

V. SIMPULAN DAN SARAN

A. Simpulan

Berdasarkan penelitian yang telah dilakukan, maka didapatkan kesimpulan sebagai berikut,

1. Kalus embrionik daun jambang sebagai target transformasi genetik *AtRKD4* menunjukkan kalus dengan tekstur kompak berwarna hijau dengan struktur sel tanaman yang globular.
2. Densitas optik kultur *A. tumefaciens* terhadap transformasi genetik *AtRKD4* dengan kalus embrionik daun jambang sebagai target transformasi menunjukkan hasil frekuensi transformasi tertinggi pada nilai OD₆₀₀ 0,6 yaitu sebesar 87,77%.
3. Konsentrasi asetosiringon pada tahap transformasi genetik *AtRKD4* pada kalus embrionik daun jambang sebagai target transformasi menunjukkan hasil persentase frekuensi transformasi tertinggi pada konsentrasi 75 mg/L yaitu sebesar 93,33% pada OD₆₀₀ 0,6

B. Saran

Berdasarkan penelitian yang telah dilakukan maka dapat diberikan saran sebagai berikut:

1. Dilakukan uji lanjutan terhadap hasil kalus transforman putatif sehingga didapatkan kalus transforman yang selanjutnya dikembangkan menjadi tanaman utuh.

2. Dilakukan pengembangan dalam rentang yang lebih luas terhadap variasi densitas optik kultur bakteri *A. tumefaciens* dan variasi konsentrasi asetsiringon sehingga didapatkan perlakuan yang optimal.



DAFTAR PUSTAKA

- Aggarwal, D., Kumar, A. dan Reddy, M.S. 2011. *Agrobacterium tumefaciens* mediated genetic transformation of selected elite clone(s) of *Eucalyptus tereticornis*. *Acta Physiologiae Plantarum* 33(5): 1603–1611.
- Apriyanthi, D.P.R.V., Laksmi, A.S. dan Widayanti, N.P. 2022. Identifikasi Bakteri Kontaminasi pada Gelang Tri Datu. *Jurnal Biologi Makassar* 7(2): 24–33.
- Artati, D. 2016. Sensitivitas gel red sebagai pewarna DNA pada gel elektroforesis. *Buletin Teknik Litkayasa Akuakultur* 11(1): 11–14.
- Asif, H., Khan, A., Iqbal, A., Khan, I.A., Heinze, B. dan Azim, M.K. 2013. The chloroplast genome sequence of *Syzygium cumini* (L.) and its relationship with other angiosperms. *Tree Genetics and Genomes* 9(3): 867–877.
- Breed, E.S., Murray, E.G.D. dan Smith, N.R. 1957. *Bergey's manual of determinative bacteriology*. Waverly Press, Baltimre.
- Budaya, M.S., Mursyanti, E. dan Yuda, P. 2022. Transformasi Genetik pada Kalus Embriogenik Tanaman Suku Rubiaceae. *Biota : Jurnal Ilmiah Ilmu-Ilmu Hayati* 7(April): 94–107.
- Carsono, N., Lukman, P.N., Damayanti, F., Susanto, U. dan Sari, S. 2014. Identifikasi polimorfis marka-marka molekuler yang diduga berkaitan dengan karakter daya hasil tinggi pada 30 genotip padi. *Chimica et Natura Acta* 2(1): 91–95.
- Darmawan, C. 2017. *Transformasi gen gusA dan hptII ke dalam kalus embriogenik kelapa sawit (Elaeis guineensis Jacq.) dengan elektroporasi*. Institut Pertanian Bogor.
- Fahlevi, M.R., Bakti, D. dan Sitepu, S.F. 2017. Karakterisasi molekuler *Elaeidobius kamerunicus* Faust. (Coleoptera; Curculionidae) asal Sumatera Utara menggunakan metode Amplified fragment length polymorphism (Aflp). *Jurnal Agroekoteknologi FP USU* 5(4): 941–953.
- Feranisa, A. 2016. Komparasi antara *Polymerase Chain Reaction* (PCR) Dan Loopmediated Isothermal Amplification (Lamp) dalam diagnosis molekuler. *ODONTO : Dental Journal* 3(2): 145.
- de França Bettencourt, G.M., Soccol, C.R., Giovanella, T.S., Franciscon, L., Kestring, D.R., Gerhardt, I.R. dan Degenhardt-Goldbach, J. 2020. *Agrobacterium tumefaciens*-mediated transformation of *Eucalyptus urophylla* clone BRS07-01. *Journal of Forestry Research* 31(2): 507–519.

- Glick, B.R., Pasternak, J.J. dan Patten, C.L. 2010. *Molecular Biotechnology: Principles and Applications of Recombinant DNA, 4th Edition*. ASM Press.
- Handayani, T. 2013. Penggunaan *Agrobacterium tumefaciens* sebagai perantara dalam transformasi genetik pada rumput laut. *Oseana* 38(4): 17–25.
- Harjanto, S. dan Raharjo, R. 2017. Peran *laminar air flow cabinet* dalam uji mikroorganisme untuk menunjang keselamatan kerja mahasiswa di laboratorium mikrobiologi. *Metana* 13(2): 55–57.
- Jejurker, S.H., Tanpure, U.R., Pawar, S.D., Joshi, R.R. dan Wadikar, M.S. 2016. Micropropagation of callus from *Syzygium cumini* explant. *International Journal of Pure dan Applied Bioscience* 4(1): 291–295.
- Jha, P., Shashi, Rustagi, A., Agnihotri, P.K., Kulkarni, V.M. dan Bhat, V. 2011. Efficient *Agrobacterium*-mediated transformation of *Pennisetum glaucum* (L.) R. Br. using shoot apices as explant source. *Plant Cell, Tissue and Organ Culture* 107(3): 501–512.
- Joko, T., Kusumandari, N. dan Hartono, S. 2011. Optimasi metode PCR untuk deteksi *Pectobacterium carotovorum*, penyebab penyakit busuk lunak anggrek. *Jurnal Perlindungan Tanaman Indonesia* 17(2): 54–59.
- Jyothishwaran, G., Kotresha, D., Selvaraj, T., Srideshikan, S.M., Rajvanshi, P.K. dan Jayabaskaran, C. 2007. A modified freeze-thaw method for efficient transformation of *Agrobacterium tumifaciens*. *Scientific Correspondence* 93(6): 770–772.
- Karthik, S., Pavan, G., Sathish, S., Siva, R. dan Suresh, P. 2018. Genotype - independent and enhanced in planta *Agrobacterium tumefaciens* - mediated genetic transformation of peanut [*Arachis hypogaea* (L.)]. *3 Biotech* 8(4): 1–15.
- Kumianjani, E.A.B., Damanik, R. dan Siregar, L. 2016. Pengaruh pemberian N 2,4-D terhadap pertumbuhan dan metabolisme kalus kedelai pada kondisi hipoksida secara *in vitro*. *Jurnal Agroekoteknologi Universitas Sumatera Utara* 4(1): 1673–1680.
- Li, M., Wang, D., Long, X., Hao, Z., Lu, Y., Zhou, Y., Peng, Y., Cheng, T., Shi, J. dan Chen, J. 2022. *Agrobacterium*-Mediated Genetic Transformation of Embryogenic Callus in a *Liriodendron* Hybrid (*L. Chinense* × *L. Tulipifera*). *Frontiers in Plant Science* 13(March).
- Mahadi, I., Syafi'i, W. dan Sari, Y. 2016. Pengaruh pemberian hormon 2,4 D dan BAP terhadap pertumbuhan kalus jeruk kasturi (*Citrus microcarpa*). *Biogenesis* 12(2): 99–104.
- Mahmudah, L., Nurcahyani, E., Irawan, B. dan Yulianty 2018. Penambahan

