adulteration) and quantitative studies (quantify the percentage of adulteration in Kalosi ground roasted coffee).
• In the introduction part the authors should make clear about following points: The coffee could be adulterated by other materials also such as coffee by products, maize, soybean etc. Why the authors only focusing on adulteration by using coffee skin? In which form of coffee adulteration usually happen?	Yes. The authors agree to revise this part.	Yes. The authors agree that coffee adulteration may be performed by changing the quality of beans or adding other low-cost coffee and non-coffee materials as described by previous reported studies: robusta coffee (Garrett *et al.* 2012), inferior quality of arabica coffee (Toledo *et al.* 2014), mixed of four materials (coffee husks, spent coffee ground, barley, and corn) (Reis *et al.* 2016), wheat, corn, and chickpea (Sezer *et al.* 2018), soybeans, green mung beans and spent coffee grounds (Cheah and Fang 2020), and coffee husks, soybean, corn, barley, rice, and wheat (Milani *et al.* 2020). In this study, the authors used coffee skins for adulterant materials based on the following reasons:

		1. The chemical properties of coffee skins are very similar to coffee bean as reported by previous works (Esquivel and Jimenez 2012; Klingel *et al.* 2020). Therefore, the detection and quantification of ground roasted Kalosi coffee adulterated with coffee skins is more challenging. 2. The physical properties of ground roasted coffee and fine grinded coffee skin is also very similar and difficult to be differentiated visually by naked eyes. 3. Mostly Kalosi green bean coffee was processed using dry method resulted in huge amounts of coffee skins as one of coffee by-products. For this reason, in real situation the adulteration of ground roasted Kalosi involved the intentional addition of fine grinded coffee skins. The authors added references to support the explanation. **Original sentence:** In addition, ground roasted coffee is the most difficult form of coffee adulteration, and visually, very hard to discriminate the specialty, GIs, and normal coffee (non-GIs) with samples of roasted and ground coffee [6-9]. **Revised sentence:** Coffee adulteration may be performed by changing the quality of beans or adding other low-cost coffee and non-coffee materials as described by previous reported studies: robusta coffee [7], inferior quality of arabica coffee [8], mixed of four materials (coffee husks, spent coffee ground, barley, and corn) [9],

wheat, corn, and chickpea [10], soybeans, green mung beans and spent coffee grounds [11], and coffee husks, soybean, corn, barley, rice, and wheat [12]. Mostly Kalosi green bean coffee was processed using dry method resulted in huge amounts of coffee skins as one of coffee by-products. For this reason, in real situation the adulteration of ground roasted Kalosi involved the intentional addition of fine grinded coffee skins. In addition, ground roasted coffee is the most difficult form of coffee adulteration, and visually, very hard to discriminate the specialty, GIs, and normal coffee (non-GIs) with samples of roasted and ground coffee [13-16].

References:

[7] Garrett, R.; Vaz, B.G.; Hovell, A.M.C.; Eberlin, M.N.; and Rezende, C.M. (2012). Arabica and robusta coffees: identification of major polar compounds and quantification of blends by direct-infusion electrospray ionization–mass spectrometry. *Journal of Agricultural and Food Chemistry*, 60(17), 4253–4258.

[8] Toledo, B.R.; Hantao, L.W.; Ho, T.D.; Augusto, F.; and Anderson, J.L. (2014). A chemometric approach toward the detection and quantification of coffee adulteration by solid-phase microextraction using polymeric ionic liquid sorbent coatings. *Journal of Chromatography A*, 1346, 1–7.

[9] Reis, N.; Franca, A.S.; and Oliveira, L.S. (2016).

