# LAMPIRAN

**Lampiran 1.** Surat determinasi daun mengkudu

LANSIDA
Herbal Technologi

Yogyakarta, 13 Januari 2025

No. : 164/LHD/01/2025
Hal : Hasil Determinasi

Kepada Yth.
Nur Mulyantini
NIM : 211FF03064
Farmasi Universitas Bhakti Kencana Bandung

Dengan hormat,
Bersama ini disampaikan hasil determinasi tumbuhan sesuai pemintaan sebagai berikut:

| No. | Nama jenis | Nama Lokal |
|---|---|---|
| 1. | *Morinda citrifolia* L. | Mengkudu |

Kunci Determinasi:
1b, 2b, 3b, 4b, 6b, 7b, 9b, 10b, 11b, 12b, 13b, 14b, 16a, ..... Golongan 10 : Tanaman dengan daun tunggal, terletak berhadapan, 239b, 243b, 244b, 248b, 248b, 250b, 266b, 267b, 273b, 276b, 278a, .....Familia : Rubiaceae 1b, 3b, 4b, 5a, ..... Genus 5 : Morinda ..... Spesies : *Morinda citrifolia* L.

Klasifikasi :

| | | |
|---|---|---|
| Kingdom | : | Plantae |
| Super Divisi | : | Spermatophyta |
| Divisi | : | Magnoliophyta |
| Classis | : | Magnoliopsida |
| Sub Classis | : | Asteridae |
| Ordo | : | Rubiales |
| Familia | : | Rubiaceae |
| Genus | : | Morinda |
| Species | : | *Morinda citrifolia* L. |

Demikian semoga berguna bagi saudara.

Divisi Teknik Galenika

LANSIDA Herbal Technology

Apriyani Susilowati, S.Si.

Jl. Karanglo, Bumen KG III/519 Yogyakarta
Telp. 0851 06668808 email: lansida@yahoo.com

**Lampiran 2.** Surat keterangan prosedur ekstraksi dan skrining fitokimia

| LANSIDA jasaekstraksi.com | LEMBAR KERJA EKSTRAKSI<br>LABORATORIUM PENGUJIAN | | |
|---|---|---|---|
| Nama sampel | Daun Mengkudu | Tanggal | 13 Januari 2025 |
| Kode sampel | 250133051 | Metode | Maserasi ;TLC |

**Prosedur ekstraksi :**

1. Petik daun pegagan
2. Cuci pada krain air mengalir.
3. Masukkan kedalam tabung spinner, putar selama 5 menit.
4. Keringkan dalam oven pada suhu 40°C selama 12 jam
5. Giling simplisia kering menggunakan diskmill dengan ayakan 40 mesh
6. Masukkan ke dalam kontainer ekstraktor
7. Tambahkan solvent ethanol 70%
8. Ekstraksikan dengan ultra turax pada kecepatan 1.000 rpm selama 2 jam
9. Maserasikan selama 24 jam
10. Filtrasi dengan corong buchner, sedot dengan mesin vakum
11. Residu diekstraksi ulang seperti diatas
12. Filtrat pertama dan kedua dievaporasi dengan vakum rotary evaporator pada suhu 45°C tekanan vakum
13. Tuang ekstrak ke dalam cawan porselin
14. Uapkan sisa solvent dengan penangas air waterbatch
15. Timbang ekstrak yang diperoleh.
1. mendapat bobot tetap.

**Uji Kualitatif Flavonoid :**

1. Timbang ekstrak sejumlah 50 mg.
2. Masukkan kedalam labu, tambahkan 10 ml asam chlorida 4 N.
3. Hidrolisis/refluk dengan pendingin balik selama 30 menit.
4. Ekstraksi dengan 5 ml dietileter.
5. Ambil fase dietileter, uapkan dengan gas nitrogen
6. Spoting sampel sebanyak 10 µl pada plate silikagel GF254, sertakan pembanding.
7. Masukkan plate ke dalam chamber jenuh fase
8. Eluasikan hingga batas.
9. Keringkan plate, amati di bawah sinar UV 254 nm dan 365 nm.
10. Semprot dengan pereaksi aluminium chloride.

Spray reagent :
1% ethanolic solution of aluminium chloride.

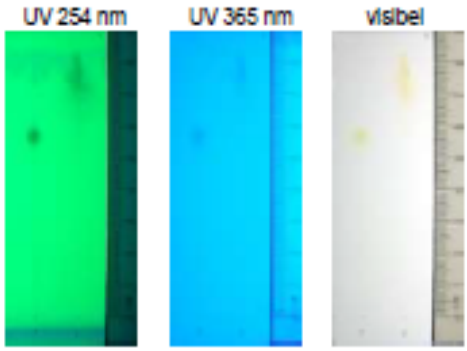
Chemicals:
Aluminium chloride hexahydrate extra pure Ph Eur, USP, Ord. No. 1.01084
Ethanol absolute GR ACS, ISO, Ord. No. 1.00983

Data Ekstraksi :

| | | | |
|---|---|---|---|
| Berat mengkudu segar | : | 6,73 | Kg |
| Berat serbuk | : | 1.502 | g |
| Volume solvent ethanol 70% | : | 15 | L |
| Berat ekstrak | : | 138,7 | g |

**TLC PROFILE**

Sample number : 250133051b
Sample detail : Ekstrak Daun Mengkudu
Analysis : Flavonoid
Adsorbent : Silicagel 60 $F_{254}$ (Al - Sheet)
Mobile Phase : Etil Asetat : Asam Formiat : Asam Asetat : Air (100:11:11:27)
Detection : Aluminium Chloride




Kiri : Comparator Rutin
Kanan : Ekstrak Daun Mengkudu

Warna spot flavonoid di visibel : kuning
Rf. flavonoid terdeteksi : 0,88

**Lampiran 3.** *Certificate of Analysis* ekstrak Daun Mengkudu

LANSIDA

**SERTIFIKAT HASIL UJI**

| | |
|---|---|
| Nomor | : 250133051b |
| Nama Sampel | : Ekstrak Daun Mengkudu (*Morinda citrifolia* L.) |
| Uji | : Kualitatif Flavonoid |
| Metode | : Thin Layer Chromatography |
| Tanggal | : 13 Januari 2025 |
| Permintaan | : Nur Mulyantini |
| NIM | : 211FF03064 |
| Institusi | : Fakultas Farmasi Universitas Bhakti Kencana |

**Hasil Uji**

| Parameter Uji Kualitatif | Hasil Uji | Metode |
|---|---|---|
| Flavonoid | Positif | Thin Layer Chromatography |

Divisi Teknis

LANSIDA

Pradekatiwi, S.Si.

**Lampiran 4.** *Certificate of Analysis Beeswax*

MAKINGCOSMETICS

## Certificate of Analysis

**(Representative Sample Certificate)**

**Product Name:** Bees Wax
**INCI Name:** Cera Alba (Bees Wax)
**CAS Number:** 8012-89-3
**Lot Number:** Not available (data may vary slightly with different lots or batches)
**Expiration Date:** 24 months from production date

| Analytical Tests | Specification | Actual Analysis |
|---|---|---|
| Acid Value (USP Method) | 17.0 - 24.0 | 19.6 |
| Color | White to off-white | White to off-white |
| Ester Value | 72.0 - 79.0 | 72.9 |
| Fats, fatty acids, Japan wax, resin & soap | Passes test | Passes test |
| Melt Point (USP Class II Open Capillary Tube) °C | 62.0 - 65.0 | 62.0 |
| Residual Solvents | Complies | Complies |
| Saponification Cloud Point °C | Maximum 65.0 | 61.6 |

The above data were obtained using the test indicated and is subject to the deviation inherent in the test method. Results may vary under other test methods or conditions.

This report is not to be signed.



MakingCosmetics.com Inc.
35318 SE Center Street, Snoqualmie, WA 98065
Phone 425-292-9502 Fax 425-292-9601 www.makingcosmetics.com

**Lampiran 5.** *Certificate of Analysis Carnauba wax*

**PT. SUMBER BERLIAN KIMIA**
Jl. Pecenongan 82 A, Jakarta Pusat 10120 - Indonesia
Telp : 021-70907717 / 3521349 Fax : 021-3521349
E-mail : sumberberliankimia@gmail.com

## CARNAUBA WAX PELLET

Batch 033-002

Production: 04.09.2017

Re-Test date: 04.09.2027

| Parameter | Test | Specification | Method |
|---|---|---|---|
| Drop point | 79°C | 76 - 82°C | Mettler ( mod ). |
| Acid value | 5 mg KOH/ g | 2 – 10 mg KOH/ g | |
| Saponification value | 37 mg KOH/ g | 35 – 45 mg KOH/ g | |

**Lampiran 6.** *Certificate of Analysis* Tween 80

## CERTIFICATE OF ANALYSIS, QUALITY AND CONFORMITY

| | |
|---|---|
| **Product Name: Tween-80** | |
| **Product Code: CH077** | **Expiry Date : 31/03/2027** |
| **Lot Number: G18-19/Jul/30** | **Release Date: 25/07/2018** |
| **Analytical Report Number: QAD/AR-18/07-682** | **Page No : Page 1 of 1** |

| TESTS CONDUCTED | SPECIFICATIONS | OBSERVATIONS | REMARKS |
|---|---|---|---|
| CAS No. | 9005-65-6 | 9005-65-6 | Complies |
| Chemical Name | Polyoxyethylene sorbitan monooleate; Polysorbate-80; Tween80 | Polyoxyethylene sorbitan monooleate; Polysorbate-80; Tween80 | Complies |
| Appearance | Yellow to amber colored viscous, oily liquid | Yellow to amber colored viscous, oily liquid | Complies |
| Solubility | 1 ml miscible in 1 ml of water | 1 ml miscible in 1 ml of water | Complies |
| Hydroxyl value | 65 - 80 | 75 | Complies |
| Saponification value | 45 - 55 | 45 | Complies |
| Acid value | <=2.0 | <=1.70 | Complies |
| Water (K.F.) | <=3.0% | <=2.78% | Complies |

**Final Results: COMPLIES**

**This is to certify that this lot passes and it conforms to the above mentioned tests and specifications.**

| | | |
|---|---|---|
| **TESTED BY (Pooja Sutar) MICROBIOLOGIST** | **CHECKED BY (Madhavi Sawant) HEAD MICROBIOLOGY** | **APPROVED BY (Rupali Sabale) HEAD QUALITY ASSURANCE** |

**End Of The Report**

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Micromaster laboratories Pvt.Ltd
Manufacturer and Exporter
Unit No.38/39, Kalpataru Industrial Estate .Near Runwal Estate,Behind R Mall,
Ghodbunder Road,Thane (W)-400607,Maharashtra,India
Tel:- +91-22-2589 5505sales@micromasterlab.com

**Lampiran 7.** *Certificate of Analysis olive oil*

24 CHATHAM PLACE, BRIGHTON, BN1 3TN (UK)
TEL. (UK) 0845 310 8066 International Tel. +44 1273 746505
EMAIL: info@nhrorganicoils.com Web Site: www.nhrorganicoils.com

*Certificate of Analysis Sheet*

**Organic Virgin Olive Oil (Olea europea)**

| | | | | | |
|---|---|---|---|---|---|
| Product Name | Organic Virgin Olive Oil FG | | | | |
| Customer | - | | | | |
| Batch | BN270117-6 | Product Code | - | Date | 26/01/2017 |

TEST RESULTS

| ANALYTICAL TEST | SPECIFICATION RANGE | RESULT |
|---|---|---|
| Appearance | Clear liquid natural green | Conforms |
| Odour | Characteristic | Conforms |
| Relative Density @ 20°C (g/ml) | 0.910 – 0.920 | 0.910 |
| Peroxide value (Meq/kg) | ≤ 20.0 | 7.08 *(at time of production analysis)* |
| Free Fatty Acid (% as Oleic) | ≤ 1.5 | 0.187 |
| Acid Value (mgKOH/g) | | 0.372 |
| $K_{232}$ (%) | ≤ 2.5 | 1.22 |
| $K_{270}$ (%) | ≤ 0.22 | 0.14 |
| Cholesterol | ≤ 0.5 | 0.1 |
| Brasicasterol | ≤ 0.1 | < 0.1 |
| Campesterol | ≤ 4.0 | 3.7 |
| Stigmasterol | ≤ Campesterol | 1.1 |
| Beta- Sitosterol | ≥ 93.0 | 94.1 |
| Delta – 7 Stigmasterol | ≤ 0.5 | 0.4 |
| Total Sterols (MG/KG) | > 1000 | Not determined |
| Eritrodial & Uavol (%) | ≤ 4.5 | Not determined |
| Fatty Acid Profile (%) | | |
| C 14:0 Myristic Acid | ≤ 0.05 | 0.01 |
| C 16:0 Palmitic Acid | 7.0 – 12.0 | 10.07 |
| C 16:1 Palmitoleic Acid | ≤ 4.0 | 0.90 |
| C 18:0 Stearic Acid | 0.5 – 5.0 | 4.0 |
| C 18:1 Oleic Acid | 55.0 – 85.0 | 76.7 |
| C 18:2 Linoleic Acid | 3.5 – 21.0 | 6.0 |
| C 18:3 Alpha Linolenic | ≤ 1.0 | 0.60 |
| C 20:0 Arachidic Acid | ≤ 0.6 | 0.0 |
| C 20:1 Eicosenoic Acid | ≤ 1.0 | 0.20 |
| C 22:0 Behenic Acid | ≤ 0.2 | 0.10 |

**Lampiran 8.** *Certificate of Analysis* DMDM *Hyadantoin*

NGUYEN BA TRADING AND MANUFACTURING CO. LTD
947/46/6 Cach Mang Thang 8 Street, Ward 7, Tan Binh District.
Tel: 39490974 – 39771039 – Fax: 39491374
Email:nguyenbachem@hotmail.com – Website: http://nguyenbachem.com

# DMDM Hydantoin

**Chemical name:**

Dimethylol Dimethyl Hydantoin (DMDMH)

**CAS NO:** 6440-58-0

**Trade name:**

Hydantoin, 1,3-bis(hydroxymethyl)-5,5-dimethyl-,1,3-Bis(hydroxymethyl)-5,5-dimethylhydantoin;1,3-dimethylol-5,5-dimethylhydantoin;2,4-Imidazolidinedione, 1,3-bis(hydroxymethyl)-5,5-dimethyl-;Dantoindmdmh 55;Dimethylol-5,5-dimethylhydantoin;DMDM hydantoin;dmdmh;dmdmh 55;Glydant; Nipaguard

**Molecular formula:** C7H12N2O4

**Molecular weight:** 188.2

**Introduction:**
DMDMH isbiocide . The active ingredient provides broad-spectrum activity against common bacteria and fungi. It is approved by EPA and FDA for industrial and cosmetic applications.

**Physical and Chemical Properites:**
Percent Active: 55.0%
Description: Colorless liquid
PH: 6.5-7.5
Stability: Stable for 1 year @ 25 $^{0}$C

**Lampiran 9.** Surat Kode Etik

**KOMISI ETIK PENELITIAN KESEHATAN**
**UNIVERSITAS BHAKTI KENCANA**
Jl. Soekarno - Hatta 754. Bandung
Telp : 022-7830 760 / 022-7830-768
Email : komisi.etik@bku.ac.id

**KOMISI ETIK PENELITIAN KESEHATAN**
*HEALTH RESEARCH ETHICS COMMITTE*
**UNIVERSITAS BHAKTI KENCANA**
*BHAKTI KENCANA UNIVERSITY*

**KETERANGAN LAYAK ETIK**
*DESCRIPTION OF ETHICAL APPROVAL*
**"ETHICAL APPROVAL"**
**146/09.KEPK/UBK/VI/2025**

Protokol penelitian yang diusulkan oleh :
*The research protocol proposed by* :

Peneliti Utama : Nur Mulyantini
*Principal in investigator*

Nama institusi : Bhakti Kencana University
*Name of institution*

Dengan judul :
*Tittle*

**Formulasi Dan Evaluasi Lip Balm Sun Protection Factor (SPF) Ekstrak Daun Mengkudu (Morinda citrifolia L.) Sebagai Tabir Surya**

*Formulation and Evaluation of Lip Balm Sun Protection Factor (SPF) of Noni Leaf Extract (Morinda citrifolia L.) as Sunscreen*

Dinyatakan layak etik sesuai (tujuh) standar WH0 2011, yaitu 1) Nilai Sosial, 2) Nilai Ilmiah, 3) Pemerataan Beban dan Manfaat, dan 4) Risiko, 5) Bujukan atau eksploitasi, 6) Kerahasiaan atau Privacy, 7) Persetujuan Setelah Penjelasan, yang merujuk pada Pedoman CIOMS 2016. Hal ini seperti yang ditunjukan oleh terpenuhnya indikator setiap standar.

*Declared to be ethically approviate in accordance to 7 (seven) WHO 2011standars, 1) Social Value, 2) Scientific Value, 3) Equitable Assessment and Benefits, 4) Risks, 5) Persuasion/Eksploitation, 6) Confidentiality and Privacy, and Informed Concent, referring to the 2016 CIOMS guidelines. This is as indicated by the fulfillment of the indicators of each standards.*

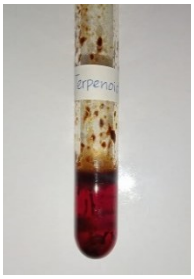
Pernyataan Laik Etik ini berlaku selama kurun waktu 12 Juni 2025 sampai dengan tanggal 12 Juni 2026.

*This declaration of ethics applies during the period 12 th June 2025 until 12 th June 2026.*

12 Juni 2025
Professor and Chairperson

R. Nety Kustikayanti, S.Kp., M.Kep
NIK. 02019010336

**Lampiran 10.** Hasil Skrinning Fitokimia Ekstrak Daun Mengkudu

| Pengujian | Ekstrak Daun Mengkudu | | | |
|---|---|---|---|---|
| | **Pereaksi** | **Hasil** | **Keterangan** | **Gambar** |
| Alkaloid | Reagen dragendorff | + | Terbentuk endapan jingga kecoklatan |  |
| Flavonoid | Serbuk Mg + HCl pekat | + | Terbentuk warna merah bata |  |
| Tannin | $FeCl_3$ 1% | + | Terbentuk warna hijau gelap |  |
| Terpenoid | Asam asetat anhidrat + $H_2SO_4$ pekat | + | Terbentuk warna merah |  |
| Saponin | Aquadest panas + HCl 2N | + | Terbentuk buih yang stabil |  |