- Ekstrak tomat (*Solanum lycopersicum* L.) pada medium *Murashige and Skoog* (MS) terhadap pertumbuhan eksplan kentang (L.) kultivar granola secara *in vitro*. *Jurnal Penelitian Pertanian Terapan* 10(1): 1–8.
- Malik, S., Almeida, E.B. dan de Andrade Paes, A.M. 2017. *Syzygium cumini* (L.) Skeels: cardiometabolic properties and potential tissue culture-based improvement of secondary metabolites production. *Reference Series in Phytochemistry* 231–250.
- Mertawan, I.G.A.I., Dwiyantri, R. dan Yuswanti, H. 2018. Transformasi gen SoSPS1 melalui *Agrobacterium tumefaciens* pada tanaman anggur bali (*Vitis vinifera* L. var. Alphonso Laval) secara *in planta*. *Agrotrop* 8(1): 93–102.
- Mudiana, D. 2006. Germination of *Syzygium cumini* (L.) Skeels. *Biodiversitas Journal of Biological Diversity* 8(1): 39–42.
- Mulyaningsih, E.S., Aswidinnoor, H., Sopandie, D., Ouwerkerk, P.B.F., Nugroho, S. dan Loedin, I.H.S. 2017. Perbandingan tiga metode transformasi *Agrobacterium* untuk pencarian gen-gen terkait toleransi kekeringan menggunakan transposon Ac/Ds pada padi cv. Batutegi. *Jurnal Biologi Indonesia* 6(3): 367–381.
- Mursyanti, E. 2017. *Induksi Embrio Somatik Tannaman Anggrek Phalaenopsis "Sogo Vivien" Melalui Penyisipan Gen AtRKD4 dengan Agrobacterium tumefaciens*. Universitas Gajah Mada.
- Mursyanti, E., Aziz-Purwantoro, Moeljopawiro, S. dan Semiarti, E. 2015. Induction of Somatic Embryogenesis through Overexpression of ATRKD4 Genes in Phalaenopsis "Sogo Vivien." *Indonesian Journal of Biotechnology* 20(1): 42–53.
- Niazian, M., Sadatnoori, S.A., Galuszka, P. dan Mortazavian, S.M.M. 2017. Tissue culture-based *Agrobacterium*-mediated and in Planta transformation methods. *Czech Journal of Genetics and Plant Breeding* 53(4): 133–143.
- Nurwidayati, A. 2016. Aplikasi Teknik Diagnosis Schistosomiasis Berbasis Molekuler. *Jurnal Vektor Penyakit* 9(1): 29–35.
- Nuryanti, S., Fitriana, F. dan Pratiwi, A.R. 2021. Karakterisasi isolat bakteri penghasil selulosa dari buah naga merah (*Hylocereus polyrhizus*). *Jurnal Ilmiah As-Syifaa* 13(1): 71–79.
- Özkul, M., Özel, Ç.A., Yüzbaşıoğlu, D. dan Ünal, F. 2016. Does 2,4-dichlorophenoxyacetic acid (2,4-D) induce genotoxic effects in tissue cultured *Allium* roots? *Cytotechnology* 68(6): 2395–2405.
- Pandiangan, D. 2012. Perubahan Morfologi dan Anatomi Kalus *Catharanthus roseus* dengan Perlakuan Triptofan. *JURNAL BIOSLOGOS* 2(1): 45–50.

- Perdana, N.G.A., Mose, W., Lawrie, M.D., Marcos, J.G. dan Semiarti, E. 2021. Stable transformant of *Phalaenopsis amabilis* somatic embryo carrying 35s::atrkd4 develops into normal phenotype of transgenic plant. *Journal of Tropical Biodiversity and Biotechnology* 6(2): 1–11.
- Poerwanto, R. 2011. *Bioteknologi Dalam Pemuliaan Tanaman*. Penerbit IPB Press, Bogor.
- Puspitasari, F., Sutra, C.L., Sundari, D., Wirajagat, G.C., Setiari, N., Gutierrez-Marcos, J. dan Semiarti, E. 2020. Stability of AtRKD4 gene integration in the genome of dendrobium phalaenopsis fitzg. Transformants induces somatic embryogenesis. *Propagation of Ornamental Plants* 20(4): 129–138.
- Rahmadian, C.A., Ismail, Abrar, M., Erina, Rastina dan Fahrimal, Y. 2018. Isolasi dan Identifikasi Bakteri *Pseudomonas sp.* Pada Ikan Asin Di Tempat Pelelangan Ikan Labuan Haji Aceh Selatan. *Jimvet* 2(4): 493–502.
- Rashid, H., Afza, A., Khan, M.H., Chaudhry, Z. dan Malik, S.A. 2010. Effect of bacterial culture density and acetosyringone concentration on Agrobacterium mediated transformation in wheat. (January 2015).
- Ratjens, S., Mortensen, S., Kumpf, A., Bartsch, M. dan Winkelmann, T. 2018. Embryogenic callus as target for efficient transformation of cyclamen persicum enabling gene function studies. *Frontiers in Plant Science* 9(July): 1–15.
- Roslim, D.I. dan Herman 2017. Application of rps16 Intron and trnL-trnF Intergenic Spacer Sequences to Identify Rengas Clone Riau. *Biosaintifika: Journal of Biology dan Biology Education* 9(2): 209–216.
- Rusdianto dan Indrianto, A. 2012. INDUKSI KALUS EMBRIOGENIK PADA WORTEL (*Daucus carota* L.) MENGGUNAKAN 2,4-DICHLOROPHENOXYACETIC ACID (2,4-D). *Jurnal Bionature* 13(2): 136–140.
- Sambamurty, A.V.S.S. 2013. *Taxonomy of Angiosperms*.
- Sasmito, D.E.K., Kurniawan, R. dan Muhimmah, I. 2014. Karakteristik Primer pada Polymerase Chain Reaction(PCR) untuk Sekuensing DNA: Mini Review. *Seminar Informatika Medis 2014*. Yogyakarta, hal.93–102.
- Seniati, Marbiah dan Irham, A. 2019. Pengukuran kepadatan bakteri *Vibrio harveyi* secara cepat dengan menggunakan spektrofotometer. *Agrokompleks* 19(2): 12–19.
- Seprianto 2017. Isolasi dan Penapisan Bakteri Selulolitik dari Berbagai Jenis Sebagai Penghasil Enzim Selulase. *Ijobb* 1(2): 64–70.