		Concomitant use of Fourier transform infrared attenuated total reflectance spectroscopy and chemometrics for quantification of multiple adulterants in roasted and ground coffee. *Journal of Spectroscopy*, 2016, 4974173. [10] Sezer, B.; Apaydin, H.; Bilge, G.; and Boyaci, I.H. (2018). Coffee arabica adulteration: Detection of wheat, corn and chickpea. *Food Chemistry*, 264, 142–148. [11] Cheah, W.L.; and Fang, M. (2020). HPLC-based chemometric analysis for coffee adulteration. *Foods*, 9(7), 880. [12] Milani, M.I.; Rossini, E.L.; Catelani, T.A.; Pezza, L.; Toci, A.T.; Pezza, H.R. (2020). Authentication of roasted and ground coffee samples containing multiple adulterants using NMR and a chemometric approach. *Food Control*, 112, 107104. Esquivel, P.; and Jiménez, V.M. (2012). Functional properties of coffee and coffee by-products. *Food Research International*, 46(2), 488–495. Klingel, T.; Kremer, J.I.; Gottstein, V.; Rajcic de Rezende, T.; Schwarz, S.; and Lachenmeier, D.W. (2020). A review of coffee by-products including leaf, flower, cherry, husk, silver skin, and spent grounds as novel foods within the European union. *Foods*, 9(5), 665.
• In the introduction part the authors should make clear about following points:	Yes. The authors	The authors revised the introduction and added the particular stage of

The authentication procedure should be conducted in particular stage of supply chain, how this method will help?	agree to revise this part.	supply chain which may be helped by this proposed method. In general, adulteration may occur in all stages of supply chain. However, the initial possible adulteration of ground raosted coffee both accidentally and intentionally may be happened in the production stage before packing. This proposed method can be used as a routine analysis for final quality inspection of ground roasted Kalosi coffee before packing. **Original sentence:** Therefore, this research aims to determine the possible application of UV spectroscopy and chemometrics method to quantify the percentage of adulteration in Kalosi ground roasted coffee. **Revised sentence:** Therefore, this research aims to determine the possible application of UV spectroscopy and chemometrics method for ground roasted Kalosi coffee authentication both in qualitative (classify the samples into low, middle and high degree of adulteration) and quantitative studies (quantify the percentage of adulteration in Kalosi ground roasted coffee). This proposed method can be used as a routine analysis for final quality inspection of ground roasted Kalosi coffee before packing.
• Materials and method: Are the method of sampling preparation in this research representing real adulteration situation?	Yes. The authors agree to revise this part.	Yes. In real situation, the adulteration of ground roasted Kalosi coffee with coffee skins is frequently happened. For economic reason, the percentage of adulteration is actually more than 50%. In the previous reported studies, there are several strategies to compose coffee blends (the ratio

		between coffee and adulterant) (Garrett *et al.* 2012; Toledo *et al.* 2014; Reis *et al.* 2016; Sezer *et al.* 2018; Milani *et al.* 2020). In this study, to provide a wide range of adulteration, the ratio between ground roasted Kalosi coffee and coffee skins is 0 to 90% (w/w) in increment of 10% from low (0-20% w/w), middle (30-50% w/w) and high degree of adulteration (60-90% w/w) for calibration, validation and prediction. The authors add this explanation in the revised manuscript. **Original sentence:** Approximately 220 mixtures of Kalosi coffee samples adulterated with different percentages of coffee skins were prepared, ranging from 0 to 90% with low (0-20% w/w), middle (30-50% w/w), and high adulteration (60-90%w/w) of 10%. **Revised sentence:** Approximately 220 mixtures of Kalosi coffee samples adulterated with different percentages of coffee skins were prepared. In this study, to provide a wide range of adulteration, the ratio between ground roasted Kalosi coffee and coffee skins is 0 to 90% (w/w) in increment of 10% from low (0-20% w/w), middle (30-50% w/w) and high degree of adulteration (60-90% w/w) for both calibration, validation and prediction. **References:** Garrett *et al.* (2012) **Coffee**: Ground roasted arabica coffee