**Lampiran 11.** Alat dan bahan

Cawan uap

Batang pengaduk

Beaker glass

Labu ukur

Mortar & stamper

Pipet tetes

Spatel

Tabung reaksi

Penanggas air

Timbangan analitik

Oven

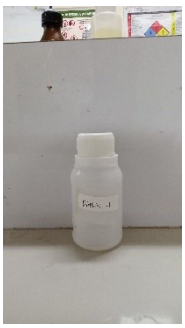
Gelas ukur

*Beeswax*

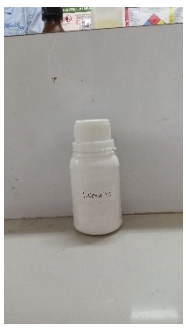
*Carnauba wax*

Olive oil

Gliserin



Dmdm *hydantoin*



tween 80


Ekstrak Daun Mengkudu


Aquadest

Essence Strawberry

**Lampiran 12.** Dokumentasi evaluasi sediaan

**Organoleptis**

Stabilitas *Real time*

Stabilitas *Cycling test*

**Homogenitas**

F0

F1

F2

F3

**pH**

F0

F1

F2

F3

**Titik Lebur**

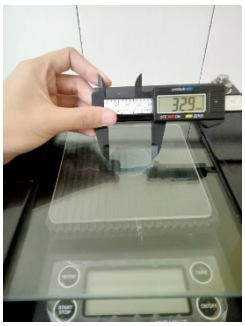

F0

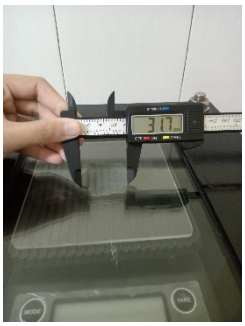

F1

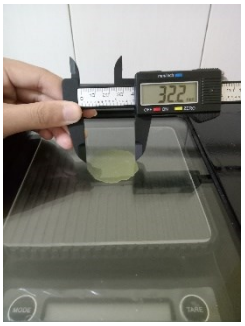

F2

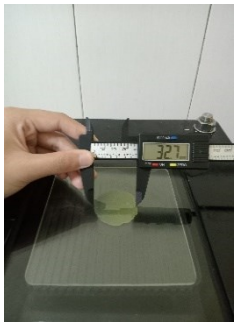

F3

**Daya Sebar**

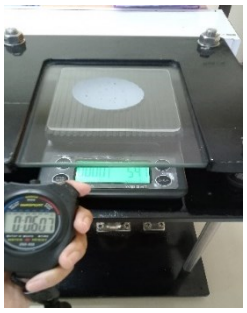

F0


F1


F2


F3

**Daya Lekat**


F0


F1


F2


F3


Stabilitas *Cycling test*


Optimasi Basis

**Lampiran 13.** Hasil Evaluasi stabilitas *realtime* (28 hari)

a. Uji pH

| Formula | Hari ke- | Batch | | | Rata-rata±SD |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| F0 | 0 | 5.73 | 5.62 | 5.67 | 5.67±0.06 |
| | 7 | 5.70 | 5.68 | 5.60 | 5.66±0.05 |
| | 14 | 5.72 | 5.62 | 5.60 | 5.65±0.06 |
| | 21 | 5.65 | 5.55 | 5.59 | 5.60±0.05 |
| | 28 | 5.60 | 5.59 | 5.55 | 5.58±0.03 |
| F1 | 0 | 5.55 | 5.30 | 5.22 | 5.36±0/17 |
| | 7 | 5.52 | 5.24 | 5.19 | 5.32±0.18 |
| | 14 | 5.31 | 5.26 | 5.27 | 5.28±0.03 |
| | 21 | 5.30 | 5.25 | 5.23 | 5.26±0.04 |
| | 28 | 5.32 | 5.24 | 5.20 | 5.25±0.06 |
| F2 | 0 | 5.09 | 5.07 | 5.00 | 5.05±0.05 |
| | 7 | 5.06 | 5.00 | 5.01 | 5.02±0.03 |
| | 14 | 5.00 | 5.02 | 4.99 | 5.00±0.02 |
| | 21 | 4.99 | 5.09 | 4.97 | 5.02±0.06 |
| | 28 | 5.03 | 4.97 | 4.94 | 4.98±0.05 |
| F3 | 0 | 4.89 | 4.81 | 4.97 | 4.89±0.08 |
| | 7 | 4.89 | 4.87 | 4.90 | 4.89±0.02 |
| | 14 | 4.85 | 4.83 | 4.84 | 4.84±0.01 |
| | 21 | 4.81 | 4.75 | 4.85 | 4.80±0.05 |
| | 28 | 4.80 | 4.77 | 4.76 | 4.75±0.02 |

b. Uji titik lebur

| Formula | Hari ke- | Batch | | | Rata-rata±SD |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| F0 | 0 | 54.4 | 54.5 | 54.2 | 54.4±0.15 |
| | 7 | 54.4 | 54.6 | 54.3 | 54.4±0.15 |
| | 14 | 54.5 | 54.4 | 54.6 | 54.5±0.10 |
| | 21 | 54.8 | 54.5 | 54.6 | 54.6±0.15 |
| | 28 | 55.0 | 54.9 | 54.7 | 54.9±0.15 |
| F1 | 0 | 53.3 | 53.1 | 53.0 | 53.1±0.15 |
| | 7 | 53.9 | 53.4 | 53.2 | 53.5±0.26 |
| | 14 | 53.9 | 53.4 | 53.1 | 53.5±0.30 |
| | 21 | 54.0 | 53.6 | 53.4 | 53.7±0.31 |
| | 28 | 54.0 | 53.8 | 53.7 | 53.8±0.15 |
| F2 | 0 | 52.8 | 52.7 | 52.6 | 52.7±0.10 |
| | 7 | 52.9 | 52.6 | 52.8 | 52.8±0.15 |
| | 14 | 53.1 | 52.8 | 52.9 | 52.9±0.15 |
| | 21 | 53.2 | 53.1 | 53.0 | 53.1±0.10 |
| | 28 | 53.1 | 53.5 | 52.8 | 53.1±0.35 |

| | | | | | |
|---|---|---|---|---|---|
| F3 | 0 | 52.0 | 52.2 | 52.1 | 52.1±0.10 |
| | 7 | 52.0 | 52.6 | 52.2 | 52.3±0.15 |
| | 14 | 52.3 | 52.4 | 52.2 | 52.3±0.10 |
| | 21 | 52.2 | 52.4 | 52.5 | 52.4±0.15 |
| | 28 | 52.3 | 52.4 | 52.5 | 52.4±0.10 |

c. Uji daya sebar

| **Formula** | **Hari ke-** | **Batch** | | | **Rata-rata±SD** |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| F0 | 0 | 3.42 | 3.45 | 3.40 | 3.42±0.03 |
| | 7 | 3.38 | 3.37 | 3.35 | 3.37±0.02 |
| | 14 | 3.35 | 3.34 | 3.37 | 3.35±0.02 |
| | 21 | 3.12 | 3.14 | 3.13 | 3.13±0.01 |
| | 28 | 3.09 | 3.11 | 3.10 | 3.10±0.02 |
| F1 | 0 | 3.51 | 3.50 | 3.53 | 3.51±0.02 |
| | 7 | 3.45 | 3.47 | 3.48 | 3.47±0.01 |
| | 14 | 3.40 | 3.41 | 3.42 | 3.41±0.01 |
| | 21 | 3.11 | 3.12 | 3.13 | 3.12±0.02 |
| | 28 | 3.12 | 3.13 | 3.14 | 3.13±0.01 |
| F2 | 0 | 3.55 | 3.52 | 3.47 | 3.51±0.04 |
| | 7 | 3.50 | 3.48 | 3.45 | 3.48±0.03 |
| | 14 | 3.45 | 3.44 | 3.41 | 3.43±0.02 |
| | 21 | 3.14 | 3.15 | 3.16 | 3.15±0.01 |
| | 28 | 3.16 | 3.14 | 3.13 | 3.14±0.02 |
| F3 | 0 | 3.59 | 3.60 | 3.58 | 3.59±0.01 |
| | 7 | 3.54 | 3.59 | 3.56 | 3.56±0.06 |
| | 14 | 3.52 | 3.55 | 3.51 | 3.53±0.02 |
| | 21 | 3.20 | 3.21 | 3.18 | 3.20±0.02 |
| | 28 | 3.15 | 3.18 | 3.17 | 3.17±0.02 |

d. Uji daya lekat

| **Formula** | **Hari ke-** | **Batch** | | | **Rata-rata±SD** |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| F0 | 0 | 20.3 | 20.0 | 19.9 | 20.07±0.21 |
| | 7 | 15.6 | 15.1 | 15.4 | 15.37±0.25 |
| | 14 | 10.9 | 10.7 | 10.8 | 10.80±0.10 |
| | 21 | 10.6 | 10.5 | 10.5 | 10.53±0.06 |
| | 28 | 10.1 | 10.2 | 10.4 | 10.23±0.15 |
| F1 | 0 | 20.9 | 20.9 | 20.8 | 20.87±0.06 |
| | 7 | 15.9 | 16.2 | 16.0 | 16.03±0.15 |
| | 14 | 11.9 | 11.7 | 11.8 | 11.80±0.10 |
| | 21 | 11.2 | 11.3 | 11.1 | 11.20±0.10 |
| | 28 | 10.9 | 10.8 | 10.7 | 10.80±0.10 |
| F2 | 0 | 21.7 | 21.1 | 21.9 | 21.57±0.42 |

| | | | | | |
|---|---|---|---|---|---|
| | 7 | 16.3 | 15.7 | 15.9 | 15.97±0.31 |
| | 14 | 12.2 | 12.6 | 12.5 | 12.43±0.21 |
| | 21 | 12.1 | 12.0 | 12.3 | 12.13±0.15 |
| | 28 | 11.4 | 11.1 | 11.2 | 11.23±0.15 |
| F3 | 0 | 22.4 | 23.1 | 22.9 | 22.80±0.36 |
| | 7 | 16.7 | 16.0 | 16.4 | 16.37±0.35 |
| | 14 | 13.9 | 14.0 | 14.1 | 14.00±0.10 |
| | 21 | 12.7 | 12.9 | 13.1 | 12.90±0.20 |
| | 28 | 12.2 | 12.3 | 12.8 | 12.43±0.32 |

**Lampiran 14.** Hasil Evaluasi stabilitas *cycling test* (6 siklus)

a. Uji pH

| **Formula** | **Siklus ke-** | **Batch** | | | **Rata-Rata±SD** |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| F0 | 1 | 5.73 | 5.68 | 5.67 | 5.69±0.03 |
| | 2 | 5.60 | 5.62 | 5.66 | 5.63±0.03 |
| | 3 | 5.79 | 5.76 | 5.74 | 5.76±0.03 |
| | 4 | 5.60 | 5.52 | 5.51 | 5.54±0.05 |
| | 5 | 5.50 | 5.40 | 5.43 | 5.44±0.05 |
| | 6 | 5.48 | 5.43 | 5.39 | 5.43±0.05 |
| F1 | 1 | 5.31 | 5.26 | 5.27 | 5.28±0.03 |
| | 2 | 5.27 | 5.25 | 5.33 | 5.28±0.04 |
| | 3 | 5.44 | 5.57 | 5.38 | 5.46±0.10 |
| | 4 | 5.39 | 5.20 | 5.27 | 5.29±0.10 |
| | 5 | 4.99 | 4.98 | 4.96 | 4.98±0.02 |
| | 6 | 5.03 | 4.94 | 4.93 | 4.97±0.06 |
| F2 | 1 | 5.09 | 5.07 | 5.23 | 5.13±0.09 |
| | 2 | 4.98 | 4.78 | 5.01 | 4.92±0.13 |
| | 3 | 4.94 | 4.88 | 5.00 | 4.94±0.06 |
| | 4 | 5.19 | 4.72 | 5.10 | 5.00±0.25 |
| | 5 | 4.82 | 4.73 | 4.96 | 4.84±0.12 |
| | 6 | 4.73 | 4.87 | 4.94 | 4.85±0.11 |
| F3 | 1 | 4.92 | 4.94 | 4.97 | 4.94±0.03 |
| | 2 | 4.78 | 4.81 | 4.85 | 4.81±0.04 |
| | 3 | 4.76 | 4.78 | 4.80 | 4.78±0.02 |
| | 4 | 4.73 | 4.74 | 4.78 | 4.75±0.03 |
| | 5 | 4.68 | 4.73 | 4.77 | 4.73±0.05 |
| | 6 | 4.66 | 4.69 | 4.71 | 4.69±0.03 |

b. Uji titik lebur

| **Formula** | **Siklus ke-** | **Batch** | | | **Rata-Rata±SD** |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| F0 | 1 | 55.1 | 54.8 | 54.9 | 54.93±0.15 |

| | | | | | |
|---|---|---|---|---|---|
| | 2 | 54.9 | 54.8 | 54.6 | 54.77±0.15 |
| | 3 | 53.6 | 53.4 | 53.5 | 53.50±0.10 |
| | 4 | 53.4 | 53.1 | 53.3 | 53.27±0.15 |
| | 5 | 53.4 | 53.1 | 53.5 | 53.33±0.21 |
| | 6 | 52.9 | 52.7 | 52.5 | 52.70±0.20 |
| F1 | 1 | 53.9 | 53.6 | 53.4 | 53.63±0.25 |
| | 2 | 53.9 | 53.2 | 52.9 | 53.33±0.51 |
| | 3 | 52.1 | 52.4 | 52.2 | 52.23±0.15 |
| | 4 | 51.9 | 52.0 | 52.1 | 52.00±0.10 |
| | 5 | 51.8 | 51.7 | 52.0 | 51.83±0.15 |
| | 6 | 51.3 | 51.5 | 51.7 | 51.50±0.20 |
| F2 | 1 | 53.4 | 53.1 | 53.3 | 53.27±0.15 |
| | 2 | 53.1 | 52.9 | 52.8 | 52.93±0.15 |
| | 3 | 51.4 | 51.7 | 51.3 | 51.47±0.21 |
| | 4 | 51.1 | 51.5 | 51.0 | 51.20±0.26 |
| | 5 | 50.8 | 50.7 | 50.9 | 50.80±0.10 |
| | 6 | 50.8 | 50.6 | 50.3 | 50.57±0.25 |
| F3 | 1 | 52.3 | 52.2 | 52.0 | 52.17±0.15 |
| | 2 | 52.2 | 52.1 | 52.0 | 52.10±0.10 |
| | 3 | 51.0 | 51.1 | 50.8 | 50.97±0.15 |
| | 4 | 50.9 | 50.6 | 50.8 | 50.77±0.15 |
| | 5 | 50.6 | 50.8 | 50.5 | 50.63±0.15 |
| | 6 | 50.5 | 50.4 | 50.3 | 50.40±0.10 |

c. Uji daya lekat

| **Formula** | **Siklus ke-** | **Batch** | | | **Rata-Rata±SD** |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| F0 | 1 | 3.25 | 3.28 | 3.22 | 3.25±0.03 |
| | 2 | 3.26 | 3.28 | 3.25 | 3.26±0.02 |
| | 3 | 3.30 | 3.28 | 3.30 | 3.29±0.01 |
| | 4 | 3.35 | 3.34 | 3.37 | 3.35±0.02 |
| | 5 | 3.38 | 3.37 | 3.35 | 3.37±0.02 |
| | 6 | 3.42 | 3.45 | 3.40 | 3.42±0.03 |
| F1 | 1 | 3.30 | 3.31 | 3.29 | 3.30±0.01 |
| | 2 | 3.30 | 3.31 | 3.30 | 3.30±0.01 |
| | 3 | 3.35 | 3.38 | 3.34 | 3.36±0.02 |
| | 4 | 3.39 | 3.40 | 3.38 | 3.39±0.01 |
| | 5 | 3.40 | 3.41 | 3.42 | 3.41±0.01 |
| | 6 | 3.45 | 3.47 | 3.48 | 3.47±0.02 |
| F2 | 1 | 3.29 | 3.30 | 3.31 | 3.30±0.01 |
| | 2 | 3.30 | 3.33 | 3.32 | 3.32±0.02 |
| | 3 | 3.35 | 3.33 | 3.34 | 3.34±0.01 |
| | 4 | 3.45 | 3.44 | 3.41 | 3.43±0.02 |
| | 5 | 3.50 | 3.48 | 3.45 | 3.48±0.03 |

| | | | | | |
|---|---|---|---|---|---|
| | 6 | 3.55 | 3.52 | 3.47 | 3.51±0.04 |
| F3 | 1 | 3.33 | 3.36 | 3.34 | 3.34±0.02 |
| | 2 | 3.35 | 3.39 | 3.37 | 3.37±0.02 |
| | 3 | 3.45 | 3.44 | 3.41 | 3.43±0.02 |
| | 4 | 3.52 | 3.55 | 3.51 | 3.53±0.02 |
| | 5 | 3.54 | 3.59 | 3.56 | 3.56±0.03 |
| | 6 | 3.59 | 3.60 | 3.58 | 3.59±0.01 |

d. Uji daya lekat

| **Formula** | **Siklus ke-** | **Batch** | | | **Rata-Rata±SD** |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| F0 | 1 | 9.6 | 9.5 | 9.3 | 9.47±0.15 |
| | 2 | 18.1 | 17.4 | 17.5 | 17.67±0.38 |
| | 3 | 20.2 | 20.0 | 20.4 | 20.20±0.20 |
| | 4 | 20.5 | 20.3 | 20.4 | 20.40±0.10 |
| | 5 | 23.7 | 23.9 | 23.4 | 23.67±0.25 |
| | 6 | 28.1 | 28.2 | 27.8 | 28.03±0.21 |
| F1 | 1 | 5.30 | 5.30 | 5.32 | 5.28±0.06 |
| | 2 | 10.1 | 10.2 | 10.2 | 10.17±0.49 |
| | 3 | 18.3 | 17.4 | 17.5 | 17.73±0.21 |
| | 4 | 20.8 | 20.5 | 20.4 | 20.57±0.10 |
| | 5 | 20.9 | 20.8 | 20.7 | 20.80±0.10 |
| | 6 | 23.7 | 23.9 | 23.8 | 23.80±0.15 |
| F2 | 1 | 28.7 | 28.8 | 29.0 | 28.83±0.10 |
| | 2 | 18.9 | 18.5 | 18.2 | 18.53±0.35 |
| | 3 | 21.0 | 20.9 | 20.8 | 20.90±0.10 |
| | 4 | 21.0 | 21.1 | 21.2 | 21.10±0.10 |
| | 5 | 23.9 | 24.0 | 24.1 | 24.00±0.10 |
| | 6 | 29.2 | 29.5 | 29.0 | 29.23±0.25 |
| F3 | 1 | 11.1 | 11.2 | 11.0 | 11.10±0.11 |
| | 2 | 18.9 | 18.8 | 18.7 | 18.80±0.10 |
| | 3 | 21.5 | 21.7 | 21.8 | 21.67±0.15 |
| | 4 | 22.0 | 21.9 | 21.8 | 21.90±0.10 |
| | 5 | 23.9 | 24.3 | 24.1 | 24.10±0.20 |
| | 6 | 29.3 | 29.5 | 29.6 | 29.47±0.15 |

**Lampiran 15.** Hasil uji SPF ekstrak sebelum diformulasikan

| Formula | PG (nm) | Abs | | | EE x 1 | Abs x (EE x 1) | | | CF | SPF |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | | 1 | 2 | 3 | | |
| Ekstrak 5% | **290** | 4.000 | 4.000 | 4.000 | 0.0150 | 0.0600 | 0.0600 | 0.0600 | **10** | 31.5216 |
| | **295** | 3.904 | 3.905 | 3.902 | 0.0817 | 0.3190 | 0.3190 | 0.3188 | | |
| | **300** | 3.240 | 3.273 | 3.269 | 0.2874 | 0.9312 | 0.9407 | 0.9395 | | |
| | **305** | 3.014 | 3.294 | 3.030 | 0.3278 | 0.9880 | 1.0798 | 0.9932 | | 32.6619 |
| | **310** | 3.012 | 3.119 | 3.085 | 0.1864 | 0.5614 | 0.5814 | 0.5750 | | |
| | **315** | 2.890 | 2.815 | 2.962 | 0.0839 | 0.2425 | 0.2362 | 0.2485 | | |
| | **320** | 2.785 | 2.731 | 2.855 | 0.0180 | 0.0501 | 0.0492 | 0.0514 | | 31.8647 |
| | | | | | | 3.1522 | 3.2662 | 3.1865 | | |
| | $SPF = CF \times \sum_{290}^{320} \text{EE}\ (\lambda)\ \times\ \text{I}\ (\lambda)\ \times\ \text{abs}\ (\lambda)$ | | | | | | | | Rata-Rata | 32.01608 |
| Ekstrak 10% | **290** | 4.000 | 4.000 | 4.000 | 0.0150 | 0.0600 | 0.0600 | 0.0600 | **10** | 35.7351 |
| | **295** | 3.771 | 3.897 | 3.895 | 0.0817 | 0.3081 | 0.3184 | 0.3182 | | |
| | **300** | 3.897 | 3.783 | 3.787 | 0.2874 | 1.1200 | 1.0872 | 1.0884 | | |
| | **305** | 3.414 | 3.466 | 3.222 | 0.3278 | 1.1191 | 1.1362 | 1.0562 | | 35.7265 |
| | **310** | 3.355 | 3.258 | 3.180 | 0.1864 | 0.6254 | 0.6073 | 0.5928 | | |
| | **315** | 3.363 | 3.664 | 3.970 | 0.0839 | 0.2822 | 0.3074 | 0.3331 | | |
| | **320** | 3.266 | 3.121 | 3.266 | 0.0180 | 0.0588 | 0.0562 | 0.0588 | | 35.074 |
| | | | | | | 3.5735 | 3.5727 | 3.5074 | | |
| | $SPF = CF \times \sum_{290}^{320} \text{EE}\ (\lambda)\ \times\ \text{I}\ (\lambda)\ \times\ \text{abs}\ (\lambda)$ | | | | | | | | Rata-Rata | 35.51189 |
| Ekstrak 10% | **290** | 4.000 | 4.000 | 4.000 | 0.0150 | 0.0600 | 0.0600 | 0.0600 | **10** | 39.7458 |
| | **295** | 4.000 | 4.000 | 4.000 | 0.0817 | 0.3268 | 0.3268 | 0.3268 | | |
| | **300** | 4.000 | 4.000 | 4.000 | 0.2874 | 1.1496 | 1.1496 | 1.1496 | | |
| | **305** | 3.978 | 3.969 | 3.896 | 0.3278 | 1.3040 | 1.3010 | 1.2771 | | 39.5117 |
| | **310** | 3.969 | 3.897 | 3.894 | 0.1864 | 0.7398 | 0.7264 | 0.7258 | | |
| | **315** | 3.968 | 3.873 | 3.877 | 0.0839 | 0.3329 | 0.3249 | 0.3253 | | |
| | **320** | 3.414 | 3.466 | 3.484 | 0.0180 | 0.0615 | 0.0624 | 0.0627 | | 39.2734 |
| | | | | | | 3.9746 | 3.9512 | 3.9273 | | |
| | $SPF = CF \times \sum_{290}^{320} \text{EE}\ (\lambda)\ \times\ \text{I}\ (\lambda)\ \times\ \text{abs}\ (\lambda)$ | | | | | | | | Rata-Rata | 39.51031 |