- Silalahi, M. 2018. Jamblang (*Syzygium Cumini* (L.) Dan Bioaktivitasnya. *Interest : Jurnal Ilmu Kesehatan* 7(2).
- Silveira, V., de Vita, A.M., Macedo, A.F., Dias, M.F.R., Floh, E.I.S. dan Santa-Catarina, C. 2013. Morphological and polyamine content changes in embryogenic and non-embryogenic callus of sugarcane. *Plant Cell, Tissue and Organ Culture* 114(3): 351–364.
- Sisharmini, A., Purwoko, B.S., Khumaida, N. dan Trijatmiko, D.K.R. 2019. Optimasi Konsentrasi Asetosiringon dan Higromisin dalam Transformasi Genetik Padi Fatmawati dengan Perantaraan *Agrobacterium tumefaciens*. *Jurnal Agronomi Indonesia (Indonesian Journal of Agronomy)* 46(3): 223–230.
- Sisharmini, A., Purwoko, B.S., Khumaida, N., Trijatmiko, R., Pertanian, S.G., Tentara, J. dan No, P. 2018. Optimasi Konsentrasi Asetosiringon dan Higromisin dalam Transformasi Genetik Padi Fatmawati dengan Perantaraan *Agrobacterium tumefaciens* Optimization of Acetosyringone and Hygromycin on Genetic Transformation of Rice cv . Fatmawati Mediated by *Agrobacterium tumefaciens*. 46(3): 223–230.
- Song, Y., Bai, X., Dong, S., Yang, Y., Dong, H., Wang, N., Zhang, H. dan Li, S. 2020. Stable and Efficient *Agrobacterium*-Mediated Genetic Transformation of Larch Using Embryogenic Callus. *Frontiers in Plant Science* 11(November): 1–10.
- Sudin, S., Sulistijowati, R. dan Hermain, R.M. 2020. Penapisan Dan Pola Pertumbuhan Bakteri Kitinolitik Dari Cangkang Rajungan (*Portunus pelagicus*). *Jambura Fish Processing Journal* 2(1): 36–45.
- Sundari 2018. Pengembangan Protokol Isolasi DNA Genom Tanaman Durian Dengan Menggunakan Modifikasi Bufer CTAB. *Techno: Jurnal Penelitian* 6(02): 33.
- Tangapo, A., Marwani, E. dan Dwivani, F.M. 2012. Transformasi dan ekspresi transien gen pelapor Gusa pada *Andrographis paniculata* (Burm.F) wallich ex ness. *J Bioslogos* 2(1): 10–19.
- Ummah, M., Mashluhah, K. dan Resmisari, R.S. 2020. Conservation Of Juwet (*Syzygium Cumini*) Plant Using In Vitro Culture Techniques. *El-Hayah* 7(3): 106–112.
- Wang, K. ed., 2006. *Agrobacterium Protocols 2nd*. 2nd Editio ed. Humana Press, New Jersey.
- Winarsih, L., Aprira, Susanto, D. dan Edwar 2020. Mencari Media Pemanas Autoclave yang Murah dan Bersih. *Indonesian Journal of Laboratory* 3(1):

34–38.

Yahya, L.A., Ulfir, I. dan Kurniawan, F. 2016. Pemanfaatan Nata de Coco sebagai Media Gel Elektroforesis pada Zat Warna Remazol : Pengaruh pH, Waktu dan Aplikasi Pemisahan Gelatin. *Jurnal Sains Dan Seni ITS* 5(2): 137–140.

Yustinadewi, P.D., Yustiantara, P.S. dan Narayani, I. 2018. Teknik perancangan primer untuk sekuen gen MDR-1 varian 1199 pada sampel buffy coat pasien anak dengan LLA. *Metamorfosa: Journal of Biological Sciences* 5(1): 105.

Zulwanis, Setiari, N., Gutierrez-Marcos, J. dan Semiarti, E. 2020. The expression of AtRKD4 transgene during induction of somatic embryogenesis in transgenic dendrobium phalaenopsis Orchid Carrying 35S::GR::AtRKD4. *AIP Conference Proceedings*.



LAMPIRAN

Lampiran 1. Rangkaian Kegiatan Penelitian

Kegiatan	Februari				Maret				April				Mei				Juni				Juli				Agustus				September				Oktober			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Pembuatan Larutan Stok																																				
Pembuatan medium & strerilisasi alat																																				
Prekultur target tranformasi																																				
Identifikasi Bakteri (PCR)																																				
Uji Biokimia																																				
Rangkaian Transformasi																																				
Pengamatan																																				
Analisis Data																																				
Penyusunan Naskah																																				

Lampiran 2. Komposisi Medium *Murasige and Skoog* (MS)

Composition	mg/L
Ammonium Nitrate	1650
Boric Acid	6.2
Calcium Chloride, Anhydrous	332.2
Cobalt Chloride•6H ₂ O	0.025
Cupric Sulfate•5H ₂ O	0.025
Na ₂ EDTA•2H ₂ O	37.26
Ferrous Sulfate•7H ₂ O	27.8
Magnesium Sulfate, Anhydrous	180.7
Manganese Sulfate•H ₂ O	16.9
Molybdic Acid (Sodium Salt)• 2H ₂ O	0.25
Potassium Iodide	0.83
Potassium Nitrate	1900
Potassium Phosphate, Monobasic	170
Zinc Sulfate•7H ₂ O	8.6
Glycine (Free Base)	2
myo-Inositol	100
Nicotinic Acid (Free Acid)	0.5
Pyridoxine•HCl	0.5
Thiamine•HCl	0.1

Lampiran 3. Komposisi Medium Luria Bertani Broth

Composition	g/L
Tryptone	10.000
Yeast extract	5.000
Sodium chloride	10.000

Lampiran 4. Komposisi Medium Luria Bertani Agar

Composition	g/L
Tryptone	10.000
Yeast extract	5.000
Sodium chloride	10.000
Agar	15.000

Lampiran 5. Perhitungan Pembuatan Larutan Stok

- Perhitungan Larutan Stok

Antibiotik Higromisin 10.000

mg/L

$$= 10.000 \text{ mg/L} \times 5 \text{ mL}$$

$$= 10 \text{ mg/mL} \times 5 \text{ mL}$$

$$= 50 \text{ mg}$$

- Perhitungan Larutan Stok

Antibiotik Kanamisin 10.000

mg/L

$$= 10.000 \text{ mg/L} \times 10 \text{ mL}$$

$$= 10 \text{ mg/mL} \times 10 \text{ mL}$$

$$= 100 \text{ mg}$$

- Perhitungan Larutan Stok

Antibiotik Rifampicin 10.000

mg/L

$$= 10.000 \text{ mg/L} \times 10 \text{ mL}$$

$$= 10 \text{ mg/mL} \times 10 \text{ mL}$$

$$= 100 \text{ mg}$$

- Perhitungan Larutan Stok

Antibiotik Meropenem 10.000

mg/L

$$= 10.000 \text{ mg/L} \times 10 \text{ mL}$$

$$= 10 \text{ mg/mL} \times 10 \text{ mL}$$

$$= 100 \text{ mg}$$

- Perhitungan Larutan Stok

Asetosiringon 10.000 mg/L

$$= 10.000 \text{ mg/L} \times 10 \text{ mL}$$

$$= 10 \text{ mg/mL} \times 10 \text{ mL}$$

$$= 100 \text{ mg}$$

- Perhitungan Larutan Stok Hormon

2,4-dichlorophenoxyacetic acid

1000 ppm

$$= 1.000 \text{ mg/L} \times 50 \text{ mL}$$

$$= 1 \text{ mg/mL} \times 50 \text{ mL}$$

$$= 50 \text{ mg}$$

- Perhitungan Larutan Stok Hormon

BAP (6-Benzyl Amino Purine)

