BUKTI KORESPONDENSI

Judul Artikel:	Optimization of concentration of stevia leaves (Stevia rebaudiana Bert.) and black tea: study on phytochemical composition and antioxidant activity of mixed stevia-black tea solution
Nama Penulis:	**1. Tarsisius Dwi Wibawa Budianta**, 2. Adrianus Rulianto Utomo, 3. Sentot Joko Raharjo
Nama Seminar Internasional:	International Conference on Innovation Technology and Management for Sustainable Agroindustry (ITAMSA)
Penulis Korespondensi:	Tarsisius Dwi Wibawa Budianta
Email Koresponden	tdwiwibawabudianta@ukwms.ac.id

No.	Perihal	Tanggal
1.	Bukti submisi dan penerimaan	22 Juli 2019
2.	Bukti email penerimaan dan acceptance letter	12 Agustus 2019
3.	Bukti email pengiriman makalah	30 September 2019
4.	Bukti email jadwal presentasi	6 Oktober 2019
5.	Bukti email progress submission	10 November 2019
6.	Bukti email reviewed paper	12 November 2019
7.	Bukti email pengiriman revised paper	13 November 2019
8.	Bukti email proof reading	18 Desember 2019
9.	Bukti email document request dan jawaban	20 Desember – 31 Desember 2019
10.	Bukti certificate presenter	22 Januari 2020
11.	Bukti email pre publication checking	2 Februari 2020
12.	Bukti email informasi online publication	23 Juni 2020

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1.	Bukti submisi dan penerimaan	22 Juli 2019

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

ITaMSA 2019 submission

1 pesan

EasyChair <noreply@easychair.org> 22 Juli 2019 15.29
Kepada: "T. Dwi Wibawa Budianta" <tdwiwibawabudianta@ukwms.ac.id>

Dear T. Dwi Wibawa Budianta,

Tarsisius Dwi Wibawa Budianta <tdwiwibawabudianta@ukwms.ac.id> submitted the following
paper to ITaMSA 2019:

Optimization of Concentration of Stevia Leaves (Stevia rebaudiana) and Black Tea: Study on Phytochemical Composition and Antioxidant Activity Of Stevia-Black Tea Beverages
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You are listed as one of the authors of
this paper. To enter the ITaMSA 2019 Web
pages you should visit

https://easychair.org/conferences/?conf=itamsa2019

and enter your EasyChair user name and
password.

If you forgot your user name or password,
please visit

https://easychair.org/account/forgot

and specify tdwiwibawabudianta@ukwms.ac.id as your email address.

Best regards,
EasyChair Messenger.

Please be aware that this is an unmonitored email alias,
so please do not reply to this email.
To contact EasyChair use the EasyChair contact Web page
https://easychair.org/contact

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

ITaMSA 2019 submission 52

1 pesan

ITaMSA 2019 <itamsa2019@easychair.org> 22 Juli 2019 15.29
Kepada: "T. Dwi Wibawa Budianta" <tdwiwibawabudianta@ukwms.ac.id>

Dear authors,

We received your paper:

Authors : T. Dwi Wibawa Budianta and Adrianus Rulianto Utomo
Title : Optimization of Concentration of Stevia Leaves (Stevia rebaudiana) and Black Tea: Study on Phytochemical Composition and Antioxidant Activity Of Stevia-Black Tea Beverages
Number : 52

The paper was submitted by Tarsisius Dwi Wibawa Budianta
<tdwiwibawabudianta@ukwms.ac.id>.

Thank you for submitting to ITaMSA 2019.

Best regards,
EasyChair for ITaMSA 2019.

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2.	Bukti email penerimaan dan acceptance letter	12 Agustus 2019

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

Acceptance Letter ITaMSA 2019_52

1 pesan

ITaMSA 2019 <itamsa2019@easychair.org> 12 Agustus 2019 21.08
Kepada: "T. Dwi Wibawa Budianta" <tdwiwibawabudianta@ukwms.ac.id>

Dear T. Dwi Wibawa Budianta,

We are glad to inform you that your paper:

Number: 52
Title: Optimization of Concentration of Stevia Leaves (Stevia rebaudiana) and Black Tea: Study on Phytochemical Composition and Antioxidant Activity Of Stevia-Black Tea Beverages
Authors: T. Dwi Wibawa Budianta, Adrianus Rulianto Utomo

is accepted for ORAL presentation at the INTERNATIONAL CONFERENCE ON INNOVATION IN TECHNOLOGY AND MANAGEMENT FOR SUSTAINABLE AGROINDUSTRY ITaMSA 2019, to be held on October 9-10, 2019 in IPB International Convention Center, Bogor Indonesia. Please find the acceptance letter to this email.

The deadline of Registration Payment by August 30, 2019.
Payment method: Bank Transfer
Bank Account name: INDAH YULIASIH ATAU ASOSIASI AGROINDUSTRI INDONSIA
Bank Account Number: 0672393483
Bank Name: Bank Negara Indonesia (BNI)
Swift code: BNINIDJA
Branch: BOGOR

Please keep a receipt of payment at Automatic Bank Machine or bank tellers and send the image to itamsa@apps.ipb.ac.id for our record to make an official receipt distributed at the conference reception.

If you have any further queries, please do not hesitate to E-mail us. Your interest in ITaMSA 2019 is very much appreciated. We look forward to meeting you at our conference in October.

Thank you.

Best Regards,
Secretariat of ITaMSA 2019

Acceptance Letter_Paper_52-dikompresi.pdf
76K

2019 ITaMSA

International Conference on Innovation in Technology and Management for Sustainable Agroindustry

Secretariat of ITaMSA 2019
Department of Agroindustrial Technology
Faculty of Agricultural Technology, IPB
Fateta Building 2nd Floor, IPB Dramaga Campus, Bogor 16002, Indonesia
+62 251 8621974
+62 8111187812
itamsa@apps.ipb.ac.id
itamsa.ipb.ac.id

ACCEPTANCE LETTER

T. Dwi Wibawa Budianta, Adrianus Rulianto Utomo
Widya Mandala Catholic, University Surabaya

We are pleased to inform you that your abstract entitled "**Optimization of Concentration of Stevia Leaves (Stevia rebaudiana) and Black Tea: Study on Phytochemical Composition and Antioxidant Activity Of Stevia-Black Tea Beverages**" has been accepted for **ORAL presentation** at the International Conference on Innovation in Technology and Management for Sustainable Agroindustry (ITaMSA) 2019, to be held on October 9-10, 2019 in IPB International Convention Center, Bogor Indonesia.