		Adulterant: Ground roasted robusta coffee. **Ratio:** 20-80% (w/w). Toledo *et al.* (2014) **Coffee**: Certified high quality of ground roasted arabica coffee **Adulterant**: Inferior quality of ground roasted arabica coffee. **Ratio:** 0-30% (w/w). Reis *et al.* (2016) **Coffee**: Ground roasted arabica coffee **Adulterant**: mixed of four materials (coffee husks, spent coffee ground, barley, and corn). **Ratio:** 0.5-66% (w/w). Sezer *et al.* (2018) **Coffee**: Ground roasted arabica coffee **Adulterant**: wheat, corn, and chickpea. **Ratios:** 2.5-60% (v/v) in increment of 2.5% for calibration and 2-50% (v/v) and in increment of 2% in the validation. Milani *et al.* (2020) **Coffee**: Ground roasted arabica coffee **Adulterant**: coffee husks, soybean, corn, barley, rice, and wheat. **Ratio:** 1.0, 2.5, 5.0, 10, 25, and 50% (w/w). Garrett, R.; Vaz, B.G.; Hovell, A.M.C.; Eberlin, M.N.; and Rezende, C.M. (2012). Arabica and robusta coffees: identification of major polar compounds and quantification of blends by direct-infusion electrospray ionization–mass spectrometry. *Journal of Agricultural*

		and Food Chemistry, 60(17), 4253–4258. Toledo, B.R.; Hantao, L.W.; Ho, T.D.; Augusto, F.; and Anderson, J.L. (2014). A chemometric approach toward the detection and quantification of coffee adulteration by solid-phase microextraction using polymeric ionic liquid sorbent coatings. *Journal of Chromatography A*, 1346, 1–7. Reis, N.; Franca, A.S.; and Oliveira, L.S. (2016). Concomitant use of Fourier transform infrared attenuated total reflectance spectroscopy and chemometrics for quantification of multiple adulterants in roasted and ground coffee. *Journal of Spectroscopy*, 2016, 4974173. Sezer, B.; Apaydin, H.; Bilge, G.; and Boyaci, I.H. (2018). Coffee arabica adulteration: Detection of wheat, corn and chickpea. *Food Chemistry*, 264, 142–148. Milani, M.I.; Rossini, E.L.; Catelani, T.A.; Pezza, L.; Toci, A.T.; Pezza, H.R. (2020). Authentication of roasted and ground coffee samples containing multiple adulterants using NMR and a chemometric approach. *Food Control*, 112, 107104.
• Discussion: Why the authors use PCA loading rather than PLS loading for wavelength selection of the prediction model? If the purpose is for classification then it could be understood to use PCA loading rather than PLS loading, however the final model is a regression model.	Yes. The authors agree to revise this part.	The authors agree to remove PCA loadings and add PLS loadings to investigate the important wavelengths resulted from PLS regression. The authors remove one figure of PCA loading and add one figure of PLS loading plot (wavelength versus x-loading).

		In Materials and Methods **Original sentence:** The quality of the final PLS model was also evaluated by using the determining coefficient of calibration and validation (R^2_{cal} and R^2_{val}), root means square error (RMSEC and RMSEV), and bias [22]. **Revised sentence:** The quality of the final PLS model was also evaluated by using the coefficient of determination of calibration and validation (R^2_{cal} and R^2_{val}), root means square error (RMSEC and RMSEV), and bias [33-34]. The structure of developed PLS regression model was evaluated by plotting X-loadings versus wavelengths [35]. The wavelengths with a higher value in the X-loadings of a latent variable (LV) (local maxima or minima) could be considered more important than other wavelengths. The following reference has been added in the manuscript: [34] Ali, M.M.; Janius, R.B.; Nawi, N.M.; and Hashim, M. (2018). Prediction of total soluble solids and ph in banana using near infrared spectroscopy. *Journal of Engineering Science and Technology*, 13(1), 254–264. [35] Ye, X.; Abe, S.; and Zhang, S. (2020). Estimation and mapping of nitrogen content in apple trees at leaf and canopy levels using hyperspectral imaging. *Precision Agriculture*, 21, 198–225.

