

LAMPIRAN

Lampiran 1. Alat dan Bahan Penelitian

Tabel 1. Alat yang digunakan pada penelitian

| Nama Alat | Jumlah |
|---|---------|
| Autoklaf | 1 unit |
| <i>Atomic Absorption Spectrometry (AAS)</i> | 1 unit |
| Bak dan rak pencuci | 1 unit |
| Beaker glass 100 mL | 3 unit |
| Beaker glass 1000 mL | 2 unit |
| Beaker glass 250 mL | 2 unit |
| Beaker glass 50 mL | 2 unit |
| Beaker glass 500 mL | 2 unit |
| Botol semprot | 1 unit |
| Bunsen <i>burner</i> | 2 unit |
| Cawan Petri | 50 unit |
| Centrifuge | 1 unit |
| Corong | 1 unit |
| Erlenmeyer | 5 unit |
| Gelas ukur 10 mL | 1 unit |
| Gelas ukur 100 mL | 1 unit |
| Gelas ukur 50 mL | 1 unit |
| <i>Gelas ukur 500 mL</i> | 1 unit |
| <i>Hotplate</i> | 1 unit |
| Inkubator | 1 unit |

| | |
|-----------------------------------|--------|
| Jarum inokulasi | 2 unit |
| Kamera HP | 1 unit |
| Kulkas 4°C | 1 unit |
| <i>Magnetic stirrer</i> | 1 unit |
| <i>Microplate (96-well plate)</i> | 2 unit |
| <i>Microplate Reader</i> | 1 unit |
| Mikropipet | 2 unit |
| Mikroskop | 1 unit |
| Neraca analitik | 1 unit |
| <i>Object glass + cover glass</i> | 1 pack |
| Penangas air | 1 unit |
| Pipa PVC | 2 unit |
| <i>Pipet tetes</i> | 5 unit |
| Plastik tahan panas | 1 pack |
| Rak tabung reaksi | 3 unit |
| Sarung tangan | 1 box |
| <i>Soil Corer</i> | 1 unit |
| <i>Soil Tester</i> | 1 unit |
| <i>Vortex</i> | 1 unit |

Tabel 2. Bahan yang digunakan pada penelitian

| Nama Bahan | Jumlah |
|---|---------------|
| Alkohol 96% | 100 mL |
| Akuades | 7 liter |
| Amilum | 0,5 gram |
| Ammonium dihydrogen fosfat | 0,5 gram |
| Barrits A | 5 mL |
| Barrits B | 5 mL |
| Beef Extract | 4 gram |
| Bromthymol Blue | 0,02 gram |
| Dextrosa | 0,5 gram |
| 1,5-difenilkarbazida (DPC) | 0,8 gram |
| Dipotassium fosfat | 1 gram |
| Fenol Red | 0,01 gram |
| Ferrous Amonium | 0,1 gram |
| Gelatin | 36 gram |
| Glukosa | 0,5 gram |
| H ₂ O ₂ 3% | Secukupnya |
| Kloramfenikol | 0,075 gram |
| KOH | 5 mL |
| Kovac's Reagent | 10 mL |
| Kristal violet | 10 mL |
| Kromium K ₂ CrO ₇ | 5 g |
| Lactophenol cotton blue | 10 mL |

| | |
|--------------------------------------|---------|
| Laktosa | 5 gram |
| Lipid/Minyak goreng | 3 gram |
| Lugol | 10 mL |
| Malakit Hijau | 10 mL |
| MgSO ₄ .7H ₂ O | 1 gram |
| Nutrient Agar | 50 gram |
| <i>Nutrient Broth</i> | 14 gram |
| Spirtus | 1 liter |

Lampiran 2. Hasil Uji AAS**Tabel I. Hasil Pengujian**

| No. | Parameter | Kromium (Cr) (mg/kg) |
|-----|---|----------------------------|
| | Metoda | IK-MP.K-T08 (AAS & MP-AES) |
| | Kode Laboratorium / Titik Pengambilan Contoh Uji | |
| 1 | 520/1/T1/BINA/26.01.24 Rhizosfer | 7.582 |

Keterangan :

- Hasil Analisa berdasarkan berat kering

Lampiran 3. Hasil Uji Statistika SPSS

3a. Uji SPSS Efisiensi Bioremoval

Uji Normalitas

- Hipotesis:
 - H_0 : Sebaran data bioremoval logam krom berdistribusi normal
 - H_1 : Sebaran data bioremoval logam krom tidak berdistribusi normal
- Dasar Keputusan:
 - Nilai P-Value (Sig.) \geq taraf signifikansi 5% (0.05) keputusan menerima H_0
- Keputusan:
 - Nilai (Sig. \geq 0.05) maka keputusan menerima H_0 yang berarti data berdistribusi normal

| Tests of Normality | | | | | | |
|--------------------|---------------------------------|----|-------|--------------|----|------|
| | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Nilai_Bioremoval | .137 | 24 | .200* | .938 | 24 | .150 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Uji Homogenitas