Please note the following:

1. The committee needs your confirmation that you should submit your full paper to the committee by **September 30, 2019**.
2. Each oral presenter will be scheduled for a total of 15 minutes including discussion session.
3. Each oral or poster presentation will be invited for publication in IOP Conference Series after peer reviewed and approved by the Scientific Board. A set of instructions for the full paper format and the details of registration payment information can be seen at ITaMSA 2019's website (itamsa.ipb.ac.id). **The deadline of early bird registration by August 30, 2019.**
4. All presenters will be responsible for their own travel and accommodation expenses

If you have any further queries, please do not hesitate to E-mail us. Your interest in ITaMSA 2019 is very much appreciated. We look forward to meeting you at our conference in October.

Chairperson,

Dr. Ir. Hartrisari H, DEA

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3.	Bukti email pengiriman makalah	30 September 2019

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

IPaper Opimization of Concentration of Stevia leaves (Stevia rebaudiana Bert.) and Black Tea for Stevia-tea-cacao Based Product Ingridient

1 pesan

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id> 30 September 2019 17.54
Kepada: itamsa@apps.ipb.ac.id
Cc: "T. Dwi Wibawa Budianta" <tdwiwibawabudianta@yahoo.com>

Dear ITAMSA Committee,
Thank you for supporting ...here we send our paper title:
Opimization of Concentration of Stevia leaves (*Stevia rebaudiana* Bert.) and Black Tea for Stevia-tea-cacao Based Product Ingridient
and the receipt fo payment the conference.
We hope my paper can be reviewed as soon as possible, if eligible for this oral presentation.
Thank you,
Regar
Dwi Wibawa

3 lampiran

ITAMSA Receipt_52 kwitansi bukti.pdf
431K

IOP_Paper_Template ITAMSA 52 T Dwi Wibawa Budianta.doc
795K

Opimization of Concentration of Stevia leaves (Stevia rebaudiana Bert.) and Black Tea for Stevia-tea-cacao Based Product Ingridient.pdf
1521K

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

Deadline Full Paper Submission ITaMSA 2019

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id> 30 September 2019 18.23
Kepada: ITaMSA 2019 <itamsa2019@easychair.org>

Dear Secretariat ITAMSA 2019
..I'm so sorry. I will send the revised paper now...
Thank you
Best Regard
Dwi Wibawa
[Kutipan teks disembunyikan]

REVISED IOP_Paper_Template ITAMSA 52 T Dwi Wibawa Budianta.doc
792K

.

4.	Bukti email jadwal presentasi	6 Oktober 2019

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

Presentation Guidelines and Schedule of Parallel Session

1 pesan

ITaMSA 2019 <itamsa2019@easychair.org> 6 Oktober 2019 20.23
Kepada: "T. Dwi Wibawa Budianta" <tdwiwibawabudianta@ukwms.ac.id>

Dear T. Dwi Wibawa Budianta,

Attached you can find our presentation guidelines. Please visit our website itamsa.ipb.ac.id at page DOWNLOAD to find your schedule of parallel session.

If you have any further queries, please do not hesitate to E-mail us. Your interest in ITaMSA 2019 is very much appreciated. We look forward to meeting you at our conference.

Thank you.

Best Regards,
Secretariat of ITaMSA 2019

Presentation Guidelines_191006-min.pdf
15K

PRESENTATION GUIDELINES

- Please submit your presentation at the registration desk at least one hour (1 hr) before your presentation.
- To clearly identify your presentation, please save it with your name and paper number as part of the file name i.e.Ono Suparno (TRA. B-01).ppt.
- Please ensure your first slide is a title slide stating - your name, presentation title and affiliation.
- Please choose the "On screen show" output within the "slide set up" menu when creating your presentation: this option will be checked by the preview technician and may alter the formatting or layout of your slides.
- Video files used in the presentation should be saved to the same storage media as the main .ppt file.
- Slides are easier to read when there is a high contrast between the text and the background.
- Line graphs and simple drawings are more effective than tables of figures.
- The slides must be well-adjusted within the time duration of allocated time of each individual, 10 min for presentation and 10 min for discussion (Parallel).
- Keep slide transitions simple and consistent.

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5.	Bukti email progress submission	10 November 2019

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

PROGRESS - Submission 52

1 pesan

ITaMSA 2019 <itamsa2019@easychair.org> 10 November 2019 04.12
Kepada: "T. Dwi Wibawa Budianta" <tdwiwibawabudianta@ukwms.ac.id>

Dear Authors,

We would like to inform you that your paper entitled "Optimization of Concentration of Stevia Leaves (Stevia rebaudiana) and Black Tea: Study on Phytochemical Composition and Antioxidant Activity Of Stevia-Black Tea Beverages" now is still being reviewed by the reviewers.

Should you have any inquiries, please do not hesitate to contact us.

Thank you for your contribution to the
ITaMSA 2019.

Warmest Greetings,

Paper Committee
ITaMSA 2019

.

6.	Bukti email reviewed paper	12 November 2019

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

REVIEWED PAPER - Submission 52

itamsa 2019 <itamsa@apps.ipb.ac.id> 12 November 2019 04.05
Kepada: "Ir. T. Dwi Wibawa Budianta , MT." <tdwiwibawabudianta@ukwms.ac.id>

Dear Authors,

We would like to inform you that your paper entitled " Optimization of Concentration of Stevia Leaves (Stevia rebaudiana) and Black Tea: Study on Phytochemical Composition and Antioxidant Activity Of Stevia-Black Tea Beverages" has been reviewed by the reviewer.

For this reason, we hope that you can revise your paper and submit it before November 18th, 2019.

Please find the reviewer's comments on your paper in the attachment file.
Thank you.