		In Results and Discussion **Original sentence:** The preprocessed calibration model fitted correctly with RMSEC and close to RMSEV. **Revised sentence:** The preprocessed calibration model fitted correctly with RMSEC and close to RMSEV. Figure 8 shows a plot of wavelengths versus X-loadings for the first latent variables (LV1) used to identify important wavelengths that are responsible for the quantification of degree of adulteration in ground roasted Kalosi coffee samples. Wavelengths with high X-loadings were observed at 215 nm, 230 nm, 250 nm, 278 nm, 315 nm, and 350 nm. These wavelengths had a great contribution to quantification of the percentage of adulteration and are related to the absorbance of some important chemical components of ground roasted coffee [14, 22]. The peak at 250 nm is closely related to the absorbance of vanillic acid. The peak at 278 nm is related to the absorbance of caffeine and the peak at 315 nm is closely related to the absorbance of caffeic acid [14].
• Discussion: Correlation between selected wavelength and chemical contents of original and adulterated sample is necessary.	Yes. The authors agree to revise this part.	The authors agree to add PLS loading in the discussion part. Correlation between selected wavelength or important wavelength with high X-loading and chemical contents was added. **Original sentence:** The preprocessed calibration model fitted correctly with RMSEC and close to RMSEV. **Revised sentence:**

		The preprocessed calibration model fitted correctly with RMSEC and close to RMSEV. Figure 8 shows a plot of wavelengths versus X-loadings for the first latent variables (LV1) used to identify important wavelengths that are responsible for the quantification of degree of adulteration in ground roasted Kalosi coffee samples. Wavelengths with high X-loadings were observed at 215 nm, 230 nm, 250 nm, 278 nm, 315 nm, and 350 nm. These wavelengths had a great contribution to quantification of the percentage of adulteration and are related to the absorbance of some important chemical components of ground roasted coffee [14, 22]. The peak at 250 nm is closely related to the absorbance of vanillic acid. The peak at 278 nm is related to the absorbance of caffeine and the peak at 315 nm is closely related to the absorbance of caffeic acid [14].
• Discussion: The method of analysis require careful sample preparation, could it be developed into more rapid techniques? To the least the author should discuss it in the discussion part.	Yes. The authors agree to revise this part.	The authors agree to discuss more about potential application of UV-visible spectroscopy for faster analytical method for coffee authentication. The authors explained two possible things which may help UV-visible to be more rapid analysis. The first is improvement in sample preparation by avoiding sieving. The second is to develop PLS model with very few selected wavelengths by applying variable selection in developing calibration model such as iPLS regression. **Original sentence:** However, the use of UV spectroscopy showed that an effective quantification is performed for percentages above 41.98% (w/w), which is sufficient for economically motivated adulteration in

		Indonesian specialty coffee. The affordable cost of a UV spectrometer is also another advantage for the development of an analytical method used for the authentication of Indonesian specialty coffee. **Revised sentence:** However, the use of UV spectroscopy showed that an effective quantification is performed for percentages above 41.98% (w/w), which is sufficient for economically motivated adulteration in Indonesian specialty coffee. The affordable cost of a UV spectrometer is also another advantage for the development of an analytical method used for the authentication of Indonesian specialty coffee. However, to realize a routine authentication analysis of ground roasted Kalosi coffee using UV spectroscopy, several improvements should be considered. For example, it is highly desired to develop a more rapid analysis by cancelling the laborious sample preparation of sieving. It can be achieved by developing robust PLS regression model which is less sensitive to the influence of particle size variation on the authentication of ground roasted Kalosi coffee. It is also recommended to develop robust PLS regression model using selected spectrum with several fewer important wavelengths instead of using full spectrum.
• Discussion: In chapter 3.4 the authors compared the method used in the manuscript with other method, however, advantages and disadvantages has not been discussed well. In addition, in the current method the authors used, laborious sample preparation is	Yes. The authors agree to revise this part.	The authors agree to compare the advantages and disadvantages of our current method with other method in the discussion part. The authors highlight that the accuracy of current method is less than the other