- Hipotesis:
 - H_0 : Variasi data bioremoval logam krom bersifat homogen
 - H_1 : Variasi data bioremoval logam krom tidak homogen
- Dasar Keputusan:
 - Nilai P-Value (Sig.) \geq taraf signifikansi 5% (0.05) keputusan menerima H_0
- Keputusan:
 - Nilai (Sig. \geq 0.05) maka keputusan menerima H_0 yang berarti data bersifat homogen

| Test of Homogeneity of Variances | | | | | |
|----------------------------------|---------------|------------------|-----|-----|------|
| | | Levene Statistic | df1 | df2 | Sig. |
| Nilai_Bioremoval | Based on Mean | 3.813 | 5 | 18 | .016 |

Nur Aziema, 2024

UJI KEMAMPUAN FORMULA KONSORSIUM BAKTERI RHIZOSFER DALAM BIOREMEDIASI LOGAM KROMIUM SECARA IN VITRO

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

| | | | | |
|--------------------------------------|-------|---|-------|------|
| Based on Median | 2.190 | 5 | 18 | .101 |
| Based on Median and with adjusted df | 2.190 | 5 | 7.864 | .157 |
| Based on trimmed mean | 3.522 | 5 | 18 | .021 |

Uji ANOVA One-Way

- Hipotesis:
 - H_0 : Data bioremoval logam krom antar konsorsium tidak berbeda secara signifikan
 - H_1 : Data bioremoval logam krom antar konsorsium berbeda secara signifikan
- Dasar Keputusan:
 - Nilai P-Value (Sig.) \leq taraf signifikansi 5% (0.05) keputusan menerima H_1
- Keputusan:
 - Nilai (Sig. \leq 0.05) maka keputusan menerima H_1 yang berarti efisiensi bioremoval krom oleh setiap konsorsium berbeda secara signifikan

| ANOVA | | | | | |
|------------------|----------------|----|-------------|--------|------|
| Nilai_Bioremoval | | | | | |
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | .396 | 5 | .079 | 34.427 | .000 |
| Within Groups | .041 | 18 | .002 | | |
| Total | .437 | 23 | | | |

Post Hoc Test

- Keputusan:
 - Nilai (Sig. \leq 0.05) berarti formula konsorsium yang memiliki efisiensi bioremoval krom berbeda secara signifikan dari kelompok lainnya

Multiple Comparisons

Dependent Variable: Bioremoval

Tukey HSD

| (I) Formula | (J) Formula | Mean Difference | | | 95% Confidence Interval | |
|-------------|-------------|-----------------|------------|------|-------------------------|-------------|
| | | (I-J) | Std. Error | Sig. | Lower Bound | Upper Bound |
| 1 | 2 | .161000* | .033908 | .002 | .05324 | .26876 |
| | 3 | .130000* | .033908 | .013 | .02224 | .23776 |
| | 4 | .094250 | .033908 | .107 | -.01351 | .20201 |
| | 5 | -.036250 | .033908 | .887 | -.14401 | .07151 |