Regards,

Paper Committee
ITaMSA 2019

No 52 FORM REVIEWER COMMENTS FOR PAPER.docx
24K

REVIEWER COMMENTS FOR PAPER

Submission Number : 52

Title : Optimization of concentration of stevia leaves (Stevia rebaudiana Bert.) and black tea: study on phytochemical composition and antioxidant activity of mixed stevia-black tea

*Give the checklist (√) to suitable assessment below:

General Assessment	Poor (Score = 1)	Fair (Score = 2)	Good (Score = 3)	Excellent (Score = 4)
Originality of the paper		2		
Quality of the paper		2		
Completeness of the paper		2		
Clarification of the paper		2		
Applied value of the paper			3	
Sub Total Score				
Average Score	2.2			

Specification Evaluation	*Yes	*No	Comments
Is the title appropriate?		V	The title is about concentration both materials to produce good characteristic of product, however, in the conclusion does not mention on those concentration
Is the topic appropriate?	V		
Is the abstract gives a clear introduction?	V		
Is the grammar correctly used?	V		
Is the table and figure properly used?	V		
Should material be added or removed?			ADD more sentences to fit with aims of research
Is the procedures, methods and data analysis appropriate?	V		
Is the reference appropriate?	V		

Final Decision for the Paper	*Accept	*Reject	*Accept(need revision)
			V

Comments:

the conclusion should match with the aims of the research

the best concentration of black tea and stevia should be mentioned

Notes:

Acceptance limit:

Accepted = Average Score >2.5

Revision = 1 ≤ Average score ≤ 2.5

Rejected = Average Score <1

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7.	Bukti email pengiriman revised paper	13 November 2019

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

REVIEWED PAPER - Submission 52

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id> 13 November 2019 14.18
Kepada: itamsa 2019 <itamsa@apps.ipb.ac.id>, "T. Dwi Wibawa Budianta" <tdwiwibawabudianta@yahoo.com>

Dear Paper Committee
ITaMSA2019

We thank you for information related to our paper.
We try to improve in accordance with the advice and recommendations of reviewers.
For this reason, I kindly send the revised paper in attachment.
We hope that the revision of the paper is in accordance with the advice given.
Regards,

Tarsisius Dwi Wibawa Budianta
Associate Profesor
Study Program of Food Technology, Faculty of Agricultural Technology
Widya Mandala Surabaya Catholic University
Jl. Dinoyo 42-44 Surabaya 60265
+62 315678478 ext 110, 297
+62 81259760889

[Kutipan teks disembunyikan]

2 lampiran

REVISED Itamsa 52 Optimization of Concentration of Stevia leaves.pdf
154K

REVISED Itamsa 52 Optimization of Concentration of Stevia leaves.doc
1030K

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8.	Bukti email proof reading	18 Desember 2019

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

PROOFREADING - Submission 52

1 pesan

ITaMSA 2019 <itamsa2019@easychair.org> 18 Desember 2019 04.41
Kepada: "T. Dwi Wibawa Budianta" <tdwiwibawabudianta@ukwms.ac.id>

Dear Authors,

Thank you for revising the paper in accordance with the reviewer's comment.

Your paper entitled "Optimization of Concentration of Stevia Leaves (Stevia rebaudiana) and Black Tea: Study on Phytochemical Composition and Antioxidant Activity Of Stevia-Black Tea Beverages" now is being proofread as the last step of paper proceeding to IOP.

Should you have any inquiries, please do not hesitate to contact us.

Thank you for your contribution to the
ITaMSA 2019.

Warmest Greetings,

Paper Committee
ITaMSA 2019

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9.	Bukti email document request dan jawaban	20 Desember – 31 Desember 2019

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

DOCUMENT REQUEST - Submission 52

4 pesan

ITaMSA 2019 <itamsa2019@easychair.org> 20 Desember 2019 12.32
Kepada: "T. Dwi Wibawa Budianta" <tdwiwibawabudianta@ukwms.ac.id>

Dear Authors,

We want to inform you that your paper entitled "Optimization of Concentration of Stevia Leaves (Stevia rebaudiana) and Black Tea: Study on Phytochemical Composition and Antioxidant Activity Of Stevia-Black Tea Beverages" has been through the process of proofreading.
The next process that will be done is the final editing.

To simplify the final editing process in accordance with the IOP format, we need your final revision file in Microsoft Word format.

Therefore, we hope that you can send your paper in Ms. Word (.docx) immediately before December 22nd, 2019, via email.

Thank you for your contribution to ITaMSA 2019.

Warmest Greetings,

Paper Committee
ITaMSA 2019

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id> 24 Desember 2019 09.48
Kepada: ITaMSA 2019 <itamsa2019@easychair.org>

Dear ITaMSA Committee, would you like informed me the last IOP Format. I think my last file was the correct one. If I have to changed my paper, I need more time. Thank you.
Regard,

[Kutipan teks disembunyikan]

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itamsa 2019 <itamsa@apps.ipb.ac.id> 29 Desember 2019 08.55
Kepada: "Ir. T. Dwi Wibawa Budianta , MT." <tdwiwibawabudianta@ukwms.ac.id>

Dear Ir. T. Dwi Wibawa Budianta, MT

Your paper was already correct. However, there are some writing formats that has not in accordance with the IOP format, therefore we have to fix that.
We are glad if you want to fix it by yourself. But, it will be nice if you also send us the docx. file of your paper, so that we can check and fix the rest.

Please find the attached file you requested.

Thank you for your understanding.
[Kutipan teks disembunyikan]
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Best Regards,

Committee
ITaMSA 2019

3 lampiran

JPCSA4Template.docx
23K

JPCSWordTemplateGuidelines.doc
159K

JPCSExampleWordDocument.docx
535K

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id> 31 Desember 2019 10.17
Kepada: itamsa 2019 <itamsa@apps.ipb.ac.id>

Thank you for your information. I try to correct my paper (as 2 file attachment). I hope the committee will fix the paper so eligible to published it.