required, to the least the authors should discuss how the method could be developed as a rapid measurement technique in the future possible protocols and note could also be added.		methods but sufficient for economically motivated adulteration in Indonesian specialty coffee. The cost of current method is also cheaper than that of the other established methods. However, the authors agree that the current method has also some disadvantages such as time consuming due to involving laborious sample preparation of sieving. The authors agree to discuss a possible improvement for developing a more rapid analysis using UV spectroscopy. **Original sentence:** However, the use of UV spectroscopy showed that an effective quantification is performed for percentages above 41.98% (w/w), which is sufficient for economically motivated adulteration in Indonesian specialty coffee. The affordable cost of a UV spectrometer is also another advantage for the development of an analytical method used for the authentication of Indonesian specialty coffee. **Revised sentence:** However, the use of UV spectroscopy showed that an effective quantification is performed for percentages above 41.98% (w/w), which is sufficient for economically motivated adulteration in Indonesian specialty coffee. The affordable cost of a UV spectrometer is also another advantage for the development of an analytical method used for the authentication of Indonesian specialty coffee. However, to realize a routine authentication analysis of ground roasted Kalosi coffee using UV spectroscopy, several improvements

		should be considered. For example, it is highly desired to develop a more rapid analysis by cancelling the laborious sample preparation of sieving. It can be achieved by developing robust PLS regression model which is less sensitive to the influence of particle size variation on the authentication of ground roasted Kalosi coffee. It is also recommended to develop robust PLS regression model using selected spectrum with several fewer important wavelengths instead of using full spectrum.

(Please add more rows if needed)

Reviewer # 3

Final Recommendation	**Accepted without modification**	**Accepted with minor corrections**	**Accepted with major modification**	**Rejected**
Please tick	☐	☑	☐	☐

Comments	**Addressed (Y/N)**	**Reply/Action taken**
• The use of plurals in referring to Figures.	Yes. The authors agree to revise this part.	The authors revised the sentence. **Original sentence:** Fig. 9 and 10, shows that the standard deviation of the difference between actual and predicted percentage of adulteration or SEP was 4.08% (w/w) for original and 3.89% (w/w) for preprocessed calibration model. **Revised sentence:** Figures 9 and 10 show that the standard deviation of the difference between actual and predicted percentage of adulteration or SEP was 4.08% (w/w) for original and 3.89% (w/w) for preprocessed calibration model.
• The use of plurals when referring to Equations	Yes. The authors agree to	The authors revised the sentence. **Original sentence:**

	revise this part.	In this work, the LOD and LOQ were computed using standard deviations of the residual between actual and predicted or standard error of prediction (SEP), and slopes of the regression line (s) based on the following formula [27-28]. **Revised sentence:** In this work, the LOD and LOQ were computed using standard deviations of the residual between actual and predicted or standard error of prediction (SEP), and slopes of the regression line (s) based on the following formulas [40-41].
• [Page 3: Each sample weighed 1 gram and was extracted further distilled and diluted using hot distilled water] Not clear	Yes. The authors agree to revise this part.	The authors revised the sentence. **Original sentence:** Each sample weighed 1 gram and was extracted further distilled and diluted using hot distilled water [6-8]. **Revised sentence:** 1 gram of each sample was weighed and placed in a glass beaker. It was extracted, distilled and diluted using hot distilled water based on sample preparation procedure described in previous works [13-15].
• [page 3: Fig. 1: Site for sample collection in Enrekang, South Sulawesi, Indonesia.] No need for a full stop	No. The authors disagree to revise this part.	The authors disagree to remove a full stop in the sentence. Based on the jurnal template, a full stop is needed. The authors ensure the manuscript following the template including how to write figure and table caption. **Original sentence:** Fig. 1: Site for sample collection in Enrekang, South Sulawesi, Indonesia. **Revised sentence:** Fig. 1. Site for sample collection in Enrekang, South Sulawesi, Indonesia.