1000 ppm

$$= 1.000 \text{ mg/L} \times 25 \text{ mL}$$

$$= 1 \text{ mg/mL} \times 25 \text{ mL}$$

$$= 25 \text{ mg}$$

Lampiran 6. Perhitungan Pembuatan Medium

- Medium Luria Bertani Padat

Untuk 500 mL medium

- Serbuk Luria Bertani Agar :
 $= 40 \text{ g/L} \times 0,5 \text{ L} = 20 \text{ g}$
- Rifamisin 30 mg/L :
 $= V1.N1 = V2.N2$
 $= 500 \text{ mL} \times 30 \text{ mg/L} = V2 \times 10.000 \text{ mg/L}$
 $= V2 = 15.000/10.000 \text{ mL}$
 $= V2 = 1,5 \text{ mL}$
- Kanamisin 100 mg/L :
 $= V1.N1 = V2.N2$
 $= 500 \text{ mL} \times 100 \text{ mg/L} = V2 \times 10.000 \text{ mg/L}$
 $= V2 = 50.000/10.000 \text{ mL}$
 $= V2 = 5 \text{ mL}$

- Medium Luria Bertani Cair

Untuk 500 mL medium

- Serbuk Luria Bertani Broth :
 $= 25 \text{ g/L} \times 0,5 \text{ L} = 12,5 \text{ g}$
- Rifamisin 30 mg/L :
 $= V1.N1 = V2.N2$
 $= 500 \text{ mL} \times 30 \text{ mg/L} = V2 \times 10.000 \text{ mg/L}$
 $= V2 = 15.000/10.000 \text{ mL}$
 $= V2 = 1,5 \text{ mL}$
- Kanamisin 100 mg/L :
 $= V1.N1 = V2.N2$
 $= 500 \text{ mL} \times 100 \text{ mg/L} = V2 \times 10.000 \text{ mg/L}$
 $= V2 = 50.000/10.000 \text{ mL}$
 $= V2 = 5 \text{ mL}$

- Medium *Murashige and Skoog* (MS) padat dengan penambahan hormon 2,4-D 2 mg/L dan hormon BAP 1 mg/L

Untuk 2.000 mL medium

- Serbuk MS Instan :
 $= 4,43 \text{ g/L} \times 2 \text{ L} = 8,86 \text{ g}$
- Sukrosa :
 $= 30 \text{ g/L} \times 2 \text{ L} = 60 \text{ g}$
- Agar :
 $= 8 \text{ g/L} \times 2 \text{ L} = 16 \text{ g}$
- Hormon 2,4-D 2 mg/L :
 $= V1.N1 = V2.N2$
 $= 2000 \text{ mL} \times 2 \text{ mg/L} = V2 \times 1000 \text{ mg/L}$

- $= V2 = 4000/1000 \text{ mL}$
 $= V2 = 4 \text{ mL}$
- Hormon BAP 1 mg/L :
 $= V1.N1 = V2.N2$
 $= 2000 \text{ mL} \times 1 \text{ mg/L} = V2 \times 1000 \text{ mg/L}$
 $= V2 = 2000/1000 \text{ mL}$
 $= V2 = 2 \text{ mL}$

- Callus Inducing Medium (CIM)

Untuk 2.000 mL medium

- Serbuk MS Instan :
 $= 4,43 \text{ g/L} \times 2 \text{ L} = 8,86 \text{ g}$

- Sukrosa :
 $= 30 \text{ g/L} \times 2 \text{ L} = 60 \text{ g}$

- Tomat :
 $= 100 \text{ g/L} \times 2 \text{ L} = 100 \text{ g}$

- Agar :
 $= 8 \text{ g/L} \times 2 \text{ L} = 16 \text{ g}$

- Hormon 2,4-D 2 mg/L :
 $= V1.N1 = V2.N2$

- Medium Infeksi (Medium Murashige and Skoog Cair Tanpa Sukrosa)

Untuk 2.000 mL medium

- Serbuk MS Instan :
 $= 4,43 \text{ g/L} \times 2 \text{ L} = 8,86 \text{ g}$

- Medium *Recovery*

Untuk 2.000 mL medium

- Serbuk MS Instan :
 $= 4,43 \text{ g/L} \times 2 \text{ L} = 8,86 \text{ g}$

- Sukrosa :
 $= 30 \text{ g/L} \times 2 \text{ L} = 60 \text{ g}$

- Agar :
 $= 8 \text{ g/L} \times 2 \text{ L} = 16 \text{ g}$

- Hormon 2,4-D 2 mg/L :
 $= V1.N1 = V2.N2$
 $= 2000 \text{ mL} \times 2 \text{ mg/L} = V2 \times 1000 \text{ mg/L}$
 $= V2 = 4000/1000 \text{ mL}$

$$= 2000 \text{ mL} \times 2 \text{ mg/L} = V2 \times$$

$$1000 \text{ mg/L}$$

$$= V2 = 4000/1000 \text{ mL}$$

$$= V2 = 4 \text{ mL}$$

- Hormon BAP 1 mg/L :

$$= V1.N1 = V2.N2$$

$$= 2000 \text{ mL} \times 1 \text{ mg/L} = V2 \times$$

$$1000 \text{ mg/L}$$

$$= V2 = 2000/1000 \text{ mL}$$

$$= V2 = 2 \text{ mL}$$

- Medium Eliminasi (1/2 Medium Murashige and Skoog Cair Tanpa Gula)

Untuk 2.000 mL medium

- Serbuk MS Instan :
 $= 2,215 \text{ g/L} \times 2 \text{ L} = 4,43 \text{ g}$

$$= V2 = 4 \text{ mL}$$

- Hormon BAP 1 mg/L :

$$= V1.N1 = V2.N2$$

$$= 2000 \text{ mL} \times 1 \text{ mg/L} = V2 \times$$

$$1000 \text{ mg/L}$$

$$= V2 = 2000/1000 \text{ mL}$$

$$= V2 = 2 \text{ mL}$$

- Meropenem 50 mg/L :

$$= V1.N1 = V2.N2$$

$$= 2000 \text{ mL} \times 50 \text{ mg/L} = V2 \times$$

$$10.000 \text{ mg/L}$$

$$= V2 = 100.000/10.000 \text{ mL}$$

$$= V_2 = 10 \text{ mL}$$

- Medium Seleksi (MS Dengan Penambahan Antibiotik Meropenem 50 mg/L dan Higromisin 10 mg/L)

Untuk 2.000 mL medium

- Serbuk MS Instan : $= V_2 = 2000/1000 \text{ mL}$
 $= 4,43 \text{ g/L} \times 2 \text{ L} = 8,86 \text{ g}$ $= V_2 = 2 \text{ mL}$
- Sukrosa : $= V_1.N_1 = V_2.N_2$
 $= 30 \text{ g/L} \times 2 \text{ L} = 60 \text{ g}$ $= 2000 \text{ mL} \times 50 \text{ mg/L} = V_2 \times 10.000 \text{ mg/L}$
- Agar : $= V_2 = 100.000/10.000 \text{ mL}$
 $= 8 \text{ g/L} \times 2 \text{ L} = 16 \text{ g}$ $= V_2 = 10 \text{ mL}$
- Hormon 2,4-D 2 mg/L : $= V_1.N_1 = V_2.N_2$
 $= 2000 \text{ mL} \times 2 \text{ mg/L} = V_2 \times 1000 \text{ mg/L}$
 $= V_2 = 4000/1000 \text{ mL}$
 $= V_2 = 4 \text{ mL}$
- Hormon BAP 1 mg/L : $= V_1.N_1 = V_2.N_2$
 $= 2000 \text{ mL} \times 1 \text{ mg/L} = V_2 \times 1000 \text{ mg/L}$
 $= V_2 = 20.000/10.000 \text{ mL}$
 $= V_2 = 2 \text{ mL}$
- Meropenem 50 mg/L : $= V_1.N_1 = V_2.N_2$
 $= 2000 \text{ mL} \times 50 \text{ mg/L} = V_2 \times 10.000 \text{ mg/L}$
 $= V_2 = 100.000/10.000 \text{ mL}$
 $= V_2 = 10 \text{ mL}$
- Higromisin 10 mg/L : $= V_1.N_1 = V_2.N_2$
 $= 2000 \text{ mL} \times 10 \text{ mg/L} = V_2 \times 10.000 \text{ mg/L}$
 $= V_2 = 20.000/10.000 \text{ mL}$
 $= V_2 = 2 \text{ mL}$