**Lampiran 16.** Hasil uji SPF ekstrak setelah diformulasikan

| Formula | PG (nm) | Abs | | | EE x 1 | Abs x (EE x 1) | | | CF | SPF |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | | 1 | 2 | 3 | | |
| F0 | **290** | 1.070 | 1.077 | 1.092 | 0.0150 | 0.0161 | 0.0162 | 0.0164 | **10** | 4.314972 |
| | **295** | 0.778 | 0.759 | 0.753 | 0.0817 | 0.0636 | 0.0620 | 0.0615 | | |
| | **300** | 0.459 | 0.451 | 0.462 | 0.2874 | 0.1319 | 0.1296 | 0.1328 | | |
| | **305** | 0.367 | 0.386 | 0.356 | 0.3278 | 0.1203 | 0.1265 | 0.1167 | | 4.296917 |
| | **310** | 0.354 | 0.331 | 0.342 | 0.1864 | 0.0660 | 0.0617 | 0.0637 | | |
| | **315** | 0.342 | 0.342 | 0.307 | 0.0839 | 0.0287 | 0.0287 | 0.0258 | | |
| | **320** | 0.277 | 0.277 | 0.310 | 0.0180 | 0.0050 | 0.0050 | 0.0056 | | 4.224618 |
| | | | | | | 0.4315 | 0.4297 | 0.4225 | | |
| | $SPF = CF \times \sum_{290}^{320} \text{EE}\ (\lambda)\ \times\ \text{I}\ (\lambda)\ \times\ \text{abs}\ (\lambda)$ | | | | | | | | Rata-Rata | 4.278835 |
| F1 | **290** | 3.906 | 4.000 | 4.000 | 0.0150 | 0.0586 | 0.0600 | 0.0600 | **10** | 29.4046 |
| | **295** | 3.606 | 3.343 | 3.685 | 0.0817 | 0.2946 | 0.2731 | 0.3011 | | |
| | **300** | 3.088 | 3.159 | 3.047 | 0.2874 | 0.8875 | 0.9079 | 0.8757 | | |
| | **305** | 3.010 | 2.930 | 3.035 | 0.3278 | 0.9867 | 0.9605 | 0.9949 | | 29.0165 |
| | **310** | 2.433 | 2.402 | 2.385 | 0.1864 | 0.4535 | 0.4477 | 0.4446 | | |
| | **315** | 2.558 | 2.495 | 2.541 | 0.0839 | 0.2146 | 0.2093 | 0.2132 | | |
| | **320** | 2.498 | 2.395 | 2.405 | 0.0180 | 0.0450 | 0.0431 | 0.0433 | | 29.3269 |
| | | | | | | 2.9405 | 2.9016 | 2.9327 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| F2 | **290** | 4.000 | 4.000 | 4.000 | 0.0150 | 0.0600 | 0.0600 | 0.0600 | **10** | 31.2553 |
| | **295** | 3.608 | 3.770 | 3.676 | 0.0817 | 0.2948 | 0.3080 | 0.3003 | | |
| | **300** | 3.301 | 3.692 | 3.266 | 0.2874 | 0.9487 | 1.0611 | 0.9386 | | |
| | **305** | 3.147 | 3.692 | 3.202 | 0.3278 | 1.0316 | 1.2060 | 1.0496 | | 34.7885 |
| | **310** | 2.851 | 3.120 | 2.761 | 0.1864 | 0.5314 | 0.5816 | 0.5147 | | |
| | **315** | 2.574 | 2.630 | 2.742 | 0.0839 | 0.2160 | 0.2207 | 0.2301 | | |
| | **320** | 2.393 | 2.309 | 2.717 | 0.0180 | 0.0431 | 0.0416 | 0.0489 | | 31.4222 |
| | | | | | | 3.1255 | 3.4789 | 3.1422 | | |
| | $SPF = CF \times \sum_{290}^{320} \text{EE}\,(\lambda) \times \text{I}\,(\lambda) \times \text{abs}\,(\lambda)$ | | | | | | | | Rata-Rata | 32.4886 |
| F3 | **290** | 4.000 | 4.000 | 4.000 | 0.0150 | 0.0600 | 0.0600 | 0.0600 | **10** | 36.1341 |
| | **295** | 3.895 | 3.897 | 3.898 | 0.0817 | 0.3182 | 0.3184 | 0.3185 | | |
| | **300** | 3.779 | 3.763 | 3.769 | 0.2874 | 1.0861 | 1.0815 | 1.0832 | | |
| | **305** | 3.513 | 3.510 | 3.502 | 0.3278 | 1.1516 | 1.1506 | 1.1480 | | 36.0808 |
| | **310** | 3.491 | 3.497 | 3.485 | 0.1864 | 0.6507 | 0.6518 | 0.6496 | | |
| | **315** | 3.414 | 3.401 | 3.363 | 0.0839 | 0.2864 | 0.2853 | 0.2822 | | |
| | **320** | 3.355 | 3.358 | 3.258 | 0.0180 | 0.0604 | 0.0604 | 0.0586 | | 36.0004 |
| | | | | | | 3.6134 | 3.6081 | 3.6000 | | |
| | $SPF = CF \times \sum_{290}^{320} \text{EE}\,(\lambda) \times \text{I}\,(\lambda) \times \text{abs}\,(\lambda)$ | | | | | | | | Rata-Rata | 36.0717 |
| Pembanding | **290** | 4.000 | 4.000 | 3.880 | 0.0150 | 0.0600 | 0.0600 | 0.0582 | **10** | 30.3390 |
| | **295** | 3.874 | 4.000 | 3.577 | 0.0817 | 0.3165 | 0.3268 | 0.2922 | | |
| | **300** | 3.007 | 3.080 | 3.052 | 0.2874 | 0.8642 | 0.8852 | 0.8771 | | |
| | **305** | 3.088 | 3.000 | 3.026 | 0.3278 | 1.0122 | 0.9834 | 0.9919 | | 30.7344 |
| | **310** | 2.732 | 2.890 | 2.730 | 0.1864 | 0.5092 | 0.5387 | 0.5089 | | |
| | **315** | 2.665 | 2.736 | 2.641 | 0.0839 | 0.2236 | 0.2296 | 0.2216 | | |
| | **320** | 2.672 | 2.767 | 2.636 | 0.0180 | 0.0481 | 0.0498 | 0.0474 | | 29.9741 |
| | | | | | | 3.0339 | 3.0734 | 2.9974 | | |
| | $SPF = CF \times \sum_{290}^{320} \text{EE}\,(\lambda) \times \text{I}\,(\lambda) \times \text{abs}\,(\lambda)$ | | | | | | | | Rata-Rata | 30.3492 |

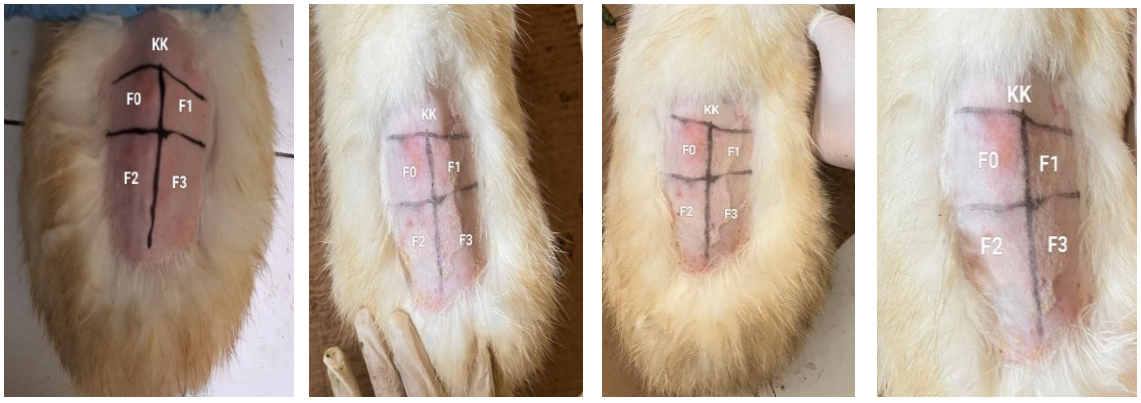
**Lampiran 17.** Hasil Uji Iritasi

| **Waktu** | **Efek Iritasi** | **Kelompok Uji** | | | | |
|---|---|---|---|---|---|---|
| | | **KK** | **F0** | **F1** | **F2** | **F3** |
| Jam ke-24 | Eritema | 0 | 0 | 0 | 0 | 0 |
| | Udema | 0 | 0 | 0 | 0 | 0 |
| Jam ke-48 | Eritema | 0 | 0 | 0 | 1 | 1 |
| | Udema | 0 | 0 | 0 | 0 | 0 |
| Jam ke-72 | Eritema | 0 | 0 | 0 | 0 | 1 |
| | Udema | 0 | 0 | 0 | 0 | 0 |
| **Jumlah eritema** | | 0 | 0 | 0 | 1 | 2 |
| **Jumlah udema** | | 0 | 0 | 0 | 0 | 0 |

Keterangan:

KK = Kelompok kontrol yaitu tidak diberi perlakuan

F0 = Basis *lip balm* tanpa zat aktif
F1 = *Lip balm* dengan ekstrak 5%
F2 = *Lip balm* dengan ekstrak 10%
F3 = *Lip balm* dengan ekstrak 15%




Sebelum pengujian Jam ke-24 Jam ke-48 Jam ke-72

Jumlah pengamatan = jumlah kelinci x waktu pengamatan

Jumlah pengamatan = 1 x 3 = 3

**F0**

- A = $\frac{0}{3} = 0$
- B = $\frac{0}{3} = 0$
- C = jumlah hewan 1
- Indeks iritasi primer = $\frac{0-0}{1} = 0$

**F1**

- A = $\frac{0}{3} = 0$
- B = $\frac{0}{3} = 0$
- C = jumlah hewan 1
- Indeks iritasi primer = $\frac{0-0}{1} = 0$

**F2**

- A = $\frac{1}{3} = 0.33$
- B = $\frac{0}{3} = 0$
- C = jumlah hewan 1
- Indeks iritasi primer = $\frac{0.33-0}{1} = 0.33$

**F3**

- A = $\frac{2}{3}$ = 0.67
- B = $\frac{0}{3}$ = 0
- C = jumlah hewan 1
- Indeks iritasi primer = $\frac{0.67-0}{3}$ = 0.67

Keterangan;
A = Jumlah skor eritema dan udema seluruh titik pengamatan sampel pada jam ke-24, 48 dan 72 dibagi jumlah pengamatan
B = Jumlah skor eritema dan udema seluruh titik pengamatan sampel pada jam ke-24, 48, dan 72 dibagi jumlah pengamatan
C = Jumlah kelinci

**Lampiran 18.** Hasil analisis statistik pengukuran pH *real time*
Normalitas

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Hari_ke | Statistic | df | Sig. | Statistic | df | Sig. |
| Formula_0 | 0 | .191 | 3 | . | .997 | 3 | .900 |
| | 7 | .314 | 3 | . | .893 | 3 | .363 |
| | 14 | .328 | 3 | . | .871 | 3 | .298 |
| | 21 | .219 | 3 | . | .987 | 3 | .780 |
| | 28 | .314 | 3 | . | .893 | 3 | .363 |
| Formula_1 | 0 | .296 | 3 | . | .919 | 3 | .448 |
| | 7 | .333 | 3 | . | .861 | 3 | .269 |
| | 14 | .314 | 3 | . | .893 | 3 | .363 |
| | 21 | .276 | 3 | . | .942 | 3 | .537 |
| | 28 | .253 | 3 | . | .964 | 3 | .637 |
| Formula_2 | 0 | .304 | 3 | . | .907 | 3 | .407 |
| | 7 | .328 | 3 | . | .871 | 3 | .298 |
| | 14 | .253 | 3 | . | .964 | 3 | .637 |
| | 21 | .328 | 3 | . | .871 | 3 | .298 |
| | 28 | .253 | 3 | . | .964 | 3 | .637 |
| Formula_3 | 0 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 7 | .328 | 3 | . | .871 | 3 | .298 |
| | 14 | .219 | 3 | . | .987 | 3 | .780 |
| | 21 | .219 | 3 | . | .987 | 3 | .780 |
| | 28 | .276 | 3 | . | .942 | 3 | .537 |

a. Lilliefors Significance Correction

Homogenitas

**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Formula_0 | Based on Mean | .641 | 4 | 10 | .645 |
| | Based on Median | .175 | 4 | 10 | .946 |

| | | | | | |
|---|---|---|---|---|---|
| | Based on Median and with adjusted df | .175 | 4 | 7.412 | .944 |
| | Based on trimmed mean | .593 | 4 | 10 | .676 |
| Formula_1 | Based on Mean | 4.850 | 4 | 10 | .020 |
| | Based on Median | .784 | 4 | 10 | .561 |
| | Based on Median and with adjusted df | .784 | 4 | 4.446 | .586 |
| | Based on trimmed mean | 4.285 | 4 | 10 | .028 |
| Formula_2 | Based on Mean | 1.956 | 4 | 10 | .178 |
| | Based on Median | .336 | 4 | 10 | .848 |
| | Based on Median and with adjusted df | .336 | 4 | 6.207 | .845 |
| | Based on trimmed mean | 1.742 | 4 | 10 | .217 |
| Formula_3 | Based on Mean | .857 | 4 | 10 | .521 |
| | Based on Median | .709 | 4 | 10 | .604 |
| | Based on Median and with adjusted df | .709 | 4 | 6.743 | .612 |
| | Based on trimmed mean | .851 | 4 | 10 | .524 |

*One Way Anova*

**ANOVA**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Formula_0 | Between Groups | .020 | 4 | .005 | 1.891 | .189 |
| | Within Groups | .026 | 10 | .003 | | |
| | Total | .046 | 14 | | | |
| Formula_1 | Between Groups | .022 | 4 | .006 | .417 | .793 |
| | Within Groups | .134 | 10 | .013 | | |
| | Total | .156 | 14 | | | |
| Formula_2 | Between Groups | .009 | 4 | .002 | 1.118 | .401 |
| | Within Groups | .019 | 10 | .002 | | |
| | Total | .028 | 14 | | | |
| Formula_3 | Between Groups | .044 | 4 | .011 | 4.590 | .023 |
| | Within Groups | .024 | 10 | .002 | | |
| | Total | .067 | 14 | | | |

*Post Hoc test*

**Multiple Comparisons**

Games-Howell

| Dependent Variable | (I) Hari_ke | (J) Hari_ke | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| Formula_0 | 0 | 7 | .01333 | .04410 | .997 | -.1829 | .2095 |
| | | 14 | .02667 | .04888 | .977 | -.1933 | .2466 |
| | | 21 | .07667 | .04308 | .486 | -.1156 | .2690 |
| | | 28 | .09333 | .03528 | .268 | -.0997 | .2864 |
| | 7 | 0 | -.01333 | .04410 | .997 | -.2095 | .1829 |
| | | 14 | .01333 | .04807 | .998 | -.2045 | .2312 |
| | | 21 | .06333 | .04216 | .610 | -.1244 | .2510 |
| | | 28 | .08000 | .03416 | .332 | -.1038 | .2638 |
| | 14 | 0 | -.02667 | .04888 | .977 | -.2466 | .1933 |
| | | 7 | -.01333 | .04807 | .998 | -.2312 | .2045 |
| | | 21 | .05000 | .04714 | .818 | -.1660 | .2660 |
| | | 28 | .06667 | .04014 | .563 | -.1671 | .3004 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 21 | 0 | -.07667 | .04308 | .486 | -.2690 | .1156 |
| | | 7 | -.06333 | .04216 | .610 | -.2510 | .1244 |
| | | 14 | -.05000 | .04714 | .818 | -.2660 | .1660 |
| | | 28 | .01667 | .03283 | .981 | -.1564 | .1897 |
| | 28 | 0 | -.09333 | .03528 | .268 | -.2864 | .0997 |
| | | 7 | -.08000 | .03416 | .332 | -.2638 | .1038 |
| | | 14 | -.06667 | .04014 | .563 | -.3004 | .1671 |
| | | 21 | -.01667 | .03283 | .981 | -.1897 | .1564 |
| Formula_1 | 0 | 7 | .04000 | .14291 | .998 | -.5957 | .6757 |
| | | 14 | .07667 | .10055 | .923 | -.6581 | .8114 |
| | | 21 | .09667 | .10154 | .859 | -.6160 | .8093 |
| | | 28 | .10333 | .10546 | .850 | -.5449 | .7516 |
| | 7 | 0 | -.04000 | .14291 | .998 | -.6757 | .5957 |
| | | 14 | .03667 | .10382 | .994 | -.7243 | .7976 |
| | | 21 | .05667 | .10477 | .974 | -.6826 | .7959 |
| | | 28 | .06333 | .10858 | .967 | -.6114 | .7381 |
| | 14 | 0 | -.07667 | .10055 | .923 | -.8114 | .6581 |
| | | 7 | -.03667 | .10382 | .994 | -.7976 | .7243 |
| | | 21 | .02000 | .02582 | .925 | -.1003 | .1403 |
| | | 28 | .02667 | .03844 | .944 | -.1928 | .2461 |
| | 21 | 0 | -.09667 | .10154 | .859 | -.8093 | .6160 |
| | | 7 | -.05667 | .10477 | .974 | -.7959 | .6826 |
| | | 14 | -.02000 | .02582 | .925 | -.1403 | .1003 |
| | | 28 | .00667 | .04096 | 1.000 | -.1993 | .2126 |
| | 28 | 0 | -.10333 | .10546 | .850 | -.7516 | .5449 |
| | | 7 | -.06333 | .10858 | .967 | -.7381 | .6114 |
| | | 14 | -.02667 | .03844 | .944 | -.2461 | .1928 |
| | | 21 | -.00667 | .04096 | 1.000 | -.2126 | .1993 |
| Formula_2 | 0 | 7 | .03000 | .03300 | .879 | -.1274 | .1874 |
| | | 14 | .05000 | .02867 | .539 | -.1317 | .2317 |
| | | 21 | .03667 | .04607 | .919 | -.1779 | .2512 |
| | | 28 | .07333 | .03801 | .426 | -.0957 | .2424 |
| | 7 | 0 | -.03000 | .03300 | .879 | -.1874 | .1274 |
| | | 14 | .02000 | .02055 | .853 | -.0929 | .1329 |
| | | 21 | .00667 | .04150 | 1.000 | -.2167 | .2300 |
| | | 28 | .04333 | .03232 | .689 | -.1093 | .1960 |
| | 14 | 0 | -.05000 | .02867 | .539 | -.2317 | .1317 |
| | | 7 | -.02000 | .02055 | .853 | -.1329 | .0929 |
| | | 21 | -.01333 | .03815 | .994 | -.2749 | .2482 |
| | | 28 | .02333 | .02789 | .901 | -.1517 | .1984 |
| | 21 | 0 | -.03667 | .04607 | .919 | -.2512 | .1779 |
| | | 7 | -.00667 | .04150 | 1.000 | -.2300 | .2167 |
| | | 14 | .01333 | .03815 | .994 | -.2482 | .2749 |
| | | 28 | .03667 | .04558 | .916 | -.1776 | .2509 |
| | 28 | 0 | -.07333 | .03801 | .426 | -.2424 | .0957 |
| | | 7 | -.04333 | .03232 | .689 | -.1960 | .1093 |
| | | 14 | -.02333 | .02789 | .901 | -.1984 | .1517 |
| | | 21 | -.03667 | .04558 | .916 | -.2509 | .1776 |
| Formula_3 | 0 | 7 | .01333 | .04978 | .998 | -.2792 | .3059 |
| | | 14 | .06333 | .04842 | .714 | -.2461 | .3727 |
| | | 21 | .08667 | .05457 | .578 | -.1810 | .3544 |
| | | 28 | .15000 | .05066 | .219 | -.1346 | .4346 |
| | 7 | 0 | -.01333 | .04978 | .998 | -.3059 | .2792 |
| | | 14 | .05000 | .02357 | .365 | -.0580 | .1580 |
| | | 21 | .07333 | .03448 | .375 | -.0949 | .2415 |
| | | 28 | .13667* | .02789 | .037 | .0118 | .2615 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 14 | 0 | -.06333 | .04842 | .714 | -.3727 | .2461 |
| | | 7 | -.05000 | .02357 | .365 | -.1580 | .0580 |
| | | 21 | .02333 | .03249 | .939 | -.1515 | .1982 |
| | | 28 | .08667 | .02539 | .127 | -.0334 | .2068 |
| | 21 | 0 | -.08667 | .05457 | .578 | -.3544 | .1810 |
| | | 7 | -.07333 | .03448 | .375 | -.2415 | .0949 |
| | | 14 | -.02333 | .03249 | .939 | -.1982 | .1515 |
| | | 28 | .06333 | .03575 | .496 | -.1044 | .2311 |
| | 28 | 0 | -.15000 | .05066 | .219 | -.4346 | .1346 |
| | | 7 | -.13667* | .02789 | .037 | -.2615 | -.0118 |
| | | 14 | -.08667 | .02539 | .127 | -.2068 | .0334 |
| | | 21 | -.06333 | .03575 | .496 | -.2311 | .1044 |

*. The mean difference is significant at the 0.05 level.