• [Page 5: The optimum number of PLS components is analysed by the lowest root to mean square error cross-validation (RMSECV).] Correct to “was”	Yes. The authors agree to revise this part.	The authors agree to correct the sentence. **Original sentence:** The optimum number of PLS components is analysed by the lowest root to mean square error cross-validation (RMSECV). **Revised sentence:** The optimum number of PLS components was analysed by the lowest root to mean square error cross-validation (RMSECV).
• [Page 6: Fig. 3 and 4 show the original average and preprocessed spectral data of Kalosi coffee samples with three degrees of adulteration, namely low, middle, and high in the range of 200-450 nm.] Correct to “Figures”	Yes. The authors agree to revise this part.	The authors agree to correct the sentence. **Original sentence:** Fig. 3 and 4 show the original average and preprocessed spectral data of Kalosi coffee samples with three degrees of adulteration, namely low, middle, and high in the range of 200-450 nm. **Revised sentence:** Figures 3 and 4 show the original average and preprocessed spectral data of Kalosi coffee samples with three degrees of adulteration, namely low, middle, and high in the range of 200-450 nm.
• [Page 9: Fig. 9 and 10, shows that the standard deviation of the difference between actual and predicted percentage of adulteration or SEP was 4.08% (w/w) for original and 3.89% (w/w) for preprocessed calibration model.] Figures	Yes. The authors agree to revise this part.	The authors agree to revise the sentence. **Original sentence:** Fig. 9 and 10, shows that the standard deviation of the difference between actual and predicted percentage of adulteration or SEP was 4.08% (w/w) for original and 3.89% (w/w) for preprocessed calibration model. **Revised sentence:**

		Figures 9 and 10 show that the standard deviation of the difference between actual and predicted percentage of adulteration or SEP was 4.08% (w/w) for original and 3.89% (w/w) for preprocessed calibration model.
• [Page 9: Using Eq. (4) and (5) the percentages of LOD and LOQ were obtained at 13.85% (w/w) and 41.98% (w/w) for the original calibration model.] Equations	Yes. The authors agree to revise this part.	The authors agree to revise the sentence. **Original sentence:** Using Eq. (4) and (5) the percentages of LOD and LOQ were obtained at 13.85% (w/w) and 41.98% (w/w) for the original calibration model. **Revised sentence:** Using Equations (4) and (5) the percentages of LOD and LOQ were obtained at 13.85% (w/w) and 41.98% (w/w) for the original calibration model.

(Please add more rows if needed)

Reviewer # 4

Final Recommendation Please tick	**Accepted without modification**	**Accepted with minor corrections**	**Accepted with major modification**	**Rejected**
	☐	☑	☐	☐

Comments	**Addressed (Y/N)**	**Reply/Action taken**
• For numbers with decimal points, it is better to fixed up to 3 or 4 decimal points only.	Yes. The authors agree to revise this part.	The authors used 3 decimal points in the numeric value in Table 2 and whole manuscript.
• Page 2, paragraph 2: …its limited supply is the main…… →…its limited supply are the main	Yes. The authors agree to revise this part.	The authors revised the sentence: **Original sentence:** The continuous increase of consumer demand for authentic single-origin specialty coffees and its limited supply is the main reason associated with the risk of fraud adulteration [3].