Lampiran 7. Perhitungan Hasil Persentase Frekuensi Trasformasi dan Kontaminasi

$$\text{persentase frekuensi transformasi} = \frac{\text{total kalus hidup}}{\text{total kalus}} \times 100\%$$

- Pengaruh variasi nilai OD₆₀₀ terhadap persentase frekuensi transformasi
 - OD₆₀₀ 0,6

$$= \frac{13}{15} \times 100\%$$

$$= 86,66667$$

- OD₆₀₀ 0,8

$$= \frac{11}{15} \times 100\%$$

$$= 73,33333333$$

- OD₆₀₀ 1,0

$$= \frac{5}{15} \times 100\%$$

$$= 33,33333333$$

- Pengaruh variasi konsentrasi asetosiringon terhadap persentase frekuensi transformasi

- Asetosiringon 25 mg/L

$$= \frac{11}{15} \times 100\%$$

$$= 73,33333333$$

- Asetosiringon 50 mg/L

$$= \frac{13}{15} \times 100\%$$

$$= 86,66667$$

- Asetosiringon 75 mg/L

$$= \frac{14}{15} \times 100\%$$

$$= 93,33333333$$

$$\text{persentase kontaminasi} = \frac{\text{total kalus yang terkontaminasi}}{\text{total kalus}} \times 100\%$$

- Persentase kontaminasi perlakuan variasi nilai OD₆₀₀

- OD₆₀₀ 0,6

$$= \frac{1}{15} \times 100\%$$

$$= 6,6666667\%$$

- OD₆₀₀ 0,8

$$= \frac{3}{15} \times 100\%$$

$$= 20\%$$

- OD₆₀₀ 1,0

$$= \frac{5}{15} \times 100\%$$

= 40%

- Persentase kontaminasi perlakuan variasi konsentrasi asetosiringon

- Asetosiringon 25 mg/L

$$= \frac{0}{15} \times 100\%$$

= 0%

- Asetosiringon 50 mg/L

$$= \frac{1}{15} \times 100\%$$

= 6,6666667 %

- Asetosiringon 75 mg/L

$$= \frac{0}{15} \times 100\%$$

= 0%

Lampiran 8. Hasil SPSS

- Perlakuan Variasi OD₆₀₀

Deskriptif								
Frekuensi								
	N	Rata-rata	Standar deviasi	Standar kesalahan	Interval Keyakinan 95% untuk Rata-Rata		Mini mum	Maks imum
					Batas Bawah	Batas Atas		
OD 0,6	15	0.87	0.352	0.091	0.67	1.06	.00	1.00
OD 0,8	15	0.73	0.458	0.118	0.48	0.99	.00	1.00
OD 1,0	15	0.33	0.488	0.126	0.06	0.60	.00	1.00
Total	45	0.64	0.484	0.072	0.50	0.79	.00	1.00

ANOVA					
Frekuensi					
	Jumlah kuadrat	df	Rata-rata kuadrat	F	Sig.
Antar grup	2.311	2	1.156	6.067	.005
Dalam grup	8.000	42	.190		
Total	10.311	44			

Frekuensi			
Duncan ^a			
Perlakuan	N	Subset untuk alfa = 0.05	
		1	2
OD 1,0	15	.3333	
OD 0,6	15		.7333
OD 0,8	15		.8777
Sig.		1.000	.408
Rata-rata untuk kelompok dalam himpunan bagian yang homogen ditampilkan.			
a. Menggunakan Ukuran Sampel Rata-Rata Harmonik = 15.000.			

• Perlakuan Variasi Asetosiringon

Descriptives								
Frekuensi								
	N	Rata-rata	Standar deviasi	Standar kesalahan	Interval Keyakinan 95% untuk Rata-Rata		Minimum	Maksimum
					Batas Bawah	Batas Atas		
Asetosiringon 25 ppm	15	0.73	0.458	0.118	0.48	0.99	0	1
Asetosiringon 50 ppm	15	0.87	0.352	0.091	0.67	1.06	0	1
Asetosiringon 75 ppm	15	0.93	0.258	0.067	0.79	1.08	0	1
Total	45	0.84	0.367	.055	0.73	0.95	0	1

ANOVA					
Frekuensi					
	Jumlah kuadrat	df	Rata-rata kuadrat	F	Sig.
Antar grup	0.311	2	.156	1.167	.321
Dalam grup	5.600	42	.133		
Total	5.911	44			

Frekuensi		
Duncan ^a		
Perlakuan	N	Subset untuk alfa = 0.05
		1
Asetosiringon 25 ppm	15	.73
Asetosiringon 50 ppm	15	.87
Asetosiringon 75 ppm	15	.93
Sig.		.164
Rata-rata untuk kelompok dalam himpunan bagian yang homogen ditampilkan.		
a. Menggunakan Ukuran Sampel Rata-Rata Harmonik = 15.000.		

Lampiran 9. Sertifikat Primer

- Primer *AtRKD4* Forward

77


YOUR ADVOCATE
 INTEGRATED DNA TECHNOLOGIES

www.idtdna.com

SPECIFICATION SHEET

24-Jan-2019

Order No. **8695828**

Ref. No. **101567430**

Sequence - *AtRKD4* F

25 nmole DNA Oligo, 23 bases

5'- GTT CAT TTC ATT TGG AGA GGA CG -3'

Properties	Amount Of Oligo	Shipped To
Tm (50mM NaCl)* 54.1 °C	5.9 = 26 = 0.19	EDLWEISS VITARA
GC Content 43.5%	OD260 nmols mg	UNIVERSITAS ATMAJAYA YOGYAKARTA
Molecular Weight 7,109.7	For 100 µM: add 260 µL	JL. BABARSARI 44 YOGYAKARTA 55281
nmols OD260: 4.4		YOGYAKARTA, INDONESIA 55281
µg OD260 31.6		INDONESIA
Ext. Coefficient: 225,100 L/(mole*cm)		085857534762
		Customer No. 4436724 PO No. PTGEN-5493-R

Secondary Structure Calculations

Lowest folding free energy (kcal/mole): 0.84 at 25 °C

Strongest Folding Tm: -0.2 °C

Oligo Base Types	Quantity	Disclaimer
DNA Bases	23	See on reverse page notes (I) (II) & (III) for usage, label license, and product warranties
Modifications and Services	Quantity	
Standard Desalting	1	

Mfg. ID282853315

Labels - Peel here

101567430

E.VITARA

282853315

24-Jan-2019

AtRKD4 F

5'- GTT CAT TTC ATT TGG AGA GGA CG -3'

5.9 = 26 = 0.19

OD260 nmols mg

For 100 µM: add 260 µL

101567430

E.VITARA

282853315

24-Jan-2019

AtRKD4 F

5'- GTT CAT TTC ATT TGG AGA GGA CG -3'

5.9 = 26 = 0.19

OD260 nmols mg

For 100 µM: add 260 µL

I N S T R U C T I O N S

*Lyophilized contents may appear as either a translucent film or a white powder. This variance does not affect the quality of the oligo.