Regards,
Tarsisius Dwi Wibawa Budianta
Associate Profesor
Study Program of Food Technology, Faculty of Agricultural Technology
Widya Mandala Surabaya Catholic University
Jl. Dinoyo 42-44 Surabaya 60265
+62 315678478 ext 110, 297
+62 81259760889

[Kutipan teks disembunyikan]

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2 lampiran

REVISED Itamsa 52 Optimization of Concentration of Stevia leaves-1.doc
1023K

REVISED Itamsa 52 Optimization of Concentration of Stevia leaves-1.pdf
866K

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10.	Bukti certificate presenter	22 Januari 2020

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

CERTIFICATE OF PRESENTER

1 pesan

itamsa 2019 <itamsa@apps.ipb.ac.id> 22 Januari 2020 11.24
Kepada: "Ir. T. Dwi Wibawa Budianta , MT." <tdwiwibawabudianta@ukwms.ac.id>

Dear Author,

Please find the attached link of your certificate of presenter.

Link: https://drive.google.com/open?id=1w41tTk8hggjV5eiTK9I0wDQBkJfK531V

Thank you for your contribution to ITaMSA 2019.

--
Best Regards,

Committee
ITaMSA 2019

2019 ITaMSA

Certificate

This certificate is presented to

TARSISIUS DWI WIBAWA

as

PRESENTER

INTERNATIONAL CONFERENCE ON INNOVATION IN TECHNOLOGY AND MANAGEMENT FOR SUSTAINABLE AGROINDUSTRY

9th - 10th October 2019

IPB International Convention Center, Bogor, West Java - Indonesia

Head of Indonesian Agroindusrty Association (AGRIN)

Prof. Dr. Anas Miftah Fauzi

Head of Department of Agroindustrial Technology IPB

Prof. Dr. Ir. Suprihatin

Organized by : IPB University Bogor Indonesia; Asosiasi Agroindustri Indonesia, Indonesian Agroindustry Association

Supported by : Ristekdikti; Perhimpunan Insinyur Indonesia Industri Pertanian

Sponsored by : Sania; Corinthian Industries (Indonesia), Part of the JELD-WEN family; Multi Buana Group, Dedicated to Excellence and Innovation; BLST, PT. Bogor Life Science and Technology, Holding Company of IPB

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11.	Bukti email pre publication checking	2 Februari 2020

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

PRE-PUBLICATION CHECKING - Submission 52

itamsa 2019 <itamsa@apps.ipb.ac.id> 2 Februari 2020 20.57
Kepada: "Ir. T. Dwi Wibawa Budianta , MT." <tdwiwibawabudianta@ukwms.ac.id>

Dear Author,

Your Work entitled
Optimization of concentration of stevia leaves (*Stevia rebaudiana* Bert.) and black tea: study on phytochemical composition and antioxidant activity of mixed stevia-black tea solution
has been successfully submitted online to the IOP Publishing Ltd on January, 31st 2020.

The next steps are the pre-publication checking and approval of the proceedings.

It needs 3 weeks for Publisher (IOP Publishing Ltd.) to process the Work. It is extremely important that the Organiser (ITaMSA 2019) carefully check the Work at this time and inform the Publisher of any corrections or amendments that may be required.
In this case, we need your cooperation to re-check the work that has been proofread and edited according to IOP guidelines.

Post-publication changes should be avoided wherever possible because these can be time-consuming and costly.

Hereby we attach the Work that has been submitted to IOP with a new submission number.

Thank you for your contribution to ITaMSA 2019.

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Best Regards,

Committee
ITaMSA 2019

10_ITAMSA 2019.pdf
787K

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12.	Bukti email informasi online publication	23 Juni 2020

Gmail

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id>

ONLINE PUBLICATION - ITaMSA 2019

2 pesan

itamsa 2019 <itamsa@apps.ipb.ac.id> 23 Juni 2020 22.08
Kepada: "Ir. T. Dwi Wibawa Budianta , MT." <tdwiwibawabudianta@ukwms.ac.id>

Dear Authors,

Your paper entitled "Optimization of concentration of stevia leaves (Stevia rebaudiana Bert.) and black tea: study on phytochemical composition and antioxidant activity of mixed stevia-black tea solution" has been published online officially at the IOP Conference Series: Earth and Environmental Science: Volume 472.

Paper can be seen at the following link:
https://iopscience.iop.org/issue/1755-1315/472/1

Please note that any post-publication changes may be charged for.

Should you have any inquiries, please don't hesitate to contact us.

Thank you for your cooperation.

--
Best Regards,

Committee
ITaMSA 2019

Ir. T. Dwi Wibawa Budianta , MT. <tdwiwibawabudianta@ukwms.ac.id> 24 Juni 2020 16.02
Kepada: "T. Dwi Wibawa Budianta" <tdwiwibawabudianta@yahoo.com>, Sentot Joko Raharjo <sentotjoko@yahoo.co.id>, rulianto@ukwms.ac.id

Tarsisius Dwi Wibawa Budianta
Associate Profesor
Study Program of Food Technology, Faculty of Agricultural Technology
Widya Mandala Surabaya Catholic University
Jl. Dinoyo 42-44 Surabaya 60265
+62 315678478 ext 110, 297
+62 81259760889

[Kutipan teks disembunyikan]

Optimization of concentration of stevia leaves (*Stevia rebaudiana* Bert.) and black tea: study on phytochemical composition and antioxidant activity of mixed stevia-black tea solution

Optimization of concentration of stevia leaves (*Stevia rebaudiana* Bert.) and black tea: study on phytochemical composition and antioxidant activity of mixed stevia-black tea solution

T D W Budianta[1.2], A R Utomo[1] and S J Raharjo[3]

[1]Study Program of Food Technology, Faculty of Agricultural Technology, Widya Mandala Catholic University Surabaya, Jl. Dinoyo 42-44, Surabaya, 60265, Indonesia
[2]Study Program of Engineer Profession Program, Widya Mandala Catholic University Surabaya,
[3]Academic Pharmacy and Food Analyst Putra Indonesia Malang, Malang, East Java, Indonesia

E-mail: tdwiwibawabudianta@ukwms.ac.id[1]

Abstract. Tea is used as an ingredient used every day in the diet of Indonesian people, with many health benefits of tea including one as an anti-diabetes compound; while stevia is a natural sweetener to replace sugar. Both ingredients are expected to produce a synergy function as antidiabetic and antioxidant compounds. This study aims to find out how to combine black tea and stevia which both have high activity. This mixture was prepared as a basic ingredient for making stevia-blacktea-cocoa candy. The experimental design for the optimization of phenol content and antioxidant activity (DPPH free radical scavenging) in the process of mixing stevia-black tea was carried out using the Response Surface Method (RSM), a central composite with 2 factors, 1 replication, a total run order of 13, axial point 4, α = 1.414421. Dry stevia tea mixture - black tea leaves are brewed with boiling water (93 ± 2°C, 3 ± 0.5 minutes). From the experiment, it is concluded that after optimization, the highest result acquired is from a mixture of stevia 0.4446% (w/v) and black tea 0.3427% (w/v) with the results of a total phenol value of 326.3626 mgGAE/L sample and a DPPH of 64.5157 mgGAE/L sample.