**Lampiran 19.** Hasil analisis statistik pengukuran titik lebur *real time*

Normalitas

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Hari_ke | Statistic | df | Sig. | Statistic | df | Sig. |
| Formula_0 | 0 | .253 | 3 | . | .964 | 3 | .637 |
| | 7 | .253 | 3 | . | .964 | 3 | .637 |
| | 14 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 21 | .253 | 3 | . | .964 | 3 | .637 |
| | 28 | .253 | 3 | . | .964 | 3 | .637 |
| Formula_1 | 0 | .253 | 3 | . | .964 | 3 | .637 |
| | 7 | .276 | 3 | . | .942 | 3 | .537 |
| | 14 | .232 | 3 | . | .980 | 3 | .726 |
| | 21 | .253 | 3 | . | .964 | 3 | .637 |
| | 28 | .253 | 3 | . | .964 | 3 | .637 |
| Formula_2 | 0 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 7 | .253 | 3 | . | .964 | 3 | .637 |
| | 14 | .253 | 3 | . | .964 | 3 | .637 |
| | 21 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 28 | .204 | 3 | . | .993 | 3 | .843 |
| Formula_3 | 0 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 7 | .253 | 3 | . | .964 | 3 | .637 |
| | 14 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 21 | .253 | 3 | . | .964 | 3 | .637 |
| | 28 | .175 | 3 | . | 1.000 | 3 | 1.000 |

a. Lilliefors Significance Correction

Homogenitas

**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Formula_0 | Based on Mean | .262 | 4 | 10 | .896 |
| | Based on Median | .077 | 4 | 10 | .988 |
| | Based on Median and with adjusted df | .077 | 4 | 9.135 | .988 |
| | Based on trimmed mean | .246 | 4 | 10 | .906 |
| Formula_1 | Based on Mean | 1.189 | 4 | 10 | .373 |
| | Based on Median | .473 | 4 | 10 | .755 |
| | Based on Median and with adjusted df | .473 | 4 | 7.095 | .755 |

| | | | | | |
|---|---|---|---|---|---|
| | Based on trimmed mean | 1.128 | 4 | 10 | .397 |
| Formula_2 | Based on Mean | 1.600 | 4 | 10 | .249 |
| | Based on Median | 1.024 | 4 | 10 | .441 |
| | Based on Median and with adjusted df | 1.024 | 4 | 4.667 | .481 |
| | Based on trimmed mean | 1.563 | 4 | 10 | .258 |
| Formula_3 | Based on Mean | 2.000 | 4 | 10 | .171 |
| | Based on Median | .833 | 4 | 10 | .534 |
| | Based on Median and with adjusted df | .833 | 4 | 4.154 | .566 |
| | Based on trimmed mean | 1.909 | 4 | 10 | .185 |

*One Way Anova*

**ANOVA**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Formula_0 | Between Groups | .469 | 4 | .117 | 5.677 | .012 |
| | Within Groups | .207 | 10 | .021 | | |
| | Total | .676 | 14 | | | |
| Formula_1 | Between Groups | .817 | 4 | .204 | 2.358 | .124 |
| | Within Groups | .867 | 10 | .087 | | |
| | Total | 1.684 | 14 | | | |
| Formula_2 | Between Groups | .449 | 4 | .112 | 2.956 | .075 |
| | Within Groups | .380 | 10 | .038 | | |
| | Total | .829 | 14 | | | |
| Formula_3 | Between Groups | .164 | 4 | .041 | 1.398 | .303 |
| | Within Groups | .293 | 10 | .029 | | |
| | Total | .457 | 14 | | | |

*Post Hoc Test*

**Multiple Comparisons**

Bonferroni

| Dependent Variable | (I) Hari_ke | (J) Hari_ke | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| Formula_0 | 0 | 7 | -.06667 | .11738 | 1.000 | -.4870 | .3537 |
| | | 14 | -.13333 | .11738 | 1.000 | -.5537 | .2870 |
| | | 21 | -.26667 | .11738 | .464 | -.6870 | .1537 |
| | | 28 | -.50000* | .11738 | .017 | -.9204 | -.0796 |
| | 7 | 0 | .06667 | .11738 | 1.000 | -.3537 | .4870 |
| | | 14 | -.06667 | .11738 | 1.000 | -.4870 | .3537 |
| | | 21 | -.20000 | .11738 | 1.000 | -.6204 | .2204 |
| | | 28 | -.43333* | .11738 | .042 | -.8537 | -.0130 |
| | 14 | 0 | .13333 | .11738 | 1.000 | -.2870 | .5537 |
| | | 7 | .06667 | .11738 | 1.000 | -.3537 | .4870 |
| | | 21 | -.13333 | .11738 | 1.000 | -.5537 | .2870 |
| | | 28 | -.36667 | .11738 | .108 | -.7870 | .0537 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 21 | 0 | .26667 | .11738 | .464 | -.1537 | .6870 |
| | | 7 | .20000 | .11738 | 1.000 | -.2204 | .6204 |
| | | 14 | .13333 | .11738 | 1.000 | -.2870 | .5537 |
| | | 28 | -.23333 | .11738 | .749 | -.6537 | .1870 |
| | 28 | 0 | .50000* | .11738 | .017 | .0796 | .9204 |
| | | 7 | .43333* | .11738 | .042 | .0130 | .8537 |
| | | 14 | .36667 | .11738 | .108 | -.0537 | .7870 |
| | | 21 | .23333 | .11738 | .749 | -.1870 | .6537 |
| Formula_1 | 0 | 7 | -.36667 | .24037 | 1.000 | -1.2275 | .4942 |
| | | 14 | -.33333 | .24037 | 1.000 | -1.1942 | .5275 |
| | | 21 | -.53333 | .24037 | .508 | -1.3942 | .3275 |
| | | 28 | -.70000 | .24037 | .155 | -1.5609 | .1609 |
| | 7 | 0 | .36667 | .24037 | 1.000 | -.4942 | 1.2275 |
| | | 14 | .03333 | .24037 | 1.000 | -.8275 | .8942 |
| | | 21 | -.16667 | .24037 | 1.000 | -1.0275 | .6942 |
| | | 28 | -.33333 | .24037 | 1.000 | -1.1942 | .5275 |
| | 14 | 0 | .33333 | .24037 | 1.000 | -.5275 | 1.1942 |
| | | 7 | -.03333 | .24037 | 1.000 | -.8942 | .8275 |
| | | 21 | -.20000 | .24037 | 1.000 | -1.0609 | .6609 |
| | | 28 | -.36667 | .24037 | 1.000 | -1.2275 | .4942 |
| | 21 | 0 | .53333 | .24037 | .508 | -.3275 | 1.3942 |
| | | 7 | .16667 | .24037 | 1.000 | -.6942 | 1.0275 |
| | | 14 | .20000 | .24037 | 1.000 | -.6609 | 1.0609 |
| | | 28 | -.16667 | .24037 | 1.000 | -1.0275 | .6942 |
| | 28 | 0 | .70000 | .24037 | .155 | -.1609 | 1.5609 |
| | | 7 | .33333 | .24037 | 1.000 | -.5275 | 1.1942 |
| | | 14 | .36667 | .24037 | 1.000 | -.4942 | 1.2275 |
| | | 21 | .16667 | .24037 | 1.000 | -.6942 | 1.0275 |
| Formula_2 | 0 | 7 | -.06667 | .15916 | 1.000 | -.6367 | .5034 |
| | | 14 | -.23333 | .15916 | 1.000 | -.8034 | .3367 |
| | | 21 | -.40000 | .15916 | .307 | -.9700 | .1700 |
| | | 28 | -.43333 | .15916 | .215 | -1.0034 | .1367 |
| | 7 | 0 | .06667 | .15916 | 1.000 | -.5034 | .6367 |
| | | 14 | -.16667 | .15916 | 1.000 | -.7367 | .4034 |
| | | 21 | -.33333 | .15916 | .627 | -.9034 | .2367 |
| | | 28 | -.36667 | .15916 | .440 | -.9367 | .2034 |
| | 14 | 0 | .23333 | .15916 | 1.000 | -.3367 | .8034 |
| | | 7 | .16667 | .15916 | 1.000 | -.4034 | .7367 |
| | | 21 | -.16667 | .15916 | 1.000 | -.7367 | .4034 |
| | | 28 | -.20000 | .15916 | 1.000 | -.7700 | .3700 |
| | 21 | 0 | .40000 | .15916 | .307 | -.1700 | .9700 |
| | | 7 | .33333 | .15916 | .627 | -.2367 | .9034 |
| | | 14 | .16667 | .15916 | 1.000 | -.4034 | .7367 |
| | | 28 | -.03333 | .15916 | 1.000 | -.6034 | .5367 |
| | 28 | 0 | .43333 | .15916 | .215 | -.1367 | 1.0034 |
| | | 7 | .36667 | .15916 | .440 | -.2034 | .9367 |
| | | 14 | .20000 | .15916 | 1.000 | -.3700 | .7700 |
| | | 21 | .03333 | .15916 | 1.000 | -.5367 | .6034 |
| Formula_3 | 0 | 7 | -.16667 | .13984 | 1.000 | -.6675 | .3342 |
| | | 14 | -.20000 | .13984 | 1.000 | -.7008 | .3008 |
| | | 21 | -.26667 | .13984 | .856 | -.7675 | .2342 |
| | | 28 | -.30000 | .13984 | .575 | -.8008 | .2008 |
| | 7 | 0 | .16667 | .13984 | 1.000 | -.3342 | .6675 |
| | | 14 | -.03333 | .13984 | 1.000 | -.5342 | .4675 |
| | | 21 | -.10000 | .13984 | 1.000 | -.6008 | .4008 |
| | | 28 | -.13333 | .13984 | 1.000 | -.6342 | .3675 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 14 | 0 | .20000 | .13984 | 1.000 | -.3008 | .7008 |
| | | 7 | .03333 | .13984 | 1.000 | -.4675 | .5342 |
| | | 21 | -.06667 | .13984 | 1.000 | -.5675 | .4342 |
| | | 28 | -.10000 | .13984 | 1.000 | -.6008 | .4008 |
| | 21 | 0 | .26667 | .13984 | .856 | -.2342 | .7675 |
| | | 7 | .10000 | .13984 | 1.000 | -.4008 | .6008 |
| | | 14 | .06667 | .13984 | 1.000 | -.4342 | .5675 |
| | | 28 | -.03333 | .13984 | 1.000 | -.5342 | .4675 |
| | 28 | 0 | .30000 | .13984 | .575 | -.2008 | .8008 |
| | | 7 | .13333 | .13984 | 1.000 | -.3675 | .6342 |
| | | 14 | .10000 | .13984 | 1.000 | -.4008 | .6008 |
| | | 21 | .03333 | .13984 | 1.000 | -.4675 | .5342 |

*. The mean difference is significant at the 0.05 level.

**Lampiran 20.** Hasil analisis statistik pengukuran daya sebar *real time*

Normalitas

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Hari_ke | Statistic | df | Sig. | Statistic | df | Sig. |
| Formula_0 | 0 | .219 | 3 | . | .987 | 3 | .780 |
| | 7 | .253 | 3 | . | .964 | 3 | .637 |
| | 14 | .253 | 3 | . | .964 | 3 | .637 |
| | 21 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 28 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| Formula_1 | 0 | .253 | 3 | . | .964 | 3 | .637 |
| | 7 | .253 | 3 | . | .964 | 3 | .637 |
| | 14 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 21 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 28 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| Formula_2 | 0 | .232 | 3 | . | .980 | 3 | .726 |
| | 7 | .219 | 3 | . | .987 | 3 | .780 |
| | 14 | .292 | 3 | . | .923 | 3 | .463 |
| | 21 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 28 | .253 | 3 | . | .964 | 3 | .637 |
| Formula_3 | 0 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 7 | .219 | 3 | . | .987 | 3 | .780 |
| | 14 | .292 | 3 | . | .923 | 3 | .463 |
| | 21 | .253 | 3 | . | .964 | 3 | .637 |
| | 28 | .253 | 3 | . | .964 | 3 | .637 |

a. Lilliefors Significance Correction

Homogenitas

**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Formula_0 | Based on Mean | .966 | 4 | 10 | .468 |
| | Based on Median | .500 | 4 | 10 | .737 |
| | Based on Median and with adjusted df | .500 | 4 | 6.522 | .738 |
| | Based on trimmed mean | .932 | 4 | 10 | .483 |
| Formula_1 | Based on Mean | .453 | 4 | 10 | .769 |
| | Based on Median | .167 | 4 | 10 | .951 |
| | Based on Median and with adjusted df | .167 | 4 | 7.714 | .949 |

| | | | | | |
|---|---|---|---|---|---|
| | Based on trimmed mean | .431 | 4 | 10 | .783 |
| Formula_2 | Based on Mean | 1.519 | 4 | 10 | .269 |
| | Based on Median | .716 | 4 | 10 | .600 |
| | Based on Median and with adjusted df | .716 | 4 | 5.838 | .611 |
| | Based on trimmed mean | 1.457 | 4 | 10 | .286 |
| Formula_3 | Based on Mean | .784 | 4 | 10 | .561 |
| | Based on Median | .310 | 4 | 10 | .865 |
| | Based on Median and with adjusted df | .310 | 4 | 7.538 | .863 |
| | Based on trimmed mean | .744 | 4 | 10 | .583 |

*One Way Anova*

**ANOVA**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Formula_0 | Between Groups | .265 | 4 | .066 | 254.397 | .000 |
| | Within Groups | .003 | 10 | .000 | | |
| | Total | .267 | 14 | | | |
| Formula_1 | Between Groups | .428 | 4 | .107 | 698.326 | .000 |
| | Within Groups | .002 | 10 | .000 | | |
| | Total | .430 | 14 | | | |
| Formula_2 | Between Groups | .396 | 4 | .099 | 163.379 | .000 |
| | Within Groups | .006 | 10 | .001 | | |
| | Total | .403 | 14 | | | |
| Formula_3 | Between Groups | .523 | 4 | .131 | 400.031 | .000 |
| | Within Groups | .003 | 10 | .000 | | |
| | Total | .526 | 14 | | | |

*Post Hoc Test*

**Multiple Comparisons**

Bonferroni

| Dependent Variable | (I) Hari_ke | (J) Hari_ke | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| Formula_0 | 0 | 7 | .05667* | .01317 | .016 | .0095 | .1038 |
| | | 14 | .07000* | .01317 | .003 | .0228 | .1172 |
| | | 21 | .29333* | .01317 | .000 | .2462 | .3405 |
| | | 28 | .32333* | .01317 | .000 | .2762 | .3705 |
| | 7 | 0 | -.05667* | .01317 | .016 | -.1038 | -.0095 |
| | | 14 | .01333 | .01317 | 1.000 | -.0338 | .0605 |
| | | 21 | .23667* | .01317 | .000 | .1895 | .2838 |
| | | 28 | .26667* | .01317 | .000 | .2195 | .3138 |
| | 14 | 0 | -.07000* | .01317 | .003 | -.1172 | -.0228 |
| | | 7 | -.01333 | .01317 | 1.000 | -.0605 | .0338 |
| | | 21 | .22333* | .01317 | .000 | .1762 | .2705 |
| | | 28 | .25333* | .01317 | .000 | .2062 | .3005 |
| | 21 | 0 | -.29333* | .01317 | .000 | -.3405 | -.2462 |
| | | 7 | -.23667* | .01317 | .000 | -.2838 | -.1895 |
| | | 14 | -.22333* | .01317 | .000 | -.2705 | -.1762 |
| | | 28 | .03000 | .01317 | .459 | -.0172 | .0772 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 28 | 0 | -.32333* | .01317 | .000 | -.3705 | -.2762 |
| | | 7 | -.26667* | .01317 | .000 | -.3138 | -.2195 |
| | | 14 | -.25333* | .01317 | .000 | -.3005 | -.2062 |
| | | 21 | -.03000 | .01317 | .459 | -.0772 | .0172 |
| Formula_1 | 0 | 7 | .04667* | .01011 | .010 | .0105 | .0829 |
| | | 14 | .10333* | .01011 | .000 | .0671 | .1395 |
| | | 21 | .39333* | .01011 | .000 | .3571 | .4295 |
| | | 28 | .38333* | .01011 | .000 | .3471 | .4195 |
| | 7 | 0 | -.04667* | .01011 | .010 | -.0829 | -.0105 |
| | | 14 | .05667* | .01011 | .002 | .0205 | .0929 |
| | | 21 | .34667* | .01011 | .000 | .3105 | .3829 |
| | | 28 | .33667* | .01011 | .000 | .3005 | .3729 |
| | 14 | 0 | -.10333* | .01011 | .000 | -.1395 | -.0671 |
| | | 7 | -.05667* | .01011 | .002 | -.0929 | -.0205 |
| | | 21 | .29000* | .01011 | .000 | .2538 | .3262 |
| | | 28 | .28000* | .01011 | .000 | .2438 | .3162 |
| | 21 | 0 | -.39333* | .01011 | .000 | -.4295 | -.3571 |
| | | 7 | -.34667* | .01011 | .000 | -.3829 | -.3105 |
| | | 14 | -.29000* | .01011 | .000 | -.3262 | -.2538 |
| | | 28 | -.01000 | .01011 | 1.000 | -.0462 | .0262 |
| | 28 | 0 | -.38333* | .01011 | .000 | -.4195 | -.3471 |
| | | 7 | -.33667* | .01011 | .000 | -.3729 | -.3005 |
| | | 14 | -.28000* | .01011 | .000 | -.3162 | -.2438 |
| | | 21 | .01000 | .01011 | 1.000 | -.0262 | .0462 |
| Formula_2 | 0 | 7 | .03667 | .02011 | .983 | -.0354 | .1087 |
| | | 14 | .08000* | .02011 | .026 | .0080 | .1520 |
| | | 21 | .36333* | .02011 | .000 | .2913 | .4354 |
| | | 28 | .37000* | .02011 | .000 | .2980 | .4420 |
| | 7 | 0 | -.03667 | .02011 | .983 | -.1087 | .0354 |
| | | 14 | .04333 | .02011 | .566 | -.0287 | .1154 |
| | | 21 | .32667* | .02011 | .000 | .2546 | .3987 |
| | | 28 | .33333* | .02011 | .000 | .2613 | .4054 |
| | 14 | 0 | -.08000* | .02011 | .026 | -.1520 | -.0080 |
| | | 7 | -.04333 | .02011 | .566 | -.1154 | .0287 |
| | | 21 | .28333* | .02011 | .000 | .2113 | .3554 |
| | | 28 | .29000* | .02011 | .000 | .2180 | .3620 |
| | 21 | 0 | -.36333* | .02011 | .000 | -.4354 | -.2913 |
| | | 7 | -.32667* | .02011 | .000 | -.3987 | -.2546 |
| | | 14 | -.28333* | .02011 | .000 | -.3554 | -.2113 |
| | | 28 | .00667 | .02011 | 1.000 | -.0654 | .0787 |
| | 28 | 0 | -.37000* | .02011 | .000 | -.4420 | -.2980 |
| | | 7 | -.33333* | .02011 | .000 | -.4054 | -.2613 |
| | | 14 | -.29000* | .02011 | .000 | -.3620 | -.2180 |
| | | 21 | -.00667 | .02011 | 1.000 | -.0787 | .0654 |
| Formula_3 | 0 | 7 | .02667 | .01476 | 1.000 | -.0262 | .0795 |
| | | 14 | .06333* | .01476 | .016 | .0105 | .1162 |
| | | 21 | .39333* | .01476 | .000 | .3405 | .4462 |
| | | 28 | .42333* | .01476 | .000 | .3705 | .4762 |
| | 7 | 0 | -.02667 | .01476 | 1.000 | -.0795 | .0262 |
| | | 14 | .03667 | .01476 | .323 | -.0162 | .0895 |
| | | 21 | .36667* | .01476 | .000 | .3138 | .4195 |
| | | 28 | .39667* | .01476 | .000 | .3438 | .4495 |
| | 14 | 0 | -.06333* | .01476 | .016 | -.1162 | -.0105 |
| | | 7 | -.03667 | .01476 | .323 | -.0895 | .0162 |
| | | 21 | .33000* | .01476 | .000 | .2771 | .3829 |
| | | 28 | .36000* | .01476 | .000 | .3071 | .4129 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 21 | 0 | -.39333* | .01476 | .000 | -.4462 | -.3405 |
| | | 7 | -.36667* | .01476 | .000 | -.4195 | -.3138 |
| | | 14 | -.33000* | .01476 | .000 | -.3829 | -.2771 |
| | | 28 | .03000 | .01476 | .695 | -.0229 | .0829 |
| | 28 | 0 | -.42333* | .01476 | .000 | -.4762 | -.3705 |
| | | 7 | -.39667* | .01476 | .000 | -.4495 | -.3438 |
| | | 14 | -.36000* | .01476 | .000 | -.4129 | -.3071 |
| | | 21 | -.03000 | .01476 | .695 | -.0829 | .0229 |

*. The mean difference is significant at the 0.05 level.