		Revised sentence: The continuous increase of consumer demand for authentic single-origin specialty coffees and its limited supply are the main reason associated with the risk of fraud adulteration [4].
• Page 3: …. and do not need simple sample preparation? → Do you mean that the spectroscopy is tedious in the sample preparation? Because the sentence looks like you want to mention the advantage of spectroscopy	Yes. The authors agree to revise this part.	Yes. The authors want to express the several advantages of using spectroscopy (NIR, mid infrared, NMR and fluorescence spectroscopy). The authors revised the sentence to clearly mention these advantages. **Original sentence:** These spectroscopic methods are attractive, provide accurate quantification, fast measurement, and do not need simple sample preparation. **Revised sentence:** These spectroscopic methods are attractive, provide accurate quantification, fast measurement with very little or no sample preparation.
• Page 3: You mention that no research have been done using this method for Kalosi ground roasted coffee. How about the others type of coffee? If this method have been used for others coffee, how efficient or effective does this techniques works?	Yes. The authors agree to revise this part.	The authors add more explanation about this issue. The authors agree to revise the sentence. The authors added references. **Original sentence:** Regardless, the application of low-cost spectroscopic method based on UV spectroscopy for quantification of adulteration in Indonesian specialty coffee with GIs is limited. Presently, there is no research on the use of UV spectroscopy coupled with chemometrics for ground roasted Kalosi coffee authentication. Therefore, this research aims to determine the possible application of UV spectroscopy and chemometrics

		method to quantify the percentage of adulteration in Kalosi ground roasted coffee. **Revised sentence:** Comparing to other spectroscopic methods (NIR, mid-infrared, NMR and fluorescence spectroscopy) or conventional methods (HPLC and its derivative), spectroscopy in UV region has several advantages: spectrometer in this region is relatively low cost and it is available to most standard laboratories, a green technology without chemical waste during sample extraction and simple in sample preparation. Several qualitative studies have been reported using UV spectroscopy for authentication of Indonesian specialty coffee [14, 30]. However, authentication of Indonesian specialty coffee in the term of quantification of adulterant or degree of adulteration is very limited. Therefore, this research aims to determine the possible application of UV spectroscopy and chemometrics method for ground roasted Kalosi coffee authentication both in qualitative (classify the samples into low, middle and high degree of adulteration) and quantitative studies (quantify the percentage of adulteration in Kalosi ground roasted coffee). This proposed method can be used as a routine analysis for final quality inspection of ground roasted Kalosi coffee before packing. The following references has been added in the manuscript: [14] Suhandy, D.; and Yulia, M. (2017). Peaberry coffee

		discrimination using UV-visible spectroscopy combined with SIMCA and PLS-DA. *International Journal of Food Properties*, 20(sup1), S331–S339. [30] Yulia, M.; and Suhandy, D. (2019). Authentication of organic Lampung robusta ground roasted coffee by UV-visible spectroscopy and PLS-DA method. *Journal of Physics: Conference Series*, 1341, 022006.
• Page 3: Each sample weighed 1 gram …… → please rephrase the whole sentence.	Yes. The authors agree to revise this part.	The authors rephrase the whole sentence: **Original sentence:** Each sample weighed 1 gram and was extracted further distilled and diluted using hot distilled water [6-8]. **Revised sentence:** 1 gram of each sample was weighed and placed in a glass beaker. It was extracted, distilled and diluted using hot distilled water based on sample preparation procedure described in previous works [13-15].
• Page 5: Suhandy et al's→ Suhandy *et al's*	Yes. The authors agree to revise this part.	The authors correct the format: **Original format:** Suhandy et al's **Revised format:** Suhandy *et al's*
• Page 7: Suhandy and Yulia…… → the format for written the reference is wrong. Please check again how to quote the reference.	Yes. The authors agree to revise this part.	The authors have corrected the format for written the reference. **Original sentence:** Previous studies performed by Suhandy and Yulia, showed that UV-

		visible spectroscopy, coupled with PCA, allowed the estimation of authenticity in Indonesian peaberry coffee [7]. **Revised sentence:** Previous studies performed by Suhandy and Yulia [14], showed that UV-visible spectroscopy, coupled with PCA, allowed the estimation of authenticity in Indonesian peaberry coffee.

Reviewer # 5
Reviewer # 6
Reviewer # 7
Reviewer # 8
Reviewer # 9
Reviewer # 10