1. Introduction

Products that contain antioxidants and anti-diabetic properties are now sought after, due to health considerations, especially prevention of diabetes mellitus. Ingredients that are widely used include tea, cocoa, and natural sweetener stevia. Many benefits of tea have been studied and reported, among others, as immunomodulator, antigenotoxic, against cardiovascular diseases, cancer prevention, chemoprevention of prostate cancer, hepatoprotective properties, anti obesity, antibacterial and antiviral properties, antidiabetic *etc*, so that tea is classified as a product that has protective effects for human health [1]. In 2003 the antioxidant activity of green tea, oolong tea and black tea [2] was investigated with the results of the antioxidant properties of various types of tea not significantly different. A study on the differences in hypolipidemic properties and growth-suppressive effects of

Oolong, Black, Pu-erh, and Green Tea Leaves in rats by Kuo *et. al.* [3] with the result that partially or completely fermented tea was found to be more effective on the effects of growth -suppressive and hypolipidemic compared to green tea. Cao stated that tea has antidiabetic, antiobesity, and anti-inflammatory activity in animal models, but the molecular mechanism of this effect is not fully understood [4]. Research on the effect of green tea extract and black tea on glucose control in adults with type 2 diabetes mellitus [5], there is no difference in the effect of both on glucose control. From the research of Nishiumi [6] found the ability of green tea and black tea in suppressing hyperglycemia and insulin resistance. Researchers from Sri Lanka in 2011 found hypoglycemic, antihyperglycemic, and antidiabetic activities of black tea in broken orange pekoe fanning grade (BOPF) black tea [7]. The effect of brewing time on catechin composition and antioxidant activity has been investigated by Koch [8]. In 2019 research has been carried out to look at the antioxidant activity and main chemical components of tea fermentation [9].

While stevia is used as a sweetener, plants or its derivatives are used in several countries including Japan, China, Russia, Korea, Paraguay, Ecuador, Argentina, Indonesia, Malaysia, Australia, New Zealand and Mexico as treatments for hypertension, obesity or skin disorders [10]. In this case, there are important biological properties of the Stevia rebaudiana plant, among which are its anti-cariogenic capacity, antineoplastic and antihyperglycemic [11], hypoglycaemic and hypolipidaemic [12]. Both ingredients, tea, and stevia have high antioxidants, and maybe have a synergy effect. Before utilizing the two mixtures for the manufacture of tea-stevia-cacao-based products, a study was conducted on the combination of tea and stevia both to obtain high antioxidant activity values. Both ingredients were expected to produce a synergy function as antidiabetic and antioxidant compounds. This study aims to find out how to combine black tea and stevia which both have high antioxidant activity.

2. Methods

The study was conducted with qualitative and quantitative tests. To determine the phytochemical composition of the mixture of the two materials qualitative phytochemical tests were used [13], based on 0,5% black tea, and stevia 0% up to 0.37% (w/v). For data optimization, RSM testing using the total phenol and antioxidant activity or the ability to counteract the DPPH free radical compound (diphenyl-2-picrylhydrazine) was carried out quantitatively. The experimental design for the optimization of phenol content and antioxidant activity (DPPH free radical scavenging) in the process of mixing stevia-black tea was carried out using the Response Surface Method (RSM), a central composite with 2 factors, 1 replication, a total run order of 13, axial point 4, $\alpha = 1.414421$. Dry stevia - black tea leaves mixture brewed with boiling water (93 ± 2 ° C, 3 ± 0.5 minute).

The total phenol from stevia and black tea leaf steeping was determined by the spectrometry method [14]. A sample (1,000 mg / L) of 1 mL was added with 4 mL of sodium carbonate solution (75 g / L) and then shaken. Folin-Ciocalteu Phenol reagent as much as 0.2 mL was added and shaken again. After homogeneous, distilled water up to a volume of 10 mL was added and shaken again. The mixture is left at room temperature for 1 hour. Then the mixture was filtered with Whatman paper No. 42 and the absorbance of the supernatant were measured at $\lambda = 760$ nm. Total phenol was determined using gallic acid solution. The results obtained are expressed as gallic acid equivalents (GAE). As for determining the antioxidant activity of counteracting DPPH free radical compounds was carried out according to the procedure of Astadi [15]. This method aims to determine the ability of extract material to capture DPPH radicals, in this case, the ability of the extract to donate hydrogen atoms to DPPH radicals so that it becomes non radical. This ability was characterized by a DPPH color change from purple to yellow. This change was measured in absorbance at λ 516 nm. To interpret the data, the calculation of the percentage of DPPH radical capture is obtained, this interpretation was called the percent radical scavenging capacity. Data for the phytochemical composition are shown in the table, while for the total phenol and DPPH tested are included in the Design of Experiment-Response Surface Method (RSM) using Minitab 16. The design of the study used was the Central Composite Response Surface Methods with two factors: stevia leaves (% w/v) and black tea concentration (% w/v). Design factors were processed using Minitab 16 software and generate 13 formulations

(treatments) which can be seen in Table 1. The parameters tested were total phenol and antioxidant activity by DPPH method.

Table 1. Formulation Design Factor for RSM.Minitab 16.