**Lampiran 21.** Hasil analisis statistik pengukuran daya lekat *real time*

Normalitas

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Hari_ke | Statistic | df | Sig. | Statistic | df | Sig. |
| Formula_0 | 0 | .292 | 3 | . | .923 | 3 | .463 |
| | 7 | .219 | 3 | . | .987 | 3 | .780 |
| | 14 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 21 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 28 | .253 | 3 | . | .964 | 3 | .637 |
| Formula_1 | 0 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 7 | .253 | 3 | . | .964 | 3 | .637 |
| | 14 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 21 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 28 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| Formula_2 | 0 | .292 | 3 | . | .923 | 3 | .463 |
| | 7 | .253 | 3 | . | .964 | 3 | .637 |
| | 14 | .292 | 3 | . | .923 | 3 | .463 |
| | 21 | .253 | 3 | . | .964 | 3 | .637 |
| | 28 | .253 | 3 | . | .964 | 3 | .637 |
| Formula_3 | 0 | .276 | 3 | . | .942 | 3 | .537 |
| | 7 | .204 | 3 | . | .993 | 3 | .843 |
| | 14 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 21 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 28 | .328 | 3 | . | .871 | 3 | .298 |

a. Lilliefors Significance Correction

Homogenitas

**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Formula_0 | Based on Mean | 4.653 | 4 | 10 | .022 |
| | Based on Median | 1.180 | 4 | 10 | .377 |
| | Based on Median and with adjusted df | 1.180 | 4 | 2.792 | .471 |
| | Based on trimmed mean | 4.290 | 4 | 10 | .028 |
| Formula_1 | Based on Mean | .327 | 4 | 10 | .854 |
| | Based on Median | .143 | 4 | 10 | .962 |
| | Based on Median and with adjusted df | .143 | 4 | 7.538 | .961 |
| | Based on trimmed mean | .314 | 4 | 10 | .862 |
| Formula_2 | Based on Mean | 1.699 | 4 | 10 | .226 |
| | Based on Median | .443 | 4 | 10 | .775 |

| | | | | | |
|---|---|---|---|---|---|
| | Based on Median and with adjusted df | .443 | 4 | 5.646 | .775 |
| | Based on trimmed mean | 1.567 | 4 | 10 | .257 |
| Formula_3 | Based on Mean | 1.297 | 4 | 10 | .335 |
| | Based on Median | .405 | 4 | 10 | .801 |
| | Based on Median and with adjusted df | .405 | 4 | 6.810 | .800 |
| | Based on trimmed mean | 1.217 | 4 | 10 | .363 |

*One Way Anova*

**ANOVA**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Formula_0 | Between Groups | .265 | 4 | .066 | 254.397 | .000 |
| | Within Groups | .003 | 10 | .000 | | |
| | Total | .267 | 14 | | | |
| Formula_1 | Between Groups | .428 | 4 | .107 | 698.326 | .000 |
| | Within Groups | .002 | 10 | .000 | | |
| | Total | .430 | 14 | | | |
| Formula_2 | Between Groups | .396 | 4 | .099 | 163.379 | .000 |
| | Within Groups | .006 | 10 | .001 | | |
| | Total | .403 | 14 | | | |
| Formula_3 | Between Groups | .523 | 4 | .131 | 400.031 | .000 |
| | Within Groups | .003 | 10 | .000 | | |
| | Total | .526 | 14 | | | |

*Post Hoc Test*

**Multiple Comparisons**

Games-Howell

| Dependent Variable | (I) Hari_ke | (J) Hari_ke | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| Formula_0 | 0 | 7 | 4.43333* | .38873 | .009 | 2.1514 | 6.7152 |
| | | 14 | 9.00000* | .36515 | .004 | 6.3430 | 11.6570 |
| | | 21 | 9.30000* | .36515 | .004 | 6.6430 | 11.9570 |
| | | 28 | 9.56667* | .37118 | .003 | 7.0372 | 12.0962 |
| | 7 | 0 | -4.43333* | .38873 | .009 | -6.7152 | -2.1514 |
| | | 14 | 4.56667* | .15635 | .001 | 3.6440 | 5.4893 |
| | | 21 | 4.86667* | .15635 | .001 | 3.9440 | 5.7893 |
| | | 28 | 5.13333* | .16997 | .000 | 4.2881 | 5.9786 |
| | 14 | 0 | -9.00000* | .36515 | .004 | -11.6570 | -6.3430 |
| | | 7 | -4.56667* | .15635 | .001 | -5.4893 | -3.6440 |
| | | 21 | .30000 | .08165 | .091 | -.0630 | .6630 |
| | | 28 | .56667* | .10541 | .036 | .0570 | 1.0763 |
| | 21 | 0 | -9.30000* | .36515 | .004 | -11.9570 | -6.6430 |
| | | 7 | -4.86667* | .15635 | .001 | -5.7893 | -3.9440 |
| | | 14 | -.30000 | .08165 | .091 | -.6630 | .0630 |
| | | 28 | .26667 | .10541 | .266 | -.2430 | .7763 |
| | 28 | 0 | -9.56667* | .37118 | .003 | -12.0962 | -7.0372 |
| | | 7 | -5.13333* | .16997 | .000 | -5.9786 | -4.2881 |
| | | 14 | -.56667* | .10541 | .036 | -1.0763 | -.0570 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 21 | -.26667 | .10541 | .266 | -.7763 | .2430 |
| Formula_1 | 0 | 7 | 4.76667* | .10541 | .000 | 4.2570 | 5.2763 |
| | | 14 | 9.00000* | .08165 | .000 | 8.6370 | 9.3630 |
| | | 21 | 9.60000* | .08165 | .000 | 9.2370 | 9.9630 |
| | | 28 | 10.00000* | .08165 | .000 | 9.6370 | 10.3630 |
| | 7 | 0 | -4.76667* | .10541 | .000 | -5.2763 | -4.2570 |
| | | 14 | 4.23333* | .10541 | .000 | 3.7237 | 4.7430 |
| | | 21 | 4.83333* | .10541 | .000 | 4.3237 | 5.3430 |
| | | 28 | 5.23333* | .10541 | .000 | 4.7237 | 5.7430 |
| | 14 | 0 | -9.00000* | .08165 | .000 | -9.3630 | -8.6370 |
| | | 7 | -4.23333* | .10541 | .000 | -4.7430 | -3.7237 |
| | | 21 | .60000* | .08165 | .009 | .2370 | .9630 |
| | | 28 | 1.00000* | .08165 | .001 | .6370 | 1.3630 |
| | 21 | 0 | -9.60000* | .08165 | .000 | -9.9630 | -9.2370 |
| | | 7 | -4.83333* | .10541 | .000 | -5.3430 | -4.3237 |
| | | 14 | -.60000* | .08165 | .009 | -.9630 | -.2370 |
| | | 28 | .40000* | .08165 | .036 | .0370 | .7630 |
| | 28 | 0 | -10.00000* | .08165 | .000 | -10.3630 | -9.6370 |
| | | 7 | -5.23333* | .10541 | .000 | -5.7430 | -4.7237 |
| | | 14 | -1.00000* | .08165 | .001 | -1.3630 | -.6370 |
| | | 21 | -.40000* | .08165 | .036 | -.7630 | -.0370 |
| Formula_2 | 0 | 7 | 5.60000* | .29814 | .000 | 4.2107 | 6.9893 |
| | | 14 | 9.13333* | .26874 | .000 | 7.6871 | 10.5796 |
| | | 21 | 9.43333* | .25604 | .001 | 7.8776 | 10.9890 |
| | | 28 | 10.33333* | .25604 | .000 | 8.7776 | 11.8890 |
| | 7 | 0 | -5.60000* | .29814 | .000 | -6.9893 | -4.2107 |
| | | 14 | 3.53333* | .21344 | .001 | 2.5155 | 4.5511 |
| | | 21 | 3.83333* | .19720 | .001 | 2.7721 | 4.8946 |
| | | 28 | 4.73333* | .19720 | .001 | 3.6721 | 5.7946 |
| | 14 | 0 | -9.13333* | .26874 | .000 | -10.5796 | -7.6871 |
| | | 7 | -3.53333* | .21344 | .001 | -4.5511 | -2.5155 |
| | | 21 | .30000 | .14907 | .404 | -.3946 | .9946 |
| | | 28 | 1.20000* | .14907 | .008 | .5054 | 1.8946 |
| | 21 | 0 | -9.43333* | .25604 | .001 | -10.9890 | -7.8776 |
| | | 7 | -3.83333* | .19720 | .001 | -4.8946 | -2.7721 |
| | | 14 | -.30000 | .14907 | .404 | -.9946 | .3946 |
| | | 28 | .90000* | .12472 | .009 | .3455 | 1.4545 |
| | 28 | 0 | -10.33333* | .25604 | .000 | -11.8890 | -8.7776 |
| | | 7 | -4.73333* | .19720 | .001 | -5.7946 | -3.6721 |
| | | 14 | -1.20000* | .14907 | .008 | -1.8946 | -.5054 |
| | | 21 | -.90000* | .12472 | .009 | -1.4545 | -.3455 |
| Formula_3 | 0 | 7 | 6.43333* | .29059 | .000 | 5.1410 | 7.7257 |
| | | 14 | 8.80000* | .21602 | .001 | 7.3705 | 10.2295 |
| | | 21 | 9.90000* | .23805 | .000 | 8.6728 | 11.1272 |
| | | 28 | 10.36667* | .27889 | .000 | 9.1184 | 11.6149 |
| | 7 | 0 | -6.43333* | .29059 | .000 | -7.7257 | -5.1410 |
| | | 14 | 2.36667* | .21082 | .015 | .9812 | 3.7522 |
| | | 21 | 3.46667* | .23333 | .002 | 2.2766 | 4.6567 |
| | | 28 | 3.93333* | .27487 | .001 | 2.7064 | 5.1603 |
| | 14 | 0 | -8.80000* | .21602 | .001 | -10.2295 | -7.3705 |
| | | 7 | -2.36667* | .21082 | .015 | -3.7522 | -.9812 |
| | | 21 | 1.10000* | .12910 | .014 | .4053 | 1.7947 |
| | | 28 | 1.56667* | .19437 | .030 | .3206 | 2.8127 |
| | 21 | 0 | -9.90000* | .23805 | .000 | -11.1272 | -8.6728 |
| | | 7 | -3.46667* | .23333 | .002 | -4.6567 | -2.2766 |
| | | 14 | -1.10000* | .12910 | .014 | -1.7947 | -.4053 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 28 | .46667 | .21858 | .374 | -.6101 | 1.5434 |
| | 28 | 0 | -10.36667* | .27889 | .000 | -11.6149 | -9.1184 |
| | | 7 | -3.93333* | .27487 | .001 | -5.1603 | -2.7064 |
| | | 14 | -1.56667* | .19437 | .030 | -2.8127 | -.3206 |
| | | 21 | -.46667 | .21858 | .374 | -1.5434 | .6101 |

*. The mean difference is significant at the 0.05 level.

**Lampiran 22.** Hasil analisis statistik pengukuran pH *cycling test*

Normalitas

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Siklus_ke | Statistic | df | Sig. | Statistic | df | Sig. |
| Formula_0 | 1 | .328 | 3 | . | .871 | 3 | .298 |
| | 2 | .253 | 3 | . | .964 | 3 | .637 |
| | 3 | .346 | 3 | . | .837 | 3 | .206 |
| | 4 | .375 | 3 | . | .773 | 3 | .052 |
| | 5 | .363 | 3 | . | .801 | 3 | .117 |
| | 6 | .227 | 3 | . | .983 | 3 | .747 |
| Formula_1 | 1 | .314 | 3 | . | .893 | 3 | .363 |
| | 2 | .361 | 3 | . | .806 | 3 | .130 |
| | 3 | .262 | 3 | . | .957 | 3 | .600 |
| | 4 | .236 | 3 | . | .977 | 3 | .712 |
| | 5 | .253 | 3 | . | .964 | 3 | .637 |
| | 6 | .353 | 3 | . | .824 | 3 | .174 |
| Formula_2 | 1 | .343 | 3 | . | .842 | 3 | .220 |
| | 2 | .341 | 3 | . | .846 | 3 | .230 |
| | 3 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 4 | .317 | 3 | . | .887 | 3 | .346 |
| | 5 | .224 | 3 | . | .984 | 3 | .762 |
| | 6 | .253 | 3 | . | .964 | 3 | .637 |
| Formula_3 | 1 | .227 | 3 | . | .983 | 3 | .747 |
| | 2 | .253 | 3 | . | .964 | 3 | .637 |
| | 3 | .356 | 3 | . | .818 | 3 | .157 |
| | 4 | .317 | 3 | . | .888 | 3 | .348 |
| | 5 | .260 | 3 | . | .959 | 3 | .609 |
| | 6 | .324 | 3 | . | .878 | 3 | .317 |

a. Lilliefors Significance Correction

Homogenitas

**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Formula_0 | Based on Mean | 6.368 | 5 | 12 | .004 |
| | Based on Median | .505 | 5 | 12 | .767 |
| | Based on Median and with adjusted df | .505 | 5 | 4.590 | .764 |
| | Based on trimmed mean | 5.213 | 5 | 12 | .009 |
| Formula_1 | Based on Mean | 11.586 | 5 | 12 | .000 |
| | Based on Median | 1.006 | 5 | 12 | .455 |
| | Based on Median and with adjusted df | 1.006 | 5 | 2.148 | .561 |
| | Based on trimmed mean | 9.547 | 5 | 12 | .001 |
| Formula_2 | Based on Mean | 2.547 | 5 | 12 | .086 |
| | Based on Median | .440 | 5 | 12 | .812 |

| | | | | | |
|---|---|---|---|---|---|
| | Based on Median and with adjusted df | .440 | 5 | 5.203 | .806 |
| | Based on trimmed mean | 2.278 | 5 | 12 | .113 |
| Formula_3 | Based on Mean | 2.485 | 5 | 12 | .091 |
| | Based on Median | .522 | 5 | 12 | .755 |
| | Based on Median and with adjusted df | .522 | 5 | 7.281 | .754 |
| | Based on trimmed mean | 2.249 | 5 | 12 | .116 |

*One Way Anova*

**ANOVA**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Formula_0 | Between Groups | .215 | 5 | .043 | 2.384 | .101 |
| | Within Groups | .217 | 12 | .018 | | |
| | Total | .432 | 17 | | | |
| Formula_1 | Between Groups | .712 | 5 | .142 | 2.303 | .110 |
| | Within Groups | .742 | 12 | .062 | | |
| | Total | 1.454 | 17 | | | |
| Formula_2 | Between Groups | .179 | 5 | .036 | 1.880 | .172 |
| | Within Groups | .228 | 12 | .019 | | |
| | Total | .406 | 17 | | | |
| Formula_3 | Between Groups | .800 | 5 | .160 | 18.535 | .000 |
| | Within Groups | .104 | 12 | .009 | | |
| | Total | .904 | 17 | | | |

*Post Hoc Test*

**Multiple Comparisons**

Games-Howell

| Dependent Variable | (I) Siklus_ke | (J) Siklus_ke | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| Formula_0 | 1 | 2 | .06667 | .02560 | .276 | -.0549 | .1883 |
| | | 3 | -.11000 | .05676 | .529 | -.4882 | .2682 |
| | | 4 | .07333 | .10667 | .968 | -.7534 | .9001 |
| | | 5 | .13667 | .14314 | .901 | -1.0062 | 1.2795 |
| | | 6 | .24333 | .04216 | .051 | -.0019 | .4886 |
| | 2 | 1 | -.06667 | .02560 | .276 | -.1883 | .0549 |
| | | 3 | -.17667 | .05647 | .253 | -.5593 | .2060 |
| | | 4 | .00667 | .10651 | 1.000 | -.8240 | .8373 |
| | | 5 | .07000 | .14302 | .992 | -1.0761 | 1.2161 |
| | | 6 | .17667 | .04177 | .116 | -.0715 | .4248 |
| | 3 | 1 | .11000 | .05676 | .529 | -.2682 | .4882 |
| | | 2 | .17667 | .05647 | .253 | -.2060 | .5593 |
| | | 4 | .18333 | .11795 | .667 | -.4908 | .8575 |
| | | 5 | .24667 | .15173 | .643 | -.7331 | 1.2264 |
| | | 6 | .35333* | .06566 | .041 | .0226 | .6841 |
| | 4 | 1 | -.07333 | .10667 | .968 | -.9001 | .7534 |
| | | 2 | -.00667 | .10651 | 1.000 | -.8373 | .8240 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 3 | -.18333 | .11795 | .667 | -.8575 | .4908 |
| | | 5 | .06333 | .17657 | .998 | -.8133 | .9399 |
| | | 6 | .17000 | .11165 | .686 | -.5635 | .9035 |
| | 5 | 1 | -.13667 | .14314 | .901 | -1.2795 | 1.0062 |
| | | 2 | -.07000 | .14302 | .992 | -1.2161 | 1.0761 |
| | | 3 | -.24667 | .15173 | .643 | -1.2264 | .7331 |
| | | 4 | -.06333 | .17657 | .998 | -.9399 | .8133 |
| | | 6 | .10667 | .14689 | .961 | -.9495 | 1.1628 |
| | 6 | 1 | -.24333 | .04216 | .051 | -.4886 | .0019 |
| | | 2 | -.17667 | .04177 | .116 | -.4248 | .0715 |
| | | 3 | -.35333* | .06566 | .041 | -.6841 | -.0226 |
| | | 4 | -.17000 | .11165 | .686 | -.9035 | .5635 |
| | | 5 | -.10667 | .14689 | .961 | -1.1628 | .9495 |
| Formula_1 | 1 | 2 | .33000 | .34113 | .897 | -2.4873 | 3.1473 |
| | | 3 | -.18333 | .05812 | .259 | -.5990 | .2324 |
| | | 4 | -.00667 | .05754 | 1.000 | -.4171 | .4038 |
| | | 5 | .30333* | .01764 | .001 | .2076 | .3991 |
| | | 6 | .31333* | .03528 | .016 | .1064 | .5203 |
| | 2 | 1 | -.33000 | .34113 | .897 | -3.1473 | 2.4873 |
| | | 3 | -.51333 | .34537 | .706 | -3.2131 | 2.1864 |
| | | 4 | -.33667 | .34527 | .895 | -3.0389 | 2.3656 |
| | | 5 | -.02667 | .34090 | 1.000 | -2.8508 | 2.7975 |
| | | 6 | -.01667 | .34226 | 1.000 | -2.8005 | 2.7672 |
| | 3 | 1 | .18333 | .05812 | .259 | -.2324 | .5990 |
| | | 2 | .51333 | .34537 | .706 | -2.1864 | 3.2131 |
| | | 4 | .17667 | .07888 | .379 | -.1974 | .5508 |
| | | 5 | .48667* | .05676 | .042 | .0408 | .9326 |
| | | 6 | .49667* | .06446 | .019 | .1441 | .8492 |
| | 4 | 1 | .00667 | .05754 | 1.000 | -.4038 | .4171 |
| | | 2 | .33667 | .34527 | .895 | -2.3656 | 3.0389 |
| | | 3 | -.17667 | .07888 | .379 | -.5508 | .1974 |
| | | 5 | .31000 | .05617 | .100 | -.1308 | .7508 |
| | | 6 | .32000 | .06394 | .063 | -.0282 | .6682 |
| | 5 | 1 | -.30333* | .01764 | .001 | -.3991 | -.2076 |
| | | 2 | .02667 | .34090 | 1.000 | -2.7975 | 2.8508 |
| | | 3 | -.48667* | .05676 | .042 | -.9326 | -.0408 |
| | | 4 | -.31000 | .05617 | .100 | -.7508 | .1308 |
| | | 6 | .01000 | .03300 | .999 | -.2249 | .2449 |
| | 6 | 1 | -.31333* | .03528 | .016 | -.5203 | -.1064 |
| | | 2 | .01667 | .34226 | 1.000 | -2.7672 | 2.8005 |
| | | 3 | -.49667* | .06446 | .019 | -.8492 | -.1441 |
| | | 4 | -.32000 | .06394 | .063 | -.6682 | .0282 |
| | | 5 | -.01000 | .03300 | .999 | -.2449 | .2249 |
| Formula_2 | 1 | 2 | .20667 | .08800 | .358 | -.2384 | .6517 |
| | | 3 | .19000 | .06110 | .195 | -.1203 | .5003 |
| | | 4 | .12667 | .15257 | .940 | -.8864 | 1.1398 |
| | | 5 | .29333 | .08373 | .138 | -.1205 | .7071 |
| | | 6 | .28333 | .07965 | .128 | -.1027 | .6694 |
| | 2 | 1 | -.20667 | .08800 | .358 | -.6517 | .2384 |
| | | 3 | -.01667 | .08007 | 1.000 | -.4866 | .4532 |
| | | 4 | -.08000 | .16111 | .993 | -1.0082 | .8482 |
| | | 5 | .08667 | .09843 | .933 | -.3815 | .5549 |
| | | 6 | .07667 | .09499 | .951 | -.3796 | .5329 |
| | 3 | 1 | -.19000 | .06110 | .195 | -.5003 | .1203 |
| | | 2 | .01667 | .08007 | 1.000 | -.4532 | .4866 |
| | | 4 | -.06333 | .14814 | .996 | -1.1539 | 1.0272 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 5 | .10333 | .07535 | .746 | -.3249 | .5315 |
| | | 6 | .09333 | .07079 | .768 | -.2955 | .4822 |
| | 4 | 1 | -.12667 | .15257 | .940 | -1.1398 | .8864 |
| | | 2 | .08000 | .16111 | .993 | -.8482 | 1.0082 |
| | | 3 | .06333 | .14814 | .996 | -1.0272 | 1.1539 |
| | | 5 | .16667 | .15882 | .875 | -.7781 | 1.1115 |
| | | 6 | .15667 | .15670 | .891 | -.8070 | 1.1204 |
| | 5 | 1 | -.29333 | .08373 | .138 | -.7071 | .1205 |
| | | 2 | -.08667 | .09843 | .933 | -.5549 | .3815 |
| | | 3 | -.10333 | .07535 | .746 | -.5315 | .3249 |
| | | 4 | -.16667 | .15882 | .875 | -1.1115 | .7781 |
| | | 6 | -.01000 | .09104 | 1.000 | -.4432 | .4232 |
| | 6 | 1 | -.28333 | .07965 | .128 | -.6694 | .1027 |
| | | 2 | -.07667 | .09499 | .951 | -.5329 | .3796 |
| | | 3 | -.09333 | .07079 | .768 | -.4822 | .2955 |
| | | 4 | -.15667 | .15670 | .891 | -1.1204 | .8070 |
| | | 5 | .01000 | .09104 | 1.000 | -.4232 | .4432 |
| Formula_3 | 1 | 2 | .10667 | .03887 | .333 | -.1814 | .3947 |
| | | 3 | .28000* | .05164 | .032 | .0344 | .5256 |
| | | 4 | .48333 | .08819 | .060 | -.0363 | 1.0030 |
| | | 5 | .51000* | .08287 | .041 | .0375 | .9825 |
| | | 6 | .55333* | .06464 | .008 | .2302 | .8765 |
| | 2 | 1 | -.10667 | .03887 | .333 | -.3947 | .1814 |
| | | 3 | .17333 | .03621 | .120 | -.0907 | .4374 |
| | | 4 | .37667 | .08014 | .140 | -.2700 | 1.0233 |
| | | 5 | .40333 | .07424 | .107 | -.1930 | .9997 |
| | | 6 | .44667* | .05312 | .043 | .0325 | .8609 |
| | 3 | 1 | -.28000* | .05164 | .032 | -.5256 | -.0344 |
| | | 2 | -.17333 | .03621 | .120 | -.4374 | .0907 |
| | | 4 | .20333 | .08705 | .395 | -.3259 | .7326 |
| | | 5 | .23000 | .08165 | .278 | -.2506 | .7106 |
| | | 6 | .27333 | .06307 | .082 | -.0499 | .5966 |
| | 4 | 1 | -.48333 | .08819 | .060 | -1.0030 | .0363 |
| | | 2 | -.37667 | .08014 | .140 | -1.0233 | .2700 |
| | | 3 | -.20333 | .08705 | .395 | -.7326 | .3259 |
| | | 5 | .02667 | .10853 | 1.000 | -.4896 | .5430 |
| | | 6 | .07000 | .09534 | .965 | -.4219 | .5619 |
| | 5 | 1 | -.51000* | .08287 | .041 | -.9825 | -.0375 |
| | | 2 | -.40333 | .07424 | .107 | -.9997 | .1930 |
| | | 3 | -.23000 | .08165 | .278 | -.7106 | .2506 |
| | | 4 | -.02667 | .10853 | 1.000 | -.5430 | .4896 |
| | | 6 | .04333 | .09043 | .994 | -.4111 | .4978 |
| | 6 | 1 | -.55333* | .06464 | .008 | -.8765 | -.2302 |
| | | 2 | -.44667* | .05312 | .043 | -.8609 | -.0325 |
| | | 3 | -.27333 | .06307 | .082 | -.5966 | .0499 |
| | | 4 | -.07000 | .09534 | .965 | -.5619 | .4219 |
| | | 5 | -.04333 | .09043 | .994 | -.4978 | .4111 |

*. The mean difference is significant at the 0.05 level.

**Lampiran 23.** Hasil analisis statistik pengukuran titik lebur *cycling test*
Normalitas

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Siklus_ke | Statistic | df | Sig. | Statistic | df | Sig. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Formula_0 | 1 | .253 | 3 | . | .964 | 3 | .637 |
| | 2 | .253 | 3 | . | .964 | 3 | .637 |
| | 3 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 4 | .253 | 3 | . | .964 | 3 | .637 |
| | 5 | .253 | 3 | . | .964 | 3 | .637 |
| | 6 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| Formula_1 | 1 | .219 | 3 | . | .987 | 3 | .780 |
| | 2 | .269 | 3 | . | .949 | 3 | .567 |
| | 3 | .253 | 3 | . | .964 | 3 | .637 |
| | 4 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 5 | .253 | 3 | . | .964 | 3 | .637 |
| | 6 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| Formula_2 | 1 | .253 | 3 | . | .964 | 3 | .637 |
| | 2 | .253 | 3 | . | .964 | 3 | .637 |
| | 3 | .292 | 3 | . | .923 | 3 | .463 |
| | 4 | .314 | 3 | . | .893 | 3 | .363 |
| | 5 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 6 | .196 | 3 | . | .996 | 3 | .878 |
| Formula_3 | 1 | .253 | 3 | . | .964 | 3 | .637 |
| | 2 | .253 | 3 | . | .964 | 3 | .637 |
| | 3 | .219 | 3 | . | .987 | 3 | .780 |
| | 4 | .292 | 3 | . | .923 | 3 | .463 |
| | 5 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 6 | .232 | 3 | . | .980 | 3 | .726 |

a. Lilliefors Significance Correction

Homogenitas

**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Formula_0 | Based on Mean | 2.279 | 5 | 12 | .112 |
| | Based on Median | .923 | 5 | 12 | .499 |
| | Based on Median and with adjusted df | .923 | 5 | 5.660 | .528 |
| | Based on trimmed mean | 2.168 | 5 | 12 | .126 |
| Formula_1 | Based on Mean | 2.436 | 5 | 12 | .096 |
| | Based on Median | .905 | 5 | 12 | .509 |
| | Based on Median and with adjusted df | .905 | 5 | 4.164 | .552 |
| | Based on trimmed mean | 2.307 | 5 | 12 | .109 |
| Formula_2 | Based on Mean | 1.550 | 5 | 12 | .247 |
| | Based on Median | .783 | 5 | 12 | .581 |
| | Based on Median and with adjusted df | .783 | 5 | 6.796 | .593 |
| | Based on trimmed mean | 1.494 | 5 | 12 | .263 |
| Formula_3 | Based on Mean | .576 | 5 | 12 | .718 |
| | Based on Median | .323 | 5 | 12 | .890 |
| | Based on Median and with adjusted df | .323 | 5 | 9.377 | .887 |
| | Based on trimmed mean | .558 | 5 | 12 | .730 |

*One Way Anova*

**ANOVA**

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Formula_0 | Between Groups | 12.712 | 5 | 2.542 | 29.524 | .000 |
| | Within Groups | 1.033 | 12 | .086 | | |
| | Total | 13.745 | 17 | | | |
| Formula_1 | Between Groups | 11.124 | 5 | 2.225 | 31.534 | .000 |
| | Within Groups | .847 | 12 | .071 | | |
| | Total | 11.971 | 17 | | | |
| Formula_2 | Between Groups | 15.564 | 5 | 3.113 | 50.029 | .000 |
| | Within Groups | .747 | 12 | .062 | | |
| | Total | 16.311 | 17 | | | |
| Formula_3 | Between Groups | 9.389 | 5 | 1.878 | 23.638 | .000 |
| | Within Groups | .953 | 12 | .079 | | |
| | Total | 10.343 | 17 | | | |

*Post Hoc Test*

**Multiple Comparisons**

Bonferroni

| Dependent Variable | (I) Siklus_ke | (J) Siklus_ke | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| Formula_0 | 1 | 2 | .23333 | .23960 | 1.000 | -.6409 | 1.1076 |
| | | 3 | 1.43333* | .23960 | .001 | .5591 | 2.3076 |
| | | 4 | 1.66667* | .23960 | .000 | .7924 | 2.5409 |
| | | 5 | 1.93333* | .23960 | .000 | 1.0591 | 2.8076 |
| | | 6 | 2.23333* | .23960 | .000 | 1.3591 | 3.1076 |
| | 2 | 1 | -.23333 | .23960 | 1.000 | -1.1076 | .6409 |
| | | 3 | 1.20000* | .23960 | .005 | .3257 | 2.0743 |
| | | 4 | 1.43333* | .23960 | .001 | .5591 | 2.3076 |
| | | 5 | 1.70000* | .23960 | .000 | .8257 | 2.5743 |
| | | 6 | 2.00000* | .23960 | .000 | 1.1257 | 2.8743 |
| | 3 | 1 | -1.43333* | .23960 | .001 | -2.3076 | -.5591 |
| | | 2 | -1.20000* | .23960 | .005 | -2.0743 | -.3257 |
| | | 4 | .23333 | .23960 | 1.000 | -.6409 | 1.1076 |
| | | 5 | .50000 | .23960 | .884 | -.3743 | 1.3743 |
| | | 6 | .80000 | .23960 | .088 | -.0743 | 1.6743 |
| | 4 | 1 | -1.66667* | .23960 | .000 | -2.5409 | -.7924 |
| | | 2 | -1.43333* | .23960 | .001 | -2.3076 | -.5591 |
| | | 3 | -.23333 | .23960 | 1.000 | -1.1076 | .6409 |
| | | 5 | .26667 | .23960 | 1.000 | -.6076 | 1.1409 |
| | | 6 | .56667 | .23960 | .536 | -.3076 | 1.4409 |
| | 5 | 1 | -1.93333* | .23960 | .000 | -2.8076 | -1.0591 |
| | | 2 | -1.70000* | .23960 | .000 | -2.5743 | -.8257 |
| | | 3 | -.50000 | .23960 | .884 | -1.3743 | .3743 |
| | | 4 | -.26667 | .23960 | 1.000 | -1.1409 | .6076 |
| | | 6 | .30000 | .23960 | 1.000 | -.5743 | 1.1743 |
| | 6 | 1 | -2.23333* | .23960 | .000 | -3.1076 | -1.3591 |
| | | 2 | -2.00000* | .23960 | .000 | -2.8743 | -1.1257 |
| | | 3 | -.80000 | .23960 | .088 | -1.6743 | .0743 |
| | | 4 | -.56667 | .23960 | .536 | -1.4409 | .3076 |
| | | 5 | -.30000 | .23960 | 1.000 | -1.1743 | .5743 |
| Formula_1 | 1 | 2 | .30000 | .21688 | 1.000 | -.4914 | 1.0914 |
| | | 3 | 1.40000* | .21688 | .000 | .6086 | 2.1914 |
| | | 4 | 1.63333* | .21688 | .000 | .8420 | 2.4247 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 5 | 1.80000* | .21688 | .000 | 1.0086 | 2.5914 |
| | | 6 | 2.13333* | .21688 | .000 | 1.3420 | 2.9247 |
| | 2 | 1 | -.30000 | .21688 | 1.000 | -1.0914 | .4914 |
| | | 3 | 1.10000* | .21688 | .004 | .3086 | 1.8914 |
| | | 4 | 1.33333* | .21688 | .001 | .5420 | 2.1247 |
| | | 5 | 1.50000* | .21688 | .000 | .7086 | 2.2914 |
| | | 6 | 1.83333* | .21688 | .000 | 1.0420 | 2.6247 |
| | 3 | 1 | -1.40000* | .21688 | .000 | -2.1914 | -.6086 |
| | | 2 | -1.10000* | .21688 | .004 | -1.8914 | -.3086 |
| | | 4 | .23333 | .21688 | 1.000 | -.5580 | 1.0247 |
| | | 5 | .40000 | .21688 | 1.000 | -.3914 | 1.1914 |
| | | 6 | .73333 | .21688 | .082 | -.0580 | 1.5247 |
| | 4 | 1 | -1.63333* | .21688 | .000 | -2.4247 | -.8420 |
| | | 2 | -1.33333* | .21688 | .001 | -2.1247 | -.5420 |
| | | 3 | -.23333 | .21688 | 1.000 | -1.0247 | .5580 |
| | | 5 | .16667 | .21688 | 1.000 | -.6247 | .9580 |
| | | 6 | .50000 | .21688 | .597 | -.2914 | 1.2914 |
| | 5 | 1 | -1.80000* | .21688 | .000 | -2.5914 | -1.0086 |
| | | 2 | -1.50000* | .21688 | .000 | -2.2914 | -.7086 |
| | | 3 | -.40000 | .21688 | 1.000 | -1.1914 | .3914 |
| | | 4 | -.16667 | .21688 | 1.000 | -.9580 | .6247 |
| | | 6 | .33333 | .21688 | 1.000 | -.4580 | 1.1247 |
| | 6 | 1 | -2.13333* | .21688 | .000 | -2.9247 | -1.3420 |
| | | 2 | -1.83333* | .21688 | .000 | -2.6247 | -1.0420 |
| | | 3 | -.73333 | .21688 | .082 | -1.5247 | .0580 |
| | | 4 | -.50000 | .21688 | .597 | -1.2914 | .2914 |
| | | 5 | -.33333 | .21688 | 1.000 | -1.1247 | .4580 |
| Formula_2 | 1 | 2 | .33333 | .20367 | 1.000 | -.4098 | 1.0765 |
| | | 3 | 1.80000* | .20367 | .000 | 1.0568 | 2.5432 |
| | | 4 | 2.06667* | .20367 | .000 | 1.3235 | 2.8098 |
| | | 5 | 2.46667* | .20367 | .000 | 1.7235 | 3.2098 |
| | | 6 | 2.00000* | .20367 | .000 | 1.2568 | 2.7432 |
| | 2 | 1 | -.33333 | .20367 | 1.000 | -1.0765 | .4098 |
| | | 3 | 1.46667* | .20367 | .000 | .7235 | 2.2098 |
| | | 4 | 1.73333* | .20367 | .000 | .9902 | 2.4765 |
| | | 5 | 2.13333* | .20367 | .000 | 1.3902 | 2.8765 |
| | | 6 | 1.66667* | .20367 | .000 | .9235 | 2.4098 |
| | 3 | 1 | -1.80000* | .20367 | .000 | -2.5432 | -1.0568 |
| | | 2 | -1.46667* | .20367 | .000 | -2.2098 | -.7235 |
| | | 4 | .26667 | .20367 | 1.000 | -.4765 | 1.0098 |
| | | 5 | .66667 | .20367 | .100 | -.0765 | 1.4098 |
| | | 6 | .20000 | .20367 | 1.000 | -.5432 | .9432 |
| | 4 | 1 | -2.06667* | .20367 | .000 | -2.8098 | -1.3235 |
| | | 2 | -1.73333* | .20367 | .000 | -2.4765 | -.9902 |
| | | 3 | -.26667 | .20367 | 1.000 | -1.0098 | .4765 |
| | | 5 | .40000 | .20367 | 1.000 | -.3432 | 1.1432 |
| | | 6 | -.06667 | .20367 | 1.000 | -.8098 | .6765 |
| | 5 | 1 | -2.46667* | .20367 | .000 | -3.2098 | -1.7235 |
| | | 2 | -2.13333* | .20367 | .000 | -2.8765 | -1.3902 |
| | | 3 | -.66667 | .20367 | .100 | -1.4098 | .0765 |
| | | 4 | -.40000 | .20367 | 1.000 | -1.1432 | .3432 |
| | | 6 | -.46667 | .20367 | .613 | -1.2098 | .2765 |
| | 6 | 1 | -2.00000* | .20367 | .000 | -2.7432 | -1.2568 |
| | | 2 | -1.66667* | .20367 | .000 | -2.4098 | -.9235 |
| | | 3 | -.20000 | .20367 | 1.000 | -.9432 | .5432 |
| | | 4 | .06667 | .20367 | 1.000 | -.6765 | .8098 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 5 | .46667 | .20367 | .613 | -.2765 | 1.2098 |
| Formula_3 | 1 | 2 | -.16667 | .23014 | 1.000 | -1.0064 | .6731 |
| | | 3 | 1.10000* | .23014 | .007 | .2603 | 1.9397 |
| | | 4 | 1.43333* | .23014 | .001 | .5936 | 2.2731 |
| | | 5 | 1.36667* | .23014 | .001 | .5269 | 2.2064 |
| | | 6 | 1.70000* | .23014 | .000 | .8603 | 2.5397 |
| | 2 | 1 | .16667 | .23014 | 1.000 | -.6731 | 1.0064 |
| | | 3 | 1.26667* | .23014 | .002 | .4269 | 2.1064 |
| | | 4 | 1.60000* | .23014 | .000 | .7603 | 2.4397 |
| | | 5 | 1.53333* | .23014 | .000 | .6936 | 2.3731 |
| | | 6 | 1.86667* | .23014 | .000 | 1.0269 | 2.7064 |
| | 3 | 1 | -1.10000* | .23014 | .007 | -1.9397 | -.2603 |
| | | 2 | -1.26667* | .23014 | .002 | -2.1064 | -.4269 |
| | | 4 | .33333 | .23014 | 1.000 | -.5064 | 1.1731 |
| | | 5 | .26667 | .23014 | 1.000 | -.5731 | 1.1064 |
| | | 6 | .60000 | .23014 | .344 | -.2397 | 1.4397 |
| | 4 | 1 | -1.43333* | .23014 | .001 | -2.2731 | -.5936 |
| | | 2 | -1.60000* | .23014 | .000 | -2.4397 | -.7603 |
| | | 3 | -.33333 | .23014 | 1.000 | -1.1731 | .5064 |
| | | 5 | -.06667 | .23014 | 1.000 | -.9064 | .7731 |
| | | 6 | .26667 | .23014 | 1.000 | -.5731 | 1.1064 |
| | 5 | 1 | -1.36667* | .23014 | .001 | -2.2064 | -.5269 |
| | | 2 | -1.53333* | .23014 | .000 | -2.3731 | -.6936 |
| | | 3 | -.26667 | .23014 | 1.000 | -1.1064 | .5731 |
| | | 4 | .06667 | .23014 | 1.000 | -.7731 | .9064 |
| | | 6 | .33333 | .23014 | 1.000 | -.5064 | 1.1731 |
| | 6 | 1 | -1.70000* | .23014 | .000 | -2.5397 | -.8603 |
| | | 2 | -1.86667* | .23014 | .000 | -2.7064 | -1.0269 |
| | | 3 | -.60000 | .23014 | .344 | -1.4397 | .2397 |
| | | 4 | -.26667 | .23014 | 1.000 | -1.1064 | .5731 |
| | | 5 | -.33333 | .23014 | 1.000 | -1.1731 | .5064 |

*. The mean difference is significant at the 0.05 level.