Nur Aziema, 2024

UJI KEMAMPUAN FORMULA KONSORSIUM BAKTERI RHIZOSFER DALAM BIOREMEDIASI LOGAM KROMIUM SECARA IN VITRO

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

| | | | | | | |
|---|---|-----------|---------|------|---------|---------|
| | 6 | .360250* | .033908 | .000 | .25249 | .46801 |
| 2 | 1 | -.161000* | .033908 | .002 | -.26876 | -.05324 |
| | 3 | -.031000 | .033908 | .938 | -.13876 | .07676 |
| | 4 | -.066750 | .033908 | .396 | -.17451 | .04101 |
| | 5 | -.197250* | .033908 | .000 | -.30501 | -.08949 |
| | 6 | .199250* | .033908 | .000 | .09149 | .30701 |
| 3 | 1 | -.130000* | .033908 | .013 | -.23776 | -.02224 |
| | 2 | .031000 | .033908 | .938 | -.07676 | .13876 |
| | 4 | -.035750 | .033908 | .893 | -.14351 | .07201 |
| | 5 | -.166250* | .033908 | .001 | -.27401 | -.05849 |
| | 6 | .230250* | .033908 | .000 | .12249 | .33801 |
| 4 | 1 | -.094250 | .033908 | .107 | -.20201 | .01351 |
| | 2 | .066750 | .033908 | .396 | -.04101 | .17451 |
| | 3 | .035750 | .033908 | .893 | -.07201 | .14351 |
| | 5 | -.130500* | .033908 | .013 | -.23826 | -.02274 |
| | 6 | .266000* | .033908 | .000 | .15824 | .37376 |
| 5 | 1 | .036250 | .033908 | .887 | -.07151 | .14401 |
| | 2 | .197250* | .033908 | .000 | .08949 | .30501 |
| | 3 | .166250* | .033908 | .001 | .05849 | .27401 |
| | 4 | .130500* | .033908 | .013 | .02274 | .23826 |
| | 6 | .396500* | .033908 | .000 | .28874 | .50426 |
| 6 | 1 | -.360250* | .033908 | .000 | -.46801 | -.25249 |
| | 2 | -.199250* | .033908 | .000 | -.30701 | -.09149 |
| | 3 | -.230250* | .033908 | .000 | -.33801 | -.12249 |
| | 4 | -.266000* | .033908 | .000 | -.37376 | -.15824 |
| | 5 | -.396500* | .033908 | .000 | -.50426 | -.28874 |

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

1b. Uji SPSS Laju Pertumbuhan

Uji Normalitas

- Hipotesis:

H_0 : Sebaran data pertumbuhan konsorsium berdistribusi normal

H_1 : Sebaran data pertumbuhan konsorsium tidak berdistribusi normal

- Dasar Keputusan:

Nilai P-Value (Sig.) \geq taraf signifikansi 5% (0.05) keputusan menerima H_0

- Keputusan:

Nur Aziema, 2024

UJI KEMAMPUAN FORMULA KONSORSIUM BAKTERI RHIZOSFER DALAM BIOREMEDIASI LOGAM KROMIUM SECARA IN VITRO

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

Nilai (Sig. ≥ 0.05) maka keputusan menerima H_0 yang berarti data berdistribusi normal

| | | Tests of Normality | | | | | |
|--------------|---------------|---------------------------------|----|------|--------------|----|------|
| | | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
| | Jenis_Formula | Statistic | df | Sig. | Statistic | df | Sig. |
| Kurva_Tumbuh | Formula 1 | .154 | 28 | .089 | .888 | 28 | .006 |
| | Formula 2 | .144 | 28 | .143 | .907 | 28 | .016 |
| | Formula 3 | .182 | 28 | .019 | .892 | 28 | .008 |
| | Formula 4 | .184 | 28 | .017 | .913 | 28 | .023 |
| | Formula 5 | .142 | 28 | .159 | .891 | 28 | .007 |
| | Formula 6 | .145 | 28 | .138 | .917 | 28 | .030 |

a. Lilliefors Significance Correction

Uji Homogenitas

- Hipotesis:
 - H_0 : Variasi data pertumbuhan konsorsium bersifat homogen
 - H_1 : Variasi data pertumbuhan konsorsium tidak homogen
- Dasar Keputusan:
 - Nilai P-Value (Sig.) \geq taraf signifikansi 5% (0.05) keputusan menerima H_0
- Keputusan:
 - Nilai (Sig. ≥ 0.05) maka keputusan menerima H_0 yang berarti data bersifat homogen

| | | Test of Homogeneity of Variances | | | |
|--------------|--------------------------------------|----------------------------------|-----|---------|------|
| | | Levene Statistic | df1 | df2 | Sig. |
| Kurva_Tumbuh | Based on Mean | .503 | 5 | 162 | .773 |
| | Based on Median | .333 | 5 | 162 | .892 |
| | Based on Median and with adjusted df | .333 | 5 | 159.679 | .892 |
| | Based on trimmed mean | .502 | 5 | 162 | .774 |

Uji ANOVA

- Hipotesis:
 - H_0 : Data laju pertumbuhan antar konsorsium tidak berbeda secara signifikan

Nur Aziema, 2024

UJI KEMAMPUAN FORMULA KONSORSIUM BAKTERI RHIZOSFER DALAM BIOREMEDIASI LOGAM KROMIUM SECARA IN VITRO

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

H₁: Data laju pertumbuhan antar konsorsium berbeda secara signifikan

- Dasar Keputusan:

Nilai P-Value (Sig.) \leq taraf signifikansi 5% (0.05) keputusan menerima H₁

- Keputusan:

Nilai (Sig. \geq 0.05) maka keputusan menerima H₁ yang berarti laju pertumbuhan setiap konsorsium tidak berbeda secara signifikan