Run Order	Code	*Code*	Stveia % (w/v)	*Black Tea % (w/v)*
1	-1	1	0.1900	0.4445
2	0	1	0.1900	0.1900
3	-1	1	0.0000	0.1900
4	1	1	0.0100	0.3700
5	0	1	0.1900	0.1900
6	1	1	0.3700	0.3700
7	-1	1	0.1900	0.0000
8	1	1	0.0100	0.0100
9	-1	1	0.4445	0.1900
10	0	1	0.1900	0.1900
11	0	1	0.1900	0.1900
12	0	1	0.1900	0.1900
13	1	1	0.3700	0.0100

3. Result and discussions

From the experiments, with qualitative testing to see the phytochemical components of the stevia black tea mixture obtained the results as in Table 2.

Table 2. Phytochemical compound of brewed black tea-stevia.

Compound	0%	0.05%	0.13%	0.21%	0.29%	0.37%
Alkaloid	+9	+4	+5	+6	+6	+7
Flavonoid	+7	+8	+8	+8	+9	+10
Phenolic	+3	+4	+6	+6	+6	+7
Triterpenoid	-	-	-	-	-	-
Sterol	-	-	-	-	-	-
Saponin	+8	+6	+6	+8	+7	+8
Tannin	+1	+2	+1	+1	+1	+1
Cardiac glycoside	+5	+5	+6	+6	+7	+8

Note: + detected based on intensity - non detected based on intensity

The phytochemical compounds test results of black tea with the addition of stevia leaves contain alkaloids, flavonoids, phenolics, saponins, tannins, and cardiac glycosides. In the study, triterpenoid and sterol compounds were not identified because terpenoids and sterols are nonpolar. The higher the intensity value, the stronger the color.

The results of phytochemical testing were used as a basis for further analysis, including determining the nature of the antioxidant activity of the product. A positive (+) value on the test results indicates the product has antioxidant activity, so it is eligible to proceed with further analysis, namely optimization based on the nature of its antioxidant activity.

For optimization purposes, Table 1 is equipped with DPPH and Total Phenol test results, the complete contents of which are listed in the following Table3:

Table 3. Formulation Design Factor for RSM.Minitab 16.

Run Order	Code	*Code*	Stevia % (w/v)	*Black Tea* % (w/v)	*DPPH*	Total Phenol
1	-1	1	0.1900	0.4445	27.25	262.60
2	0	1	0.1900	0.1900	39.27	230.86
3	-1	1	0.0000	0.1900	23.42	208.86
4	1	1	0.0100	0.3700	15.12	250.67
5	0	1	0.1900	0.1900	44.26	221.50
6*	1	1	0.3700	0.3700	60.20*	299.65*
7	-1	1	0.1900	0.0000	0.00	22.37
8	1	1	0.0100	0.0100	23.15	176.87
9	-1	1	0.4445	0.1900	48.06	244.64
10	0	1	0.1900	0.1900	46.26	221.50
11	0	1	0.1900	0.1900	41.08	112.45
12	0	1	0.1900	0.1900	40.05	211.70
13	1	1	0.3700	0.0100	44.25	245.43

From the table above it is known that the sixth treatment produced the highest values for both DPPH and total phenol. Table 2 was used as input in the RSM program. For testing using RSM Minitab 16, the results depicted are shown in Figure 1A, Figure 1B, 1C, and 1D.

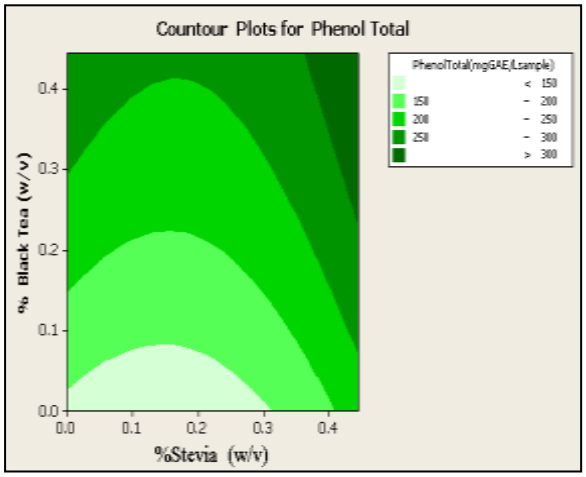

Figure 1A. Countour plot of total phenol.

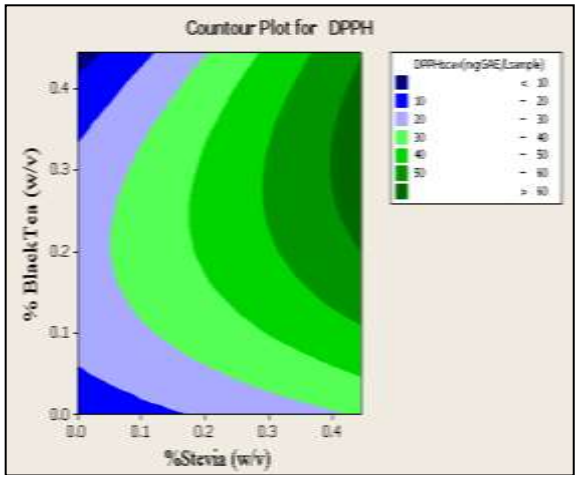

Figure 1B. Countour plot of DPPH.

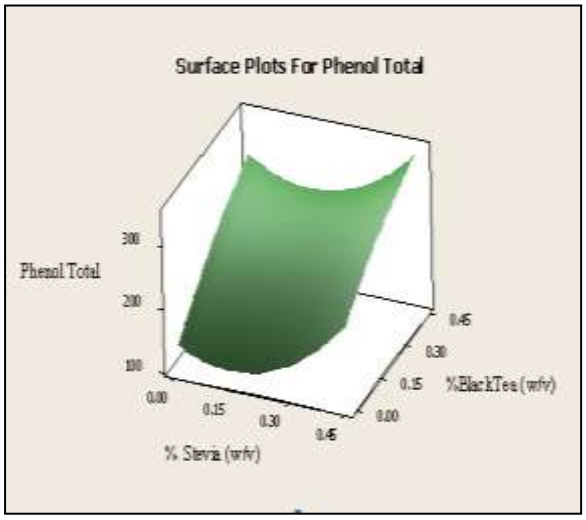

Figure 1C. Total phenol surface plot.