*Please centrifuge tubes prior to opening. Some of the product may have been dislodged during shipping.

*The Tm shown takes no account of Mg²⁺ and dNTP concentrations. Use the OligoAnalyzer® Program at www.idtdna.com/schools to calculate accurate Tm for your reaction conditions.

M

- Primer *AtRKD4 Reverse*

IDT YOUR ADVOCATE
INTEGRATED DNA TECHNOLOGIES

SPECIFICATION SHEET www.idtdna.com

24-Jan-2019 **Circle Pin 8695828**
Ref Pin 101567430

Sequence - AtRKD4 F 25 nmole DNA Oligo, 23 bases
5'- GTT CAT TTC ATT TGG AGA GGA CG -3'

Properties	Amount Of Oligo	Shipped To
Tm (50mM NaCl)* 54.1 °C	5.9 = 26 = 0.19	EDELWEISS VITARA
GC Content 43.5%	OD 260 nmols mg	UNIVERSITAS ATMAJAYA YOGYAKARTA
Molecular Weight 7,109.7	For 100 µM add 260 µl	JL. BABARSARI 44 YOGYAKARTA 55281
nmols OD260: 4.4		YOGYAKARTA, INDONESIA 55281
µg OD260: 31.6		INDONESIA
Ext. Coefficient: 225,100 L/(mole*cm)		085857534762
		Customer No. 4436724 PO No. PTGEN-5493-R
Secondary Structure Calculations		
Lowest folding free energy (kcal/mole): 0.84 at 25 °C		
Strongest Folding Tm: -0.2 °C		
Oligo Base Types	Quantity	Disclaimer
DNA Bases	23	See on reverse page notes (I) (II) & (III) for usage, label license, and product warranties
Modifications and Services	Quantity	
Standard Desalting	1	

Mfg. ID282853315
Labels - Peel here

101567430 IDT
E.VITARA
282853315
AtRKD4 F
5'- GTT CAT TTC ATT TGG AGA GGA CG -3'
Tm = 54.1 °C
GC = 43.5%
MW = 7109.7

101567430 IDT
E.VITARA
282853315
AtRKD4 F
5'- GTT CAT TTC ATT TGG AGA GGA CG -3'
Tm = 54.1 °C
GC = 43.5%
MW = 7109.7

I N S T R U C T I O N S

*Lyophilized contents may appear as either a translucent film or a white powder. This variance does not affect the quality of the oligo.

*Please centrifuge tubes prior to opening. Some of the product may have been dislodged during shipping.

*The Tm shown takes no account of Mg²⁺ and dNTP concentrations. Use the OligoAnalyzer® Program at www.idtdna.com/scitools to calculate accurate Tm for your reaction conditions.

M

- Primer *HPT Forward*



SPECIFICATION SHEET

WWW.IDTDNA.COM

10-May-2023

Order No. **9200323**

Ref. No. **108078261**

Sequence - Primer hpt Forward

25 nmole DNA Oligo, 22 bases

5'- GAG CCT GAC CTA TTG CAT CTC C -3'

Properties	Amount Of Oligo			Shipped To
Tm (50mM NaCl)*: 57.4 °C	7.0 =	35.2	= 0.23	EDELWEISS VITARA
GC Content: 54.5%	OD260	nmoles	mg	UNIVERSITAS ATMAJAYA YOGYAKARTA
Molecular Weight: 6,646.4	For 100 µM: add 352 µL			JL BABARSARI 44 YOGYAKARTA 55281
nmoles/OD260: 5.0				YOGYAKARTA, YOGYAKARTA 55281
ug/OD260: 33.5				INDONESIA
Ext. Coefficient: 198,500 L/(mole*cm)				085857534762
				Customer No. 4436724 PO No. PTGEN-19344
				8159311
Secondary Structure Calculations				
Lowest folding free energy (kcal/mole): -0.22 at 25 °C				
Strongest Folding Tm: 28.1 °C				
Oligo Base Types				
DNA bases	Quantity			
	22			
Modifications and Services				
Standard Desalting	Quantity			
	1			
			Disclaimer	
			See on reverse page notes (I) (II) & (III) for usage, label license, and product warranties	

Mfg. ID 410589595
Labels - Peel here



INSTRUCTIONS

*Lyophilized contents may appear as either a translucent film or a white powder. This variance does not affect the quality of the oligo.

*Please centrifuge tubes prior to opening. Some of the product may have been dislodged during shipping.

*The T_m shown takes no account of Mg^{2+} and dNTP concentrations. Use the OligoAnalyzer® Program at www.idtdna.com/scitools to calculate accurate T_m for your reaction conditions.

M

- Primer *HPT Reverse*



SPECIFICATION SHEET

WWW.IDTDNA.COM

10-May-2023

Order No. **9200323**Ref. No. **108078260**

Sequence - Primer hpt Reverse

25 nmole DNA Oligo, 22 bases

5'- GGC CTC CAG AAG AAG ATG TTG G -3'

Properties

T_m (50mM NaCl)*: 57.8 °C
 GC Content: 54.5%
 Molecular Weight: 6,824.5
 nmoles/OD260: 4.5
 ug/OD260: 31.0
 Ext. Coefficient: 219,800 L/(mole*cm)

Amount Of Oligo

6.0 = 27.2 = 0.19
 OD260 nmoles mg
 For 100 µM: add 272 µL

Shipped To

EDELWEISS VITARA
 UNIVERSITAS ATMA JAYA YOGYAKARTA
 JL. BABARSARI 44 YOGYAKARTA 55281
 YOGYAKARTA, YOGYAKARTA 55281
 INDONESIA
 085857534762
 Customer No. 4436724 PO No. PTGEN-19344-
 BL59311

Secondary Structure Calculations

Lowest folding free energy (kcal/mole): -0.05 at 25 °C
 Strongest Folding T_m: 25.7 °C

Oligo Base Types

Quantity
 DNA bases 22

Modifications and Services

Quantity
 Standard Desalting 1

Disclaimer

See on reverse page notes (I) (II) & (III) for usage, label
 license, and product warranties

Mfg. ID 410589430 Labels - Peel here



INSTRUCTIONS

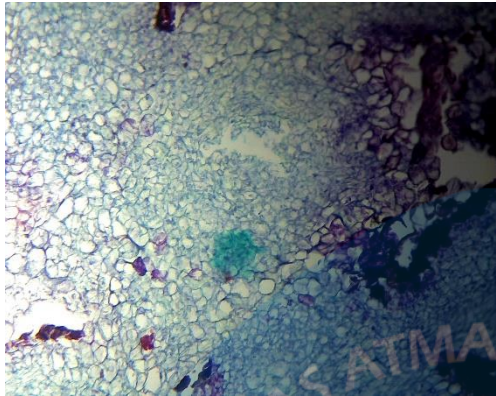
*Lyophilized contents may appear as either a translucent film or a white powder.
 This variance does not affect the quality of the oligo.

*Please centrifuge tubes prior to opening. Some of the product may have been
 dislodged during shipping.

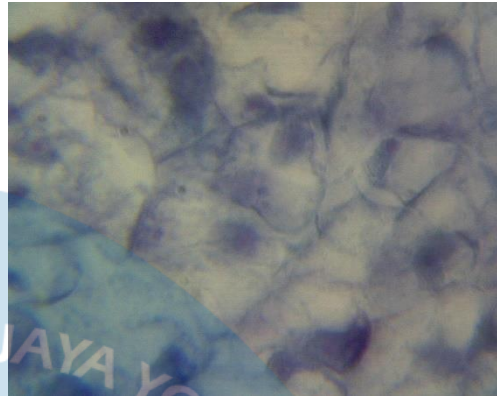
*The T_m shown takes no account of Mg²⁺ and dNTP concentrations. Use the
 OligoAnalyzer® Program at www.idtdna.com/schools to calculate accurate T_m for
 your reaction conditions.