ANOVA

Kurva_Tumbuh

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|-----|-------------|------|------|
| Between Groups | .020 | 5 | .004 | .737 | .597 |
| Within Groups | .876 | 162 | .005 | | |
| Total | .896 | 167 | | | |


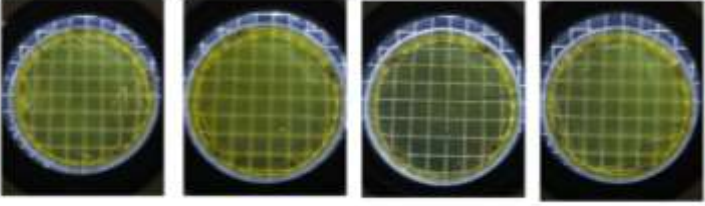
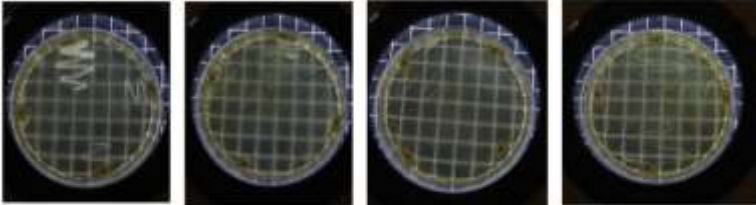
Uji Korelasi

Correlations

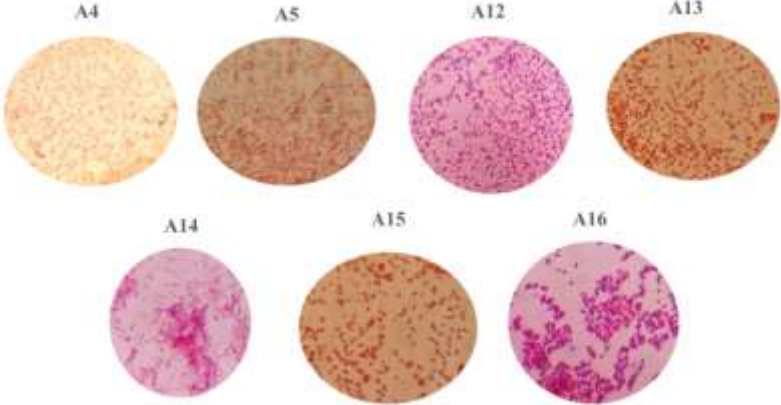
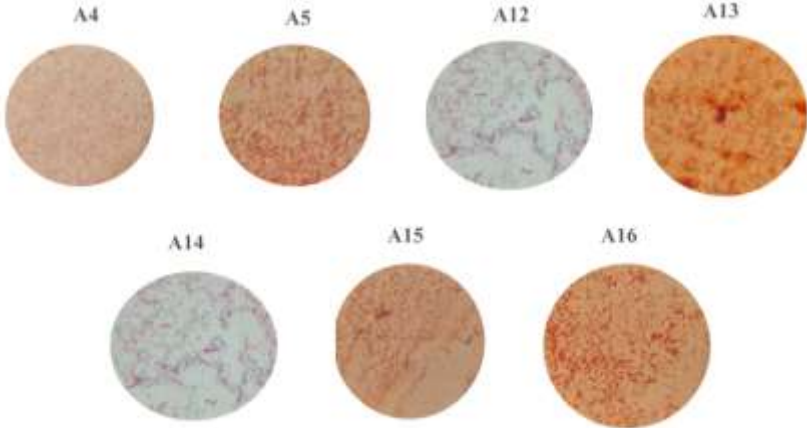
| | | Kurva_tumbuh | Bioremoval |
|--------------|---------------------|--------------|------------|
| Kurva_tumbuh | Pearson Correlation | 1 | .086 |
| | Sig. (2-tailed) | | .689 |
| | N | 168 | 24 |
| Bioremoval | Pearson Correlation | .086 | 1 |
| | Sig. (2-tailed) | .689 | |
| | N | 24 | 24 |

Lampiran 4. Dokumentasi Penelitian

4a. Hasil Seleksi Bakteri Resisten Krom

| Konsentrasi Krom | Dokumentasi |
|------------------|--|
| 2000 ppm |  |
| 1500 ppm |  |
| 1000 ppm |  |

4b. Hasil Uji Identifikasi Bakteri Resisten Krom

| Jenis Uji | Dokumentasi |
|---------------------|---|
| Pewarnaan Gram |  |
| Pewarnaan Endospora |  |

Uji Kasein