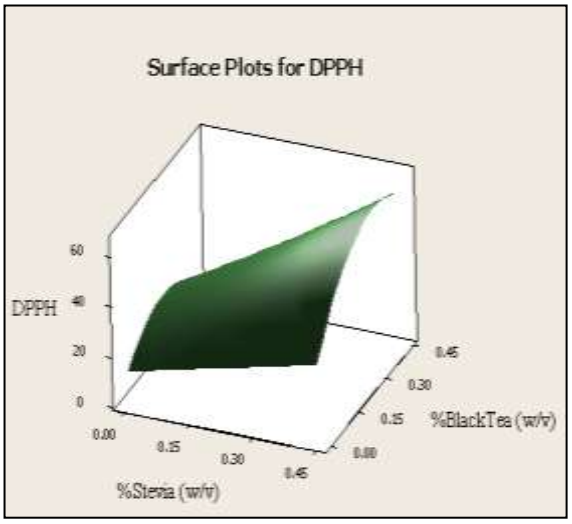

Figure 1D. DPPH surface plot.

The figure above shows the tendency that the increase in concentration between black tea and stevia, causing the same increase between DPPH and Phenol and it can be seen from Figure 1C and Figure 1D which have the same surface plot tendency. Apparently, the direction of the increase in DPPH that was different from the increase in phenol can be seen from Figure 1A and Figure 1B, so even though the effects of both were the same, the contour was different.

After optimization was done to find the maximum value, it was known that the maximum result of stevia mixing of 0.4446% with black tea of 0.3427% obtained a total phenol of 326.3626 mgGAE/L and a DPPH of 64.5157 mgGAE/L (Figure 2). These results indicate that the highest concentration of the treatment before being optimized was the 6th treatment (stevia concentration 0.37% (w/v) and black tea 0.37% (w/v)) which gives a total phenol value of 299.65 mgGAE/L and DPPH of 60.20 mgGAE/L, changing after optimization which gives the highest results was a mixture of stevia with a concentration of 0.4446% (w/v) and black tea with a concentration of 0.3427% (w/v) with the results of a total phenol value of 326.3626 mgGAE/L and a DPPH of 64.5157 mgGAE/L. From the results of the optimization, it appears that there has been a change in the treatment that gives maximum results after optimization. From the original treatment with stevia which was originally 0.37% increased to 0.4446%, and for black tea which was originally 0.37% decreased to 0.3427%.

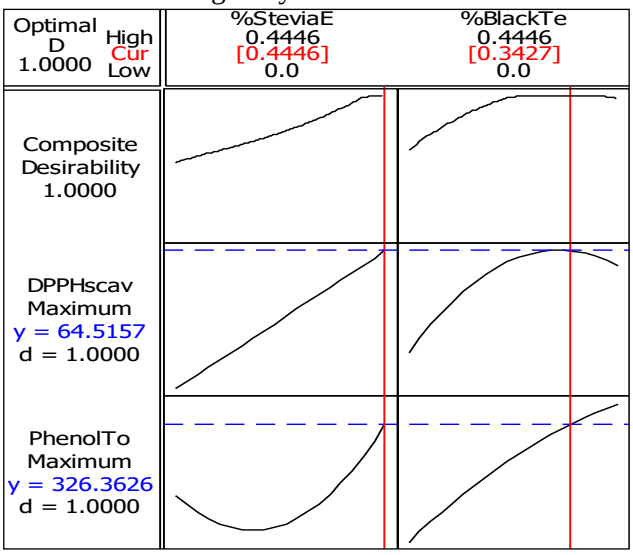

Figure 2. Optimization result.

The response surface regression result for this experiment as in Appendix. From the optimization process, the equation regression for DPPH was:

$[DPPH]=40.160+13.3375[S]+7.04248[B]+0.0921[S]^2 -10.8369[B]^2+ 5.9950\ [S][B]$

R-SQ: 70.81%

And the equation regression for Total Phenol was:

$[TP]=190.506+15.803[S]+59.318[B]+ 37.702\ [S]^2 – 8.806\ [B]^2 – 4.895\ [S][B]$

R-sq: 55.68%

Which,

[DPPH]: value of DPPH

[TP]: value of Total Phenol

[S]: concentration of Stevia (%w/v)

[B]: concentration of Black tea (%w/v)

For further use, it is still necessary to consider the sensory aspects of the mixture of the two ingredients, to what mix can be accepted by consumers. However, the use of tea and stevia for tea-stevia-cacao based products can still be continued, given their high antioxidant activity.

4. Conclusion

The highest value of the experimental results is obtained from a mixture of stevia with a concentration of 0.37% (w/v) and black tea with a concentration of 0.37% (w/v), which gives a total phenol value of 299.65 mgGAE/L and a DPPH of 60.20 mgGAE/L. After optimization which gives the highest results was a mixture of stevia with a concentration of 0.4446% (w/v) and black tea with a concentration of 0.3427% (w/v) with the results of a total phenol value of 326.3626 mgGAE/L and a DPPH of 64.5157 mgGAE/L, respectively.

5. Appendices

Response Surface Regression: DPPHscav(mgG versus %SteviaExtra, %BlackTea (w

The analysis was done using coded units.

Estimated Regression Coefficients for DPPH scav(mg GAE/L sample)

Term	Coef	SE Coef	T	P
Constant	40.1160	4.981	8.053	0.000
%SteviaExtract (w/v)	13.3375	4.421	3.017	0.019
%BlackTea (w/v)	7.0248	4.421	1.589	0.156
%SteviaExtract (w/v)* %SteviaExtract (w/v)	0.0921	5.097	0.018	0.986
%BlackTea (w/v)*%BlackTea (w/v)	-10.8369	5.097	-2.126	0.071
%SteviaExtract (w/v)*%BlackTea (w/v)	5.9950	5.720	1.048	0.329

S = 11.4400 PRESS = 6721.77

R-Sq = 70.81% R-Sq(pred) = 0.00% R-Sq(adj) = 49.96%

Analysis of Variance for DPPHscav(mg GAE/L sample)