M

Lampiran 10. Hasil Preparat Awetan Kalus Embrionik Daun Jamblang

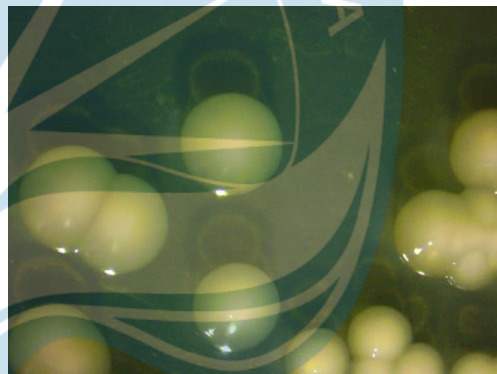


Perbesaran 10 x 45



Perbesaran 10 x 100

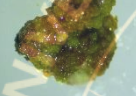
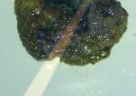
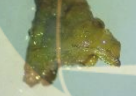
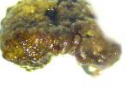
Lampiran 11. Hasil Uji Koloni Tunggal



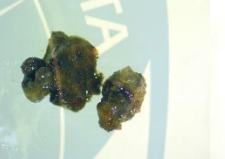
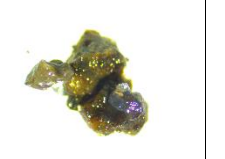
Perbesaran 0,7

Lampiran 12. Hasil Transformasi Genetik dengan Perlakuan Variasi Densitas Optik Bakteri *A. tumefaciens*

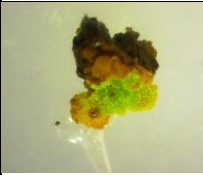
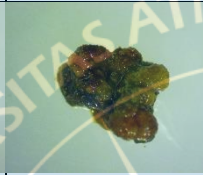
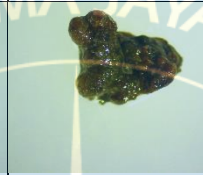
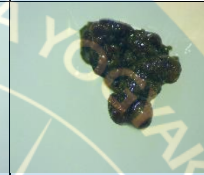
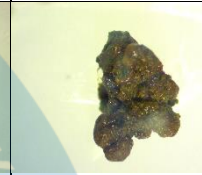
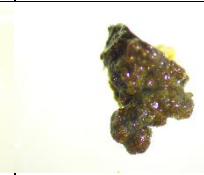
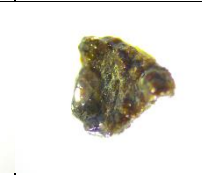
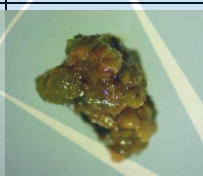
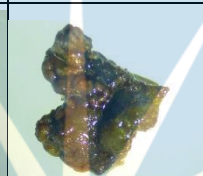
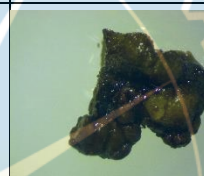
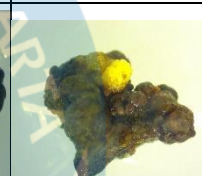
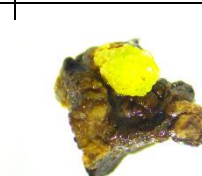
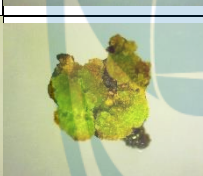
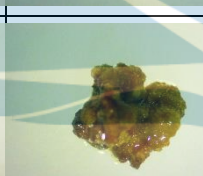
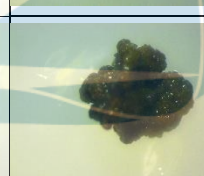
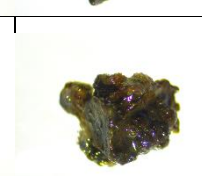
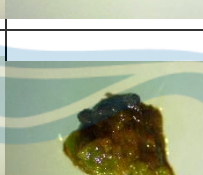
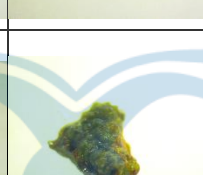
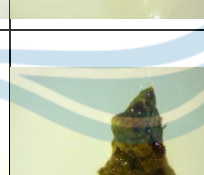
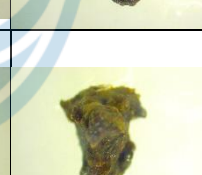
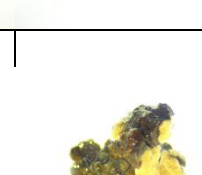
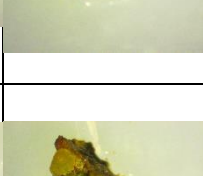
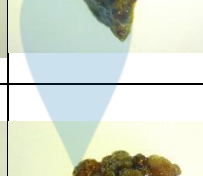
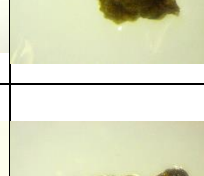
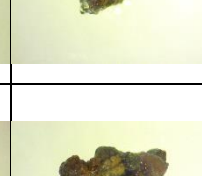
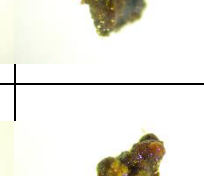
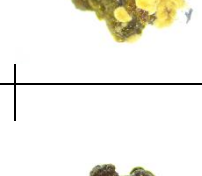
- Data Hasil Pengamatan dengan Perlakuan Densitas Optik 0,6; Konsentrasi Asetosiringon 50 ppm; Ulangan ke 1

Perlakuan dan Ulangan	Sebelum CIM (H-7)	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,6_50_U1_5									+
0,6_50_U1_4									+
0,6_50_U1_3									+
0,6_50_U1_2									+
0,6_50_U1_1									+

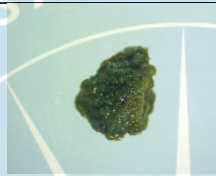
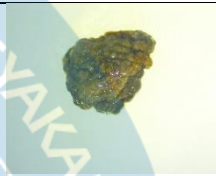
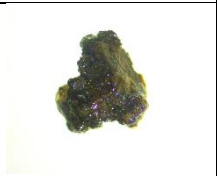
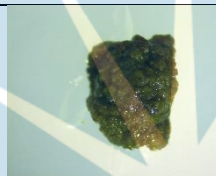
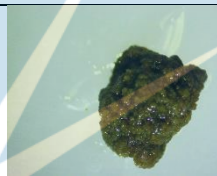
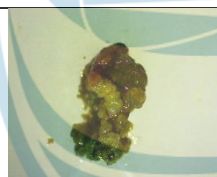
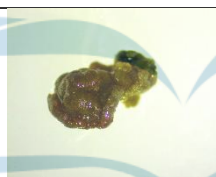
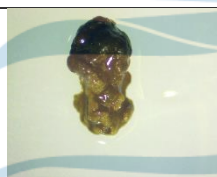
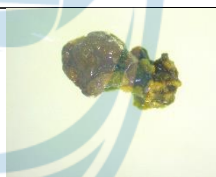
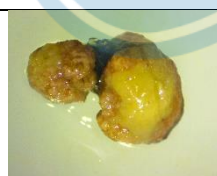
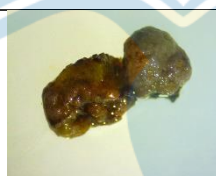
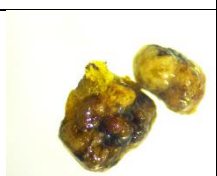
- Data Hasil Pengamatan dengan Perlakuan Densitas Optik 0,6; Konsentrasi Asetosiringon 50 ppm; Ulangan ke 2

Perlakuan dan Ulangan	Sebelum CIM (H-7)	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,6_50_U2_5									+++
0,6_50_U2_4									-
0,6_50_U2_3									+
0,6_50_U2_2									+
0,6_50_U2_1									+

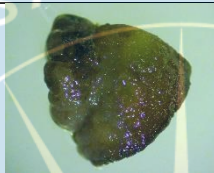
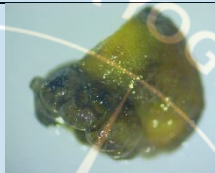
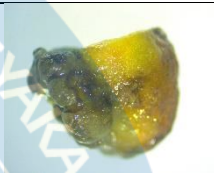
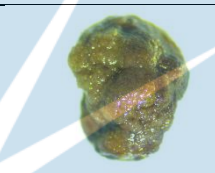
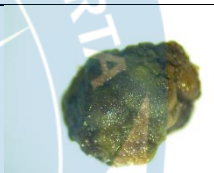
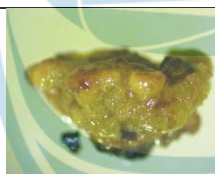
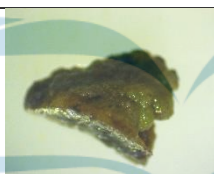
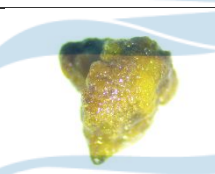
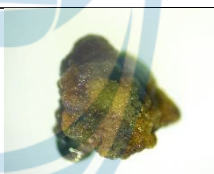
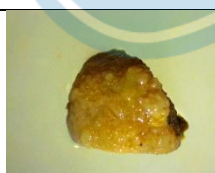
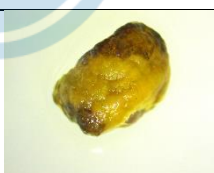
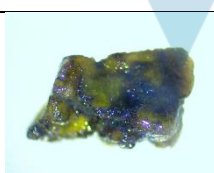
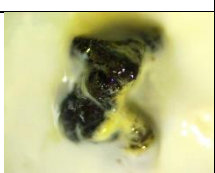
- Data Hasil Pengamatan dengan Perlakuan Densitas Optik 0,6; Konsentrasi Asetosiringon 50 ppm; Ulangan ke 3

Perlakuan dan Ulangan	Sebelum CIM (H-7)	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,6_50_U 3_5									+
0,6_50_U 3_4									+++
0,6_50_U 3_3									+
0,6_50_U 3_2									K
0,6_50_U 3_1									++

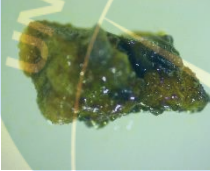
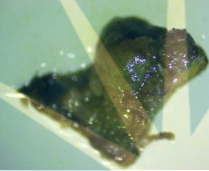
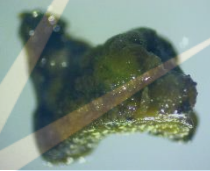
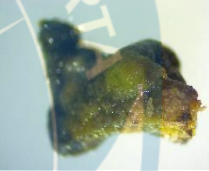
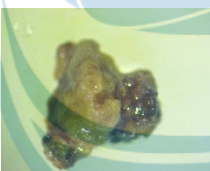
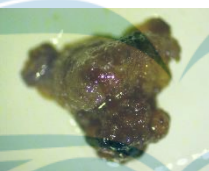
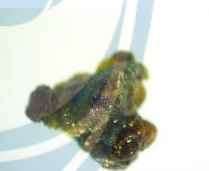
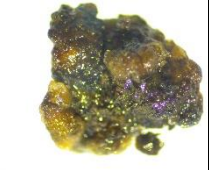
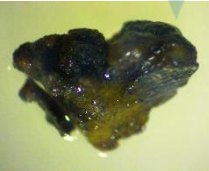
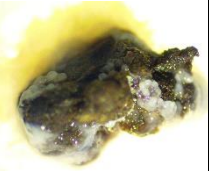
- Data Hasil Perlakuan OD 0,8; Konsentrasi Asetosiringon 50 ppm; Ulangan ke 1

Perlakuan dan Ulangan	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,8_50_U1_5								-
0,8_50_U1_4								+
0,8_50_U1_3								+
0,8_50_U1_2								+++
0,8_50_U1_1								K

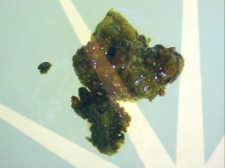
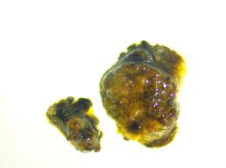
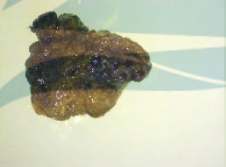
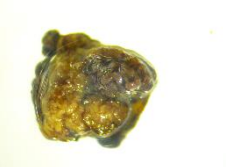
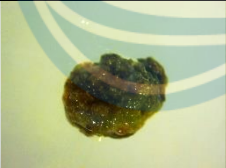
- Data Hasil Perlakuan OD 0,8; Konsentrasi Asetosiringon 50 ppm; Ulangan ke 2

Perlakuan dan Ulangan	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,8_50_U2_5								+
0,8_50_U2_4								+
0,8_50_U2_3								+
0,8_50_U2_2								+
0,8_50_U2_1								K

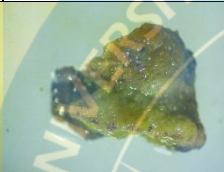
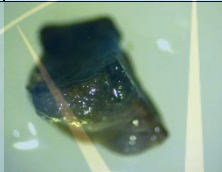
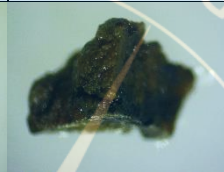
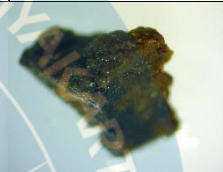
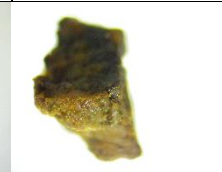
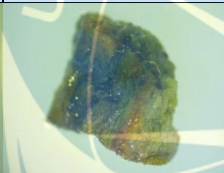
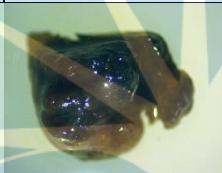
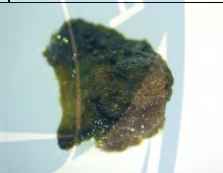
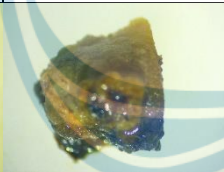
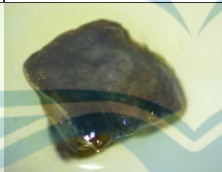
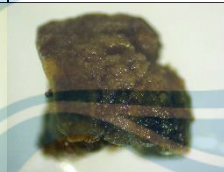