**Lampiran 24.** Hasil analisis statistik pengukuran daya sebar *cycling test*
Normalitas

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Siklus_ke | Statistic | df | Sig. | Statistic | df | Sig. |
| Formula_0 | 1 | .292 | 3 | . | .923 | 3 | .463 |
| | 2 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 3 | .253 | 3 | . | .964 | 3 | .637 |
| | 4 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 5 | .253 | 3 | . | .964 | 3 | .637 |
| | 6 | .369 | 3 | . | .789 | 3 | .089 |
| Formula_1 | 1 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 2 | .292 | 3 | . | .923 | 3 | .463 |
| | 3 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 4 | .253 | 3 | . | .964 | 3 | .637 |
| | 5 | .253 | 3 | . | .964 | 3 | .637 |
| | 6 | .314 | 3 | . | .893 | 3 | .363 |
| Formula_2 | 1 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 2 | .292 | 3 | . | .923 | 3 | .463 |
| | 3 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 4 | .301 | 3 | . | .912 | 3 | .424 |
| | 5 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 6 | .337 | 3 | . | .855 | 3 | .253 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Formula_3 | 1 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 2 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 3 | .292 | 3 | . | .923 | 3 | .463 |
| | 4 | .314 | 3 | . | .893 | 3 | .363 |
| | 5 | .314 | 3 | . | .893 | 3 | .363 |
| | 6 | .292 | 3 | . | .923 | 3 | .463 |

a. Lilliefors Significance Correction

Homogenitas

**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Formula_0 | Based on Mean | 10.322 | 5 | 12 | .001 |
| | Based on Median | .825 | 5 | 12 | .555 |
| | Based on Median and with adjusted df | .825 | 5 | 2.199 | .622 |
| | Based on trimmed mean | 8.471 | 5 | 12 | .001 |
| Formula_1 | Based on Mean | 1.458 | 5 | 12 | .274 |
| | Based on Median | .293 | 5 | 12 | .908 |
| | Based on Median and with adjusted df | .293 | 5 | 6.588 | .902 |
| | Based on trimmed mean | 1.331 | 5 | 12 | .316 |
| Formula_2 | Based on Mean | 3.752 | 5 | 12 | .028 |
| | Based on Median | .737 | 5 | 12 | .610 |
| | Based on Median and with adjusted df | .737 | 5 | 4.359 | .631 |
| | Based on trimmed mean | 3.397 | 5 | 12 | .038 |
| Formula_3 | Based on Mean | .870 | 5 | 12 | .529 |
| | Based on Median | .160 | 5 | 12 | .973 |
| | Based on Median and with adjusted df | .160 | 5 | 8.940 | .971 |
| | Based on trimmed mean | .789 | 5 | 12 | .577 |

*One Way Anova*

**ANOVA**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Formula_0 | Between Groups | .004 | 5 | .001 | .362 | .865 |
| | Within Groups | .025 | 12 | .002 | | |
| | Total | .029 | 17 | | | |
| Formula_1 | Between Groups | .026 | 5 | .005 | 17.263 | .000 |
| | Within Groups | .004 | 12 | .000 | | |
| | Total | .029 | 17 | | | |
| Formula_2 | Between Groups | .034 | 5 | .007 | 5.564 | .007 |
| | Within Groups | .015 | 12 | .001 | | |
| | Total | .049 | 17 | | | |
| Formula_3 | Between Groups | .049 | 5 | .010 | 21.195 | .000 |
| | Within Groups | .006 | 12 | .000 | | |
| | Total | .054 | 17 | | | |

*Post Hoc Test*

**Multiple Comparisons**

Games-Howell

| Dependent Variable | (I) Siklus_ke | (J) Siklus_ke | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| Formula_0 | 1 | 2 | -.00333 | .01333 | 1.000 | -.0815 | .0749 |
| | | 3 | -.00667 | .01491 | .996 | -.0809 | .0675 |
| | | 4 | -.00333 | .01333 | 1.000 | -.0815 | .0749 |
| | | 5 | -.04000 | .01491 | .269 | -.1142 | .0342 |
| | | 6 | .00333 | .06289 | 1.000 | -.4776 | .4843 |
| | 2 | 1 | .00333 | .01333 | 1.000 | -.0749 | .0815 |
| | | 3 | -.00333 | .01054 | .999 | -.0578 | .0512 |
| | | 4 | .00000 | .00816 | 1.000 | -.0387 | .0387 |
| | | 5 | -.03667 | .01054 | .151 | -.0912 | .0178 |
| | | 6 | .00667 | .06200 | 1.000 | -.4976 | .5109 |
| | 3 | 1 | .00667 | .01491 | .996 | -.0675 | .0809 |
| | | 2 | .00333 | .01054 | .999 | -.0512 | .0578 |
| | | 4 | .00333 | .01054 | .999 | -.0512 | .0578 |
| | | 5 | -.03333 | .01247 | .260 | -.0925 | .0258 |
| | | 6 | .01000 | .06236 | 1.000 | -.4844 | .5044 |
| | 4 | 1 | .00333 | .01333 | 1.000 | -.0749 | .0815 |
| | | 2 | .00000 | .00816 | 1.000 | -.0387 | .0387 |
| | | 3 | -.00333 | .01054 | .999 | -.0578 | .0512 |
| | | 5 | -.03667 | .01054 | .151 | -.0912 | .0178 |
| | | 6 | .00667 | .06200 | 1.000 | -.4976 | .5109 |
| | 5 | 1 | .04000 | .01491 | .269 | -.0342 | .1142 |
| | | 2 | .03667 | .01054 | .151 | -.0178 | .0912 |
| | | 3 | .03333 | .01247 | .260 | -.0258 | .0925 |
| | | 4 | .03667 | .01054 | .151 | -.0178 | .0912 |
| | | 6 | .04333 | .06236 | .966 | -.4510 | .5377 |
| | 6 | 1 | -.00333 | .06289 | 1.000 | -.4843 | .4776 |
| | | 2 | -.00667 | .06200 | 1.000 | -.5109 | .4976 |
| | | 3 | -.01000 | .06236 | 1.000 | -.5044 | .4844 |
| | | 4 | -.00667 | .06200 | 1.000 | -.5109 | .4976 |
| | | 5 | -.04333 | .06236 | .966 | -.5377 | .4510 |
| Formula_1 | 1 | 2 | -.00667 | .01333 | .992 | -.0849 | .0715 |
| | | 3 | -.02000 | .00816 | .316 | -.0587 | .0187 |
| | | 4 | -.03333 | .01054 | .191 | -.0878 | .0212 |
| | | 5 | -.08333* | .01054 | .013 | -.1378 | -.0288 |
| | | 6 | -.10000 | .01633 | .057 | -.2054 | .0054 |
| | 2 | 1 | .00667 | .01333 | .992 | -.0715 | .0849 |
| | | 3 | -.01333 | .01333 | .892 | -.0915 | .0649 |
| | | 4 | -.02667 | .01491 | .557 | -.1009 | .0475 |
| | | 5 | -.07667* | .01491 | .045 | -.1509 | -.0025 |
| | | 6 | -.09333 | .01944 | .053 | -.1883 | .0016 |
| | 3 | 1 | .02000 | .00816 | .316 | -.0187 | .0587 |
| | | 2 | .01333 | .01333 | .892 | -.0649 | .0915 |
| | | 4 | -.01333 | .01054 | .791 | -.0678 | .0412 |
| | | 5 | -.06333* | .01054 | .032 | -.1178 | -.0088 |
| | | 6 | -.08000 | .01633 | .095 | -.1854 | .0254 |
| | 4 | 1 | .03333 | .01054 | .191 | -.0212 | .0878 |
| | | 2 | .02667 | .01491 | .557 | -.0475 | .1009 |
| | | 3 | .01333 | .01054 | .791 | -.0412 | .0678 |
| | | 5 | -.05000 | .01247 | .086 | -.1091 | .0091 |
| | | 6 | -.06667 | .01764 | .132 | -.1624 | .0291 |
| | 5 | 1 | .08333* | .01054 | .013 | .0288 | .1378 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2 | .07667* | .01491 | .045 | .0025 | .1509 |
| | | 3 | .06333* | .01054 | .032 | .0088 | .1178 |
| | | 4 | .05000 | .01247 | .086 | -.0091 | .1091 |
| | | 6 | -.01667 | .01764 | .911 | -.1124 | .0791 |
| | 6 | 1 | .10000 | .01633 | .057 | -.0054 | .2054 |
| | | 2 | .09333 | .01944 | .053 | -.0016 | .1883 |
| | | 3 | .08000 | .01633 | .095 | -.0254 | .1854 |
| | | 4 | .06667 | .01764 | .132 | -.0291 | .1624 |
| | | 5 | .01667 | .01764 | .911 | -.0791 | .1124 |
| Formula_2 | 1 | 2 | .00333 | .01667 | 1.000 | -.0758 | .0824 |
| | | 3 | -.04000 | .01633 | .316 | -.1174 | .0374 |
| | | 4 | -.08333 | .04096 | .503 | -.3704 | .2038 |
| | | 5 | -.08000* | .01291 | .041 | -.1545 | -.0055 |
| | | 6 | -.11333 | .02472 | .086 | -.2526 | .0259 |
| | 2 | 1 | -.00333 | .01667 | 1.000 | -.0824 | .0758 |
| | | 3 | -.04333 | .01667 | .277 | -.1224 | .0358 |
| | | 4 | -.08667 | .04110 | .478 | -.3714 | .1981 |
| | | 5 | -.08333* | .01333 | .042 | -.1615 | -.0051 |
| | | 6 | -.11667 | .02494 | .079 | -.2549 | .0215 |
| | 3 | 1 | .04000 | .01633 | .316 | -.0374 | .1174 |
| | | 2 | .04333 | .01667 | .277 | -.0358 | .1224 |
| | | 4 | -.04333 | .04096 | .869 | -.3304 | .2438 |
| | | 5 | -.04000 | .01291 | .225 | -.1145 | .0345 |
| | | 6 | -.07333 | .02472 | .241 | -.2126 | .0659 |
| | 4 | 1 | .08333 | .04096 | .503 | -.2038 | .3704 |
| | | 2 | .08667 | .04110 | .478 | -.1981 | .3714 |
| | | 3 | .04333 | .04096 | .869 | -.2438 | .3304 |
| | | 5 | .00333 | .03972 | 1.000 | -.3108 | .3174 |
| | | 6 | -.03000 | .04497 | .975 | -.2779 | .2179 |
| | 5 | 1 | .08000* | .01291 | .041 | .0055 | .1545 |
| | | 2 | .08333* | .01333 | .042 | .0051 | .1615 |
| | | 3 | .04000 | .01291 | .225 | -.0345 | .1145 |
| | | 4 | -.00333 | .03972 | 1.000 | -.3174 | .3108 |
| | | 6 | -.03333 | .02261 | .708 | -.1963 | .1296 |
| | 6 | 1 | .11333 | .02472 | .086 | -.0259 | .2526 |
| | | 2 | .11667 | .02494 | .079 | -.0215 | .2549 |
| | | 3 | .07333 | .02472 | .241 | -.0659 | .2126 |
| | | 4 | .03000 | .04497 | .975 | -.2179 | .2779 |
| | | 5 | .03333 | .02261 | .708 | -.1296 | .1963 |
| Formula_3 | 1 | 2 | .03000 | .01291 | .389 | -.0445 | .1045 |
| | | 3 | -.02667 | .01667 | .637 | -.1058 | .0524 |
| | | 4 | -.04000 | .01915 | .438 | -.1345 | .0545 |
| | | 5 | -.07000 | .01915 | .122 | -.1645 | .0245 |
| | | 6 | -.13333* | .01667 | .008 | -.2124 | -.0542 |
| | 2 | 1 | -.03000 | .01291 | .389 | -.1045 | .0445 |
| | | 3 | -.05667 | .01333 | .112 | -.1349 | .0215 |
| | | 4 | -.07000 | .01633 | .128 | -.1754 | .0354 |
| | | 5 | -.10000 | .01633 | .057 | -.2054 | .0054 |
| | | 6 | -.16333* | .01333 | .007 | -.2415 | -.0851 |
| | 3 | 1 | .02667 | .01667 | .637 | -.0524 | .1058 |
| | | 2 | .05667 | .01333 | .112 | -.0215 | .1349 |
| | | 4 | -.01333 | .01944 | .974 | -.1083 | .0816 |
| | | 5 | -.04333 | .01944 | .388 | -.1383 | .0516 |
| | | 6 | -.10667* | .01700 | .019 | -.1873 | -.0261 |
| | 4 | 1 | .04000 | .01915 | .438 | -.0545 | .1345 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2 | .07000 | .01633 | .128 | -.0354 | .1754 |
| | | 3 | .01333 | .01944 | .974 | -.0816 | .1083 |
| | | 5 | -.03000 | .02160 | .736 | -.1324 | .0724 |
| | | 6 | -.09333 | .01944 | .053 | -.1883 | .0016 |
| | 5 | 1 | .07000 | .01915 | .122 | -.0245 | .1645 |
| | | 2 | .10000 | .01633 | .057 | -.0054 | .2054 |
| | | 3 | .04333 | .01944 | .388 | -.0516 | .1383 |
| | | 4 | .03000 | .02160 | .736 | -.0724 | .1324 |
| | | 6 | -.06333 | .01944 | .164 | -.1583 | .0316 |
| | 6 | 1 | .13333* | .01667 | .008 | .0542 | .2124 |
| | | 2 | .16333* | .01333 | .007 | .0851 | .2415 |
| | | 3 | .10667* | .01700 | .019 | .0261 | .1873 |
| | | 4 | .09333 | .01944 | .053 | -.0016 | .1883 |
| | | 5 | .06333 | .01944 | .164 | -.0316 | .1583 |

*. The mean difference is significant at the 0.05 level.

**Lampiran 25.** Hasil analisis statistik pengukuran daya lekat *cycling test*

Normalitas

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Siklus_ke | Statistic | df | Sig. | Statistic | df | Sig. |
| Formula_0 | 1 | .253 | 3 | . | .964 | 3 | .637 |
| | 2 | .337 | 3 | . | .855 | 3 | .253 |
| | 3 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 4 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 5 | .219 | 3 | . | .987 | 3 | .780 |
| | 6 | .292 | 3 | . | .923 | 3 | .463 |
| Formula_1 | 1 | .385 | 3 | . | .750 | 3 | .000 |
| | 2 | .349 | 3 | . | .832 | 3 | .194 |
| | 3 | .292 | 3 | . | .923 | 3 | .463 |
| | 4 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 5 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 6 | .253 | 3 | . | .964 | 3 | .637 |
| Formula_2 | 1 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 2 | .204 | 3 | . | .993 | 3 | .843 |
| | 3 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 4 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 5 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 6 | .219 | 3 | . | .987 | 3 | .780 |
| Formula_3 | 1 | .179 | 3 | . | .999 | 3 | .948 |
| | 2 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 3 | .253 | 3 | . | .964 | 3 | .637 |
| | 4 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 5 | .175 | 3 | . | 1.000 | 3 | 1.000 |
| | 6 | .253 | 3 | . | .964 | 3 | .637 |

a. Lilliefors Significance Correction

Homogenitas

**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Formula_0 | Based on Mean | 1.647 | 5 | 12 | .222 |

| | | | | | |
|---|---|---|---|---|---|
| | Based on Median | .336 | 5 | 12 | .882 |
| | Based on Median and with adjusted df | .336 | 5 | 5.178 | .872 |
| | Based on trimmed mean | 1.507 | 5 | 12 | .259 |
| Formula_1 | Based on Mean | 5.791 | 5 | 12 | .006 |
| | Based on Median | .711 | 5 | 12 | .626 |
| | Based on Median and with adjusted df | .711 | 5 | 2.961 | .656 |
| | Based on trimmed mean | 5.017 | 5 | 12 | .010 |
| Formula_2 | Based on Mean | 1.718 | 5 | 12 | .205 |
| | Based on Median | 1.167 | 5 | 12 | .380 |
| | Based on Median and with adjusted df | 1.167 | 5 | 5.189 | .432 |
| | Based on trimmed mean | 1.683 | 5 | 12 | .213 |
| Formula_3 | Based on Mean | .451 | 5 | 12 | .805 |
| | Based on Median | .294 | 5 | 12 | .907 |
| | Based on Median and with adjusted df | .294 | 5 | 9.232 | .905 |
| | Based on trimmed mean | .441 | 5 | 12 | .812 |

*One Way Anova*

**ANOVA**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Formula_0 | Between Groups | 583.563 | 5 | 116.713 | 2165.800 | .000 |
| | Within Groups | .647 | 12 | .054 | | |
| | Total | 584.209 | 17 | | | |
| Formula_1 | Between Groups | 583.978 | 5 | 116.796 | 2102.322 | .000 |
| | Within Groups | .667 | 12 | .056 | | |
| | Total | 584.645 | 17 | | | |
| Formula_2 | Between Groups | 565.771 | 5 | 113.154 | 2995.259 | .000 |
| | Within Groups | .453 | 12 | .038 | | |
| | Total | 566.224 | 17 | | | |
| Formula_3 | Between Groups | 555.461 | 5 | 111.092 | 5663.157 | .000 |
| | Within Groups | .235 | 12 | .020 | | |
| | Total | 555.697 | 17 | | | |

*Post Hoc Test*

**Multiple Comparisons**

Games-Howell

| Dependent Variable | (I) Siklus_ke | (J) Siklus_ke | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| Formula_0 | 1 | 2 | -8.20000* | .23570 | .001 | -9.6847 | -6.7153 |
| | | 3 | -10.73333* | .14530 | .000 | -11.4484 | -10.0182 |
| | | 4 | -10.93333* | .10541 | .000 | -11.4782 | -10.3885 |
| | | 5 | -14.20000* | .16997 | .000 | -15.1043 | -13.2957 |
| | | 6 | -18.56667* | .14907 | .000 | -19.3086 | -17.8248 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2 | 1 | 8.20000* | .23570 | .001 | 6.7153 | 9.6847 |
| | | 3 | -2.53333* | .24721 | .009 | -3.9262 | -1.1405 |
| | | 4 | -2.73333* | .22608 | .016 | -4.3627 | -1.1039 |
| | | 5 | -6.00000* | .26247 | .000 | -7.3492 | -4.6508 |
| | | 6 | -10.36667* | .24944 | .000 | -11.7486 | -8.9848 |
| | 3 | 1 | 10.73333* | .14530 | .000 | 10.0182 | 11.4484 |
| | | 2 | 2.53333* | .24721 | .009 | 1.1405 | 3.9262 |
| | | 4 | -.20000 | .12910 | .670 | -.9446 | .5446 |
| | | 5 | -3.46667* | .18559 | .000 | -4.3711 | -2.5622 |
| | | 6 | -7.83333* | .16667 | .000 | -8.6244 | -7.0423 |
| | 4 | 1 | 10.93333* | .10541 | .000 | 10.3885 | 11.4782 |
| | | 2 | 2.73333* | .22608 | .016 | 1.1039 | 4.3627 |
| | | 3 | .20000 | .12910 | .670 | -.5446 | .9446 |
| | | 5 | -3.26667* | .15635 | .002 | -4.2574 | -2.2760 |
| | | 6 | -7.63333* | .13333 | .000 | -8.4155 | -6.8512 |
| | 5 | 1 | 14.20000* | .16997 | .000 | 13.2957 | 15.1043 |
| | | 2 | 6.00000* | .26247 | .000 | 4.6508 | 7.3492 |
| | | 3 | 3.46667* | .18559 | .000 | 2.5622 | 4.3711 |
| | | 4 | 3.26667* | .15635 | .002 | 2.2760 | 4.2574 |
| | | 6 | -4.36667* | .18856 | .000 | -5.2778 | -3.4555 |
| | 6 | 1 | 18.56667* | .14907 | .000 | 17.8248 | 19.3086 |
| | | 2 | 10.36667* | .24944 | .000 | 8.9848 | 11.7486 |
| | | 3 | 7.83333* | .16667 | .000 | 7.0423 | 8.6244 |
| | | 4 | 7.63333* | .13333 | .000 | 6.8512 | 8.4155 |
| | | 5 | 4.36667* | .18856 | .000 | 3.4555 | 5.2778 |
| Formula_1 | 1 | 2 | -7.56667* | .28674 | .005 | -9.8732 | -5.2601 |
| | | 3 | -10.40000* | .12472 | .000 | -11.2879 | -9.5121 |
| | | 4 | -10.63333* | .06667 | .000 | -10.9952 | -10.2714 |
| | | 5 | -13.63333* | .06667 | .000 | -13.9952 | -13.2714 |
| | | 6 | -18.66667* | .09428 | .000 | -19.2755 | -18.0579 |
| | 2 | 1 | 7.56667* | .28674 | .005 | 5.2601 | 9.8732 |
| | | 3 | -2.83333* | .30912 | .018 | -4.7463 | -.9203 |
| | | 4 | -3.06667* | .29059 | .025 | -5.2749 | -.8584 |
| | | 5 | -6.06667* | .29059 | .006 | -8.2749 | -3.8584 |
| | | 6 | -11.10000* | .29814 | .001 | -13.1582 | -9.0418 |
| | 3 | 1 | 10.40000* | .12472 | .000 | 9.5121 | 11.2879 |
| | | 2 | 2.83333* | .30912 | .018 | .9203 | 4.7463 |
| | | 4 | -.23333 | .13333 | .588 | -1.0155 | .5488 |
| | | 5 | -3.23333* | .13333 | .001 | -4.0155 | -2.4512 |
| | | 6 | -8.26667* | .14907 | .000 | -9.0086 | -7.5248 |
| | 4 | 1 | 10.63333* | .06667 | .000 | 10.2714 | 10.9952 |
| | | 2 | 3.06667* | .29059 | .025 | .8584 | 5.2749 |
| | | 3 | .23333 | .13333 | .588 | -.5488 | 1.0155 |
| | | 5 | -3.00000* | .08165 | .000 | -3.3872 | -2.6128 |
| | | 6 | -8.03333* | .10541 | .000 | -8.5782 | -7.4885 |
| | 5 | 1 | 13.63333* | .06667 | .000 | 13.2714 | 13.9952 |
| | | 2 | 6.06667* | .29059 | .006 | 3.8584 | 8.2749 |
| | | 3 | 3.23333* | .13333 | .001 | 2.4512 | 4.0155 |
| | | 4 | 3.00000* | .08165 | .000 | 2.6128 | 3.3872 |
| | | 6 | -5.03333* | .10541 | .000 | -5.5782 | -4.4885 |
| | 6 | 1 | 18.66667* | .09428 | .000 | 18.0579 | 19.2755 |
| | | 2 | 11.10000* | .29814 | .001 | 9.0418 | 13.1582 |
| | | 3 | 8.26667* | .14907 | .000 | 7.5248 | 9.0086 |
| | | 4 | 8.03333* | .10541 | .000 | 7.4885 | 8.5782 |
| | | 5 | 5.03333* | .10541 | .000 | 4.4885 | 5.5782 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Formula_2 | 1 | 2 | -7.83333* | .21082 | .001 | -9.3238 | -6.3428 |
| | | 3 | -10.20000* | .08165 | .000 | -10.5872 | -9.8128 |
| | | 4 | -10.40000* | .08165 | .000 | -10.7872 | -10.0128 |
| | | 5 | -13.30000* | .08165 | .000 | -13.6872 | -12.9128 |
| | | 6 | -18.53333* | .15635 | .000 | -19.5240 | -17.5426 |
| | 2 | 1 | 7.83333* | .21082 | .001 | 6.3428 | 9.3238 |
| | | 3 | -2.36667* | .21082 | .018 | -3.8572 | -.8762 |
| | | 4 | -2.56667* | .21082 | .015 | -4.0572 | -1.0762 |
| | | 5 | -5.46667* | .21082 | .003 | -6.9572 | -3.9762 |
| | | 6 | -10.70000* | .24944 | .000 | -11.9504 | -9.4496 |
| | 3 | 1 | 10.20000* | .08165 | .000 | 9.8128 | 10.5872 |
| | | 2 | 2.36667* | .21082 | .018 | .8762 | 3.8572 |
| | | 4 | -.20000 | .08165 | .316 | -.5872 | .1872 |
| | | 5 | -3.10000* | .08165 | .000 | -3.4872 | -2.7128 |
| | | 6 | -8.33333* | .15635 | .000 | -9.3240 | -7.3426 |
| | 4 | 1 | 10.40000* | .08165 | .000 | 10.0128 | 10.7872 |
| | | 2 | 2.56667* | .21082 | .015 | 1.0762 | 4.0572 |
| | | 3 | .20000 | .08165 | .316 | -.1872 | .5872 |
| | | 5 | -2.90000* | .08165 | .000 | -3.2872 | -2.5128 |
| | | 6 | -8.13333* | .15635 | .000 | -9.1240 | -7.1426 |
| | 5 | 1 | 13.30000* | .08165 | .000 | 12.9128 | 13.6872 |
| | | 2 | 5.46667* | .21082 | .003 | 3.9762 | 6.9572 |
| | | 3 | 3.10000* | .08165 | .000 | 2.7128 | 3.4872 |
| | | 4 | 2.90000* | .08165 | .000 | 2.5128 | 3.2872 |
| | | 6 | -5.23333* | .15635 | .001 | -6.2240 | -4.2426 |
| | 6 | 1 | 18.53333* | .15635 | .000 | 17.5426 | 19.5240 |
| | | 2 | 10.70000* | .24944 | .000 | 9.4496 | 11.9504 |
| | | 3 | 8.33333* | .15635 | .000 | 7.3426 | 9.3240 |
| | | 4 | 8.13333* | .15635 | .000 | 7.1426 | 9.1240 |
| | | 5 | 5.23333* | .15635 | .001 | 4.2426 | 6.2240 |
| Formula_3 | 1 | 2 | -7.69667* | .08373 | .000 | -8.0943 | -7.2991 |
| | | 3 | -10.56333* | .10703 | .000 | -11.1071 | -10.0196 |
| | | 4 | -10.79667* | .08373 | .000 | -11.1943 | -10.3991 |
| | | 5 | -12.99667* | .13043 | .000 | -13.7333 | -12.2600 |
| | | 6 | -18.36333* | .10703 | .000 | -18.9071 | -17.8196 |
| | 2 | 1 | 7.69667* | .08373 | .000 | 7.2991 | 8.0943 |
| | | 3 | -2.86667* | .10541 | .000 | -3.4115 | -2.3218 |
| | | 4 | -3.10000* | .08165 | .000 | -3.4872 | -2.7128 |
| | | 5 | -5.30000* | .12910 | .000 | -6.0446 | -4.5554 |
| | | 6 | -10.66667* | .10541 | .000 | -11.2115 | -10.1218 |
| | 3 | 1 | 10.56333* | .10703 | .000 | 10.0196 | 11.1071 |
| | | 2 | 2.86667* | .10541 | .000 | 2.3218 | 3.4115 |
| | | 4 | -.23333 | .10541 | .404 | -.7782 | .3115 |
| | | 5 | -2.43333* | .14530 | .001 | -3.1484 | -1.7182 |
| | | 6 | -7.80000* | .12472 | .000 | -8.3915 | -7.2085 |
| | 4 | 1 | 10.79667* | .08373 | .000 | 10.3991 | 11.1943 |
| | | 2 | 3.10000* | .08165 | .000 | 2.7128 | 3.4872 |
| | | 3 | .23333 | .10541 | .404 | -.3115 | .7782 |
| | | 5 | -2.20000* | .12910 | .002 | -2.9446 | -1.4554 |
| | | 6 | -7.56667* | .10541 | .000 | -8.1115 | -7.0218 |
| | 5 | 1 | 12.99667* | .13043 | .000 | 12.2600 | 13.7333 |
| | | 2 | 5.30000* | .12910 | .000 | 4.5554 | 6.0446 |
| | | 3 | 2.43333* | .14530 | .001 | 1.7182 | 3.1484 |
| | | 4 | 2.20000* | .12910 | .002 | 1.4554 | 2.9446 |
| | | 6 | -5.36667* | .14530 | .000 | -6.0818 | -4.6516 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | 1 | 18.36333* | .10703 | .000 | 17.8196 | 18.9071 |
| | 2 | 10.66667* | .10541 | .000 | 10.1218 | 11.2115 |
| | 3 | 7.80000* | .12472 | .000 | 7.2085 | 8.3915 |
| | 4 | 7.56667* | .10541 | .000 | 7.0218 | 8.1115 |
| | 5 | 5.36667* | .14530 | .000 | 4.6516 | 6.0818 |

*. The mean difference is significant at the 0.05 level.

**Lampiran 26.** Hasil analisis statistik pengukuran Nilai SPF

Normalitas

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Formula | Statistic | df | Sig. | Statistic | df | Sig. |
| SPF | Formula 0 | .314 | 3 | . | .893 | 3 | .363 |
| | Formula 1 | .314 | 3 | . | .893 | 3 | .364 |
| | Formula 2 | .370 | 3 | . | .785 | 3 | .080 |
| | Formula 3 | .220 | 3 | . | .987 | 3 | .778 |

a. Lilliefors Significance Correction

Homogenitas

**Test of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| SPF | Based on Mean | 14.000 | 3 | 8 | .002 |
| | Based on Median | 1.024 | 3 | 8 | .432 |
| | Based on Median and with adjusted df | 1.024 | 3 | 2.032 | .527 |
| | Based on trimmed mean | 11.255 | 3 | 8 | .003 |

*One Way Anova*

**ANOVA**

SPF

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 1874.988 | 3 | 624.996 | 621.396 | .000 |
| Within Groups | 8.046 | 8 | 1.006 | | |
| Total | 1883.035 | 11 | | | |

*Post Hoc Test*

**Multiple Comparisons**

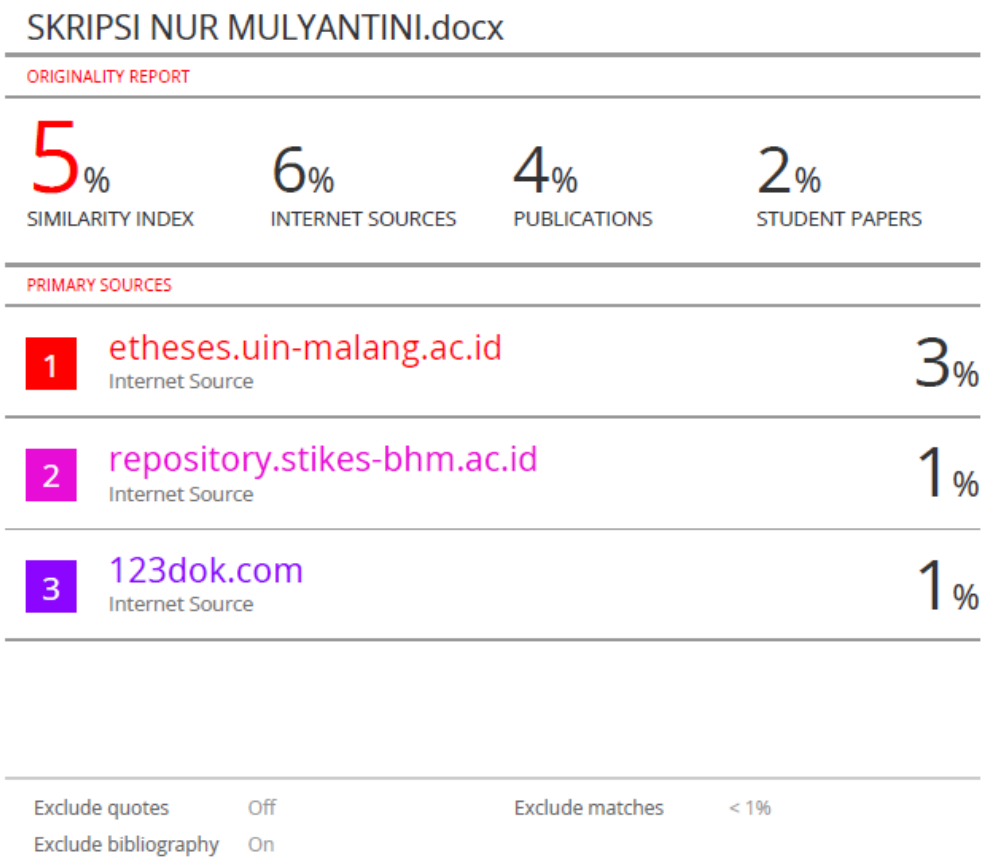
Dependent Variable: SPF
Games-Howell

| | | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| (I) Formula | (J) Formula | | | | Lower Bound | Upper Bound |
| Formula 0 | Formula 1 | -24.97049* | .12174 | .000 | -25.7272 | -24.2138 |
| | Formula 2 | -28.20977* | 1.15130 | .004 | -36.1760 | -20.2436 |
| | Formula 3 | -31.79293* | .04768 | .000 | -31.9979 | -31.5879 |
| Formula 1 | Formula 0 | 24.97049* | .12174 | .000 | 24.2138 | 25.7272 |
| | Formula 2 | -3.23929 | 1.15706 | .247 | -11.0710 | 4.5924 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Formula 3 | -6.82244* | .12478 | .000 | -7.5348 | -6.1101 |
| Formula 2 | Formula 0 | 28.20977* | 1.15130 | .004 | 20.2436 | 36.1760 |
| | Formula 1 | 3.23929 | 1.15706 | .247 | -4.5924 | 11.0710 |
| | Formula 3 | -3.58315 | 1.15162 | .212 | -11.5415 | 4.3752 |
| Formula 3 | Formula 0 | 31.79293* | .04768 | .000 | 31.5879 | 31.9979 |
| | Formula 1 | 6.82244* | .12478 | .000 | 6.1101 | 7.5348 |
| | Formula 2 | 3.58315 | 1.15162 | .212 | -4.3752 | 11.5415 |

*. The mean difference is significant at the 0.05 level.

**Lampiran 27.** Hasil Cek Plagiarisme



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**Lampiran 28.** Bukti Bimbingan

## A. Tugas Akhir 1

**NIM**

211FF03064

**Nama Mahasiswa**

NUR MULYANTINI

**Program Studi**

S1 Farmasi

**Jenis TA**

Skripsi

**SKS Lulus**

**149 SKS**

**Tgl. Pengajuan**

7 Oktober 2024

**Judul Diajukan**

Formulasi dan Evaluasi Lip Balm Sun Protection Factor (SPF) Ekstrak Daun Mengkudu (Morinda citrifolia L.) sebagai Tabir Surya

| No | Tanggal | Pembimbing Proposal | Topik | Disetujui | Aksi |
|---|---|---|---|---|---|
| 1 | 25 Oktober 2024 | Ira Adiyati Rum, M.Si | Bimbingan Pertama dan Perkenalan | ✔ | |
| 1 | 12 Oktober 2024 | MOHAMAD ISRONIJAYA | Bimbingan terkait Topik | ✔ | |
| 2 | 2 November 2024 | Ira Adiyati Rum, M.Si | Kaidah penulisan proposal | ✔ | |
| 2 | 21 Oktober 2024 | MOHAMAD ISRONIJAYA | Bimbingan Terkait Judul | ✔ | |
| 3 | 28 Oktober 2024 | MOHAMAD ISRONIJAYA | Bimbingan Proposal Bab 1 | ✔ | |
| 3 | 9 November 2024 | Ira Adiyati Rum, M.Si | Presentasi Laporan Kemajuan 1 | ✔ | |
| 4 | 9 November 2024 | Ira Adiyati Rum, M.Si | Laporan Kemajuan 1 | ✔ | |
| 4 | 8 November 2024 | MOHAMAD ISRONIJAYA | Presentasi Laporan Kemajuan 1 | ✔ | |
| 5 | 19 November 2024 | Ira Adiyati Rum, M.Si | Review Artikel | ✔ | |
| 5 | 9 November 2024 | MOHAMAD ISRONIJAYA | Laporan Kemajuan 1 | ✔ | |
| 6 | 26 November 2024 | Ira Adiyati Rum, M.Si | Bimbingan Bab 1 | ✔ | |

| No | Tanggal | Pembimbing Proposal | Topik | Disetujui | Aksi |
|---|---|---|---|---|---|
| 6 | 27 November 2024 | MOHAMAD ISRONIJAYA | Revisi Bab 1 dan Perubahan Judul | ✔ | |
| 7 | 29 November 2024 | MOHAMAD ISRONIJAYA | Bimbingan Bab 2 | ✔ | |
| 7 | 27 November 2024 | Ira Adiyati Rum, M.Si | Revisi Bab 1 dan Perubahan Judul | ✔ | |
| 8 | 12 Desember 2024 | MOHAMAD ISRONIJAYA | Bimbingan Bab 3 | ✔ | |
| 8 | 6 Desember 2024 | Ira Adiyati Rum, M.Si | Bimbingan Bab 2 | ✔ | |
| 9 | 12 Desember 2024 | Ira Adiyati Rum, M.Si | Bimbingan Bab 3 | ✔ | |
| 9 | 14 Desember 2024 | MOHAMAD ISRONIJAYA | Bimbingan Proposal Bab 1-3 | ✔ | |
| 10 | 21 Desember 2024 | MOHAMAD ISRONIJAYA | Presentasi Laporan Kemajuan 2 | ✔ | |
| 10 | 14 Desember 2024 | Ira Adiyati Rum, M.Si | Bimbingan Proposal Bab 1-3 | ✔ | |
| 11 | 14 Desember 2024 | Ira Adiyati Rum, M.Si | Special Talk dengan tema : "Ethical Issues in scientific writing" | ✔ | |
| 11 | 21 Desember 2024 | MOHAMAD ISRONIJAYA | Laporan Kemajuan 2 | ✔ | |
| 12 | 21 Desember 2024 | Ira Adiyati Rum, M.Si | Laporan Kemajuan 2 | ✔ | |
| 13 | 21 Desember 2024 | Ira Adiyati Rum, M.Si | Presentasi Laporan Kemajuan 2 | ✔ | |
| 14 | 13 Januari 2025 | Ira Adiyati Rum, M.Si | Revisi Proposal Bab 1-3 | ✔ | |

## B. Tugas Akhir 2

**NIM**

211FF03064

**Nama Mahasiswa**

NUR MULYANTINI

**Program Studi**

S1 Farmasi

**Jenis TA**

Skripsi

**Periode Mulai**

2024 Ganjil

**SKS Lulus**

**149 SKS**

**Tgl. Mulai**

4 Maret 2025

**Judul Tugas Akhir**

Formulasi dan Evaluasi Lip Balm Sun Protection Factor (SPF) Ekstrak Daun Mengkudu (Morinda citrifolia L.) sebagai Tabir Surya

**Tahap**

Seminar Kolokium/ Hasil Penelitian (Ujian)

**Status**

Selesai

| No | Tanggal | Dosen Pembimbing | Topik | Disetujui | Aksi |
|---|---|---|---|---|---|
| 1 | 12 Maret 2025 | Ira Adiyati Rum, M.Si | Pembuatan Logbook penelitian | ✔ | |
| 1 | 25 Februari 2025 | MOHAMAD ISRONIJAYA | Progress Penelitian | ✔ | |
| 2 | 25 Maret 2025 | Ira Adiyati Rum, M.Si | Progress Penelitian | ✔ | |
| 2 | 15 April 2025 | MOHAMAD ISRONIJAYA | Bimbingan terkait Formulasi Sediaan | ✔ | |
| 3 | 4 Mei 2025 | Ira Adiyati Rum, M.Si | Presentasi Laporan Kemajuan 1 | ✔ | |
| 3 | 5 Mei 2025 | MOHAMAD ISRONIJAYA | Presentasi Laporan Kemajuan 1 TA2 | ✔ | |
| 4 | 5 Mei 2025 | Ira Adiyati Rum, M.Si | Laporan kemajuan 1 | ✔ | |
| 4 | 5 Mei 2025 | MOHAMAD ISRONIJAYA | Laporan kemajuan 1 TA2 | ✔ | |
| 5 | 13 Juni 2025 | Ira Adiyati Rum, M.Si | Laporan Kemajuan 2 | ✔ | |
| 5 | 13 Juni 2025 | MOHAMAD ISRONIJAYA | PPT Laporan Kemajuan 2 | ✔ | |

| No | Tanggal | Dosen Pembimbing | Topik | Disetujui | Aksi |
|---|---|---|---|---|---|
| 6 | 13 Juni 2025 | MOHAMAD ISRONIJAYA | Laporan Kemajuan 2 | ✔ | |
| 6 | 13 Juni 2025 | Ira Adiyati Rum, M.Si | PPT Laporan Kemajuan 2 | ✔ | |
| 7 | 13 Juni 2025 | Ira Adiyati Rum, M.Si | Bimbingan Bab 4 | ✔ | |
| 7 | 27 Juni 2025 | MOHAMAD ISRONIJAYA | Bimbingan Bab 4 | ✔ | |
| 8 | 5 Juli 2025 | MOHAMAD ISRONIJAYA | Tanda tangan halaman persetujuan | ✔ | |
| 8 | 8 Juli 2025 | Ira Adiyati Rum, M.Si | Bimbingan dan Tanda tangan halaman persetujuan | ✔ | |
| 9 | 9 Juli 2025 | Ira Adiyati Rum, M.Si | Bimbingan Bab 5 | ✔ | |
| 9 | 9 Juli 2025 | MOHAMAD ISRONIJAYA | Bimbingan Bab 5 | ✔ | |
| 10 | 10 Juli 2025 | MOHAMAD ISRONIJAYA | Bimbingan Draft Skripsi | ✔ | |
| 10 | 10 Juli 2025 | Ira Adiyati Rum, M.Si | Bimbingan Draft Skripsi | ✔ | |
| 11 | 10 Juli 2025 | MOHAMAD ISRONIJAYA | Abstrak Tugas Akhir | ✔ | |
| 11 | 10 Juli 2025 | Ira Adiyati Rum, M.Si | Abstrak Tugas Akhir | ✔ | |

**Lampiran 29.** Daftar Riwayat Hidup

## DAFTAR RIWAYAT HIDUP

### A. Identitas Pribadi

| | | |
|---|---|---|
| Nama | : | Nur Mulyantini |
| NIM | : | 211FF03064 |
| Program Studi | : | S1 Farmasi |
| Tempat, Tanggal Lahir | : | Sumedang, 25 Mei 2002 |
| Jenis Kelamin | : | Perempuan |
| Agama | : | Islam |
| Kewarganegaraan | : | Indonesia |
| Alamat | : | Dusun Nagrak RT.01 RW.07, Desa Cikoneng Kulon, Kecamatan Ganeas, Kabupaten Sumedang, Jawa Barat |
| No. Telepon | : | 081222023782 |
| Email | : | 211ff03064@bku.ac.id |

### B. Riwayat Pendidikan

| | | |
|---|---|---|
| SD | : | 2009-2015 SD Negeri Cikoneng 1 Sumedang |
| SMP | : | 2015-2018 SMP Negeri 4 Sumedang |
| SMA/SMK | : | 2018-2021 SMK Bina Harapan Sumedang |
| S1 | : | 2021-2025 Universitas Bhakti Kencana |

### C. Pengalaman dan Pencapaian

- Tahun 2024-2025 Asisten Akademik MBKM Universitas Bhakti Kencana
- Tahun 2023 Juara 2 Pekan Kreativitas Mahasiswa S1 Farmasi Universitas Bhakti Kencana
- Tahun 2022 Finalis Personal Branding S1 Farmasi Universitas Bhakti Kencana
- Tahun 2021 PKL (Praktek Kerja Lapangan) di Klinik dan Apotek Tampomas Sumedang