Source	DF	Seq SS	Adj SS	Adj MS
Regression	5	2222.56	2222.56	444.51
Linear	2	1486.71	1541.81	770.91
%SteviaExtract (w/v)	1	1322.92	1191.28	1191.28
%BlackTea (w/v)	1	163.79	330.47	330.47
Square	2	592.09	592.09	296.04
%SteviaExtract (w/v)*%SteviaExtract (w/v)	1	0.48	0.04	0.04
%BlackTea (w/v)*%BlackTea (w/v)	1	591.60	591.60	591.60
Interaction	1	143.76	143.76	143.76
%SteviaExtract (w/v)*%BlackTea (w/v)	1	143.76	143.76	143.76
Residual Error	7	916.11	916.11	130.87
Lack-of-Fit	3	880.92	880.92	293.64

Pure Error	4	35.19	35.19	8.80
Total	12	3138.67		

Source	F	P
Regression	3.40	0.071
Linear	5.89	0.032
%SteviaExtract (w/v)	9.10	0.019
%BlackTea (w/v)	2.53	0.156
Square	2.26	0.175
%SteviaExtract (w/v)*%SteviaExtract (w/v)	0.00	0.986
%BlackTea (w/v)*%BlackTea (w/v)	4.52	0.071
Interaction	1.10	0.329
%SteviaExtract (w/v)*%BlackTea (w/v)	1.10	0.329
Residual Error		
Lack-of-Fit	33.38	0.003
Pure Error		
Total		

Unusual Observations for DPPHscav(mgGAE/Lsample)

Obs	StdOrder	DPPHscav(mgGAE/Lsample)	Fit	SE Fit	Residual	St Resid
7	7	0.000	20.626	7.561	-20.626	-2.40 R
13	2	44.250	29.689	9.643	14.561	2.37 R

R denotes an observation with a large standardized residual.

Estimated Regression Coefficients for DPPHscav(mgGAE/Lsample) using data in uncoded units

Term	Coef
Constant	13.3302
%SteviaExtract (w/v)	37.8612
%BlackTea (w/v)	130.970
%SteviaExtract (w/v)* %SteviaExtract (w/v)	2.84299
%BlackTea (w/v)*%BlackTea (w/v)	-334.472
%SteviaExtract (w/v)*%BlackTea (w/v)	185.031

Response Surface Regression: PhenolTotal(versus %SteviaExtra, %BlackTea (w

The analysis was done using coded units.

Estimated Regression Coefficients for PhenolTotal(mgGAE/Lsample)

Term	Coef	SE Coef	T	P
Constant	190.506	27.15	7.017	0.000
%SteviaExtract (w/v)	15.803	24.10	0.656	0.533
%BlackTea (w/v)	59.318	24.10	2.462	0.043
%SteviaExtract (w/v)* %SteviaExtract (w/v)	37.702	27.78	1.357	0.217
%BlackTea (w/v)*%BlackTea (w/v)	-8.806	27.78	-0.317	0.761
%SteviaExtract (w/v)*%BlackTea (w/v)	-4.895	31.18	-0.157	0.880

S = 62.3538 PRESS = 145850
R-Sq = 55.68% R-Sq(pred) = 0.00% R-Sq(adj) = 24.02%

Analysis of Variance for PhenolTotal(mgGAE/Lsample)

Source	DF	Seq SS	Adj SS	Adj MS
Regression	5	34186.0	34186.0	6837.2
Linear	2	26652.5	25439.3	12719.7
%SteviaExtract (w/v)	1	3987.4	1672.4	1672.4
%BlackTea (w/v)	1	22665.1	23563.7	23563.7
Square	2	7437.6	7437.6	3718.8
%SteviaExtract (w/v)*%SteviaExtract (w/v)	1	7047.0	7160.7	7160.7
%BlackTea (w/v)*%BlackTea (w/v)	1	390.6	390.6	390.6
Interaction	1	95.8	95.8	95.8
%SteviaExtract (w/v)*%BlackTea (w/v)	1	95.8	95.8	95.8
Residual Error	7	27216.0	27216.0	3888.0

```
  Lack-of-Fit                                        3  17538.0  17538.0   5846.0
  Pure Error                                         4   9677.9   9677.9   2419.5
Total                                               12  61402.0
Source                                                 F      P
Regression                                          1.76  0.240
  Linear                                            3.27  0.099
    %SteviaExtract (w/v)                            0.43  0.533
    %BlackTea (w/v)                                 6.06  0.043
  Square                                            0.96  0.429
    %SteviaExtract (w/v)*%SteviaExtract (w/v)       1.84  0.217
    %BlackTea (w/v)*%BlackTea (w/v)                 0.10  0.761
  Interaction                                       0.02  0.880
    %SteviaExtract (w/v)*%BlackTea (w/v)            0.02  0.880
Residual Error
  Lack-of-Fit                                       2.42  0.207
  Pure Error
Total
Unusual Observations for PhenolTotal(mgGAE/Lsample)
Obs  StdOrder  PhenolTotal(mgGAE/Lsample)      Fit  SE Fit  Residual  St Resid
  7         7                      22.370  118.081  41.214   -95.711     -2.05
Obs
  7  R
R denotes an observation with a large standardized residual.
Estimated Regression Coefficients for PhenolTotal(mgGAE/Lsample) using data in
     uncoded units
Term                                     Coef
Constant                               137.954
%SteviaExtract (w/v)                  -325.686
%BlackTea (w/v)                        461.528
%SteviaExtract (w/v)*                  1163.65
  %SteviaExtract (w/v)
%BlackTea (w/v)*%BlackTea (w/v)       -271.780
%SteviaExtract (w/v)*%BlackTea (w/v)  -151.080
```

Optimization Plot

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Response Optimization

```
Parameters
              Goal     Lower  Target  Upper  Weight  Import
DPPHscav(mgG  Maximum      0      61     61       1       1
PhenolTotal(  Maximum      0     300    300       1       1

Starting Point
%SteviaExtra   =   0
%BlackTea (w   =   0

Global Solution
%SteviaExtra   =   0.444558
%BlackTea (w   =   0.342656

Predicted Responses
DPPHscav(mgG   =    64.516  ,   desirability =   1.000000
PhenolTotal(   =   326.363  ,   desirability =   1.000000

Composite Desirability = 1.000000
```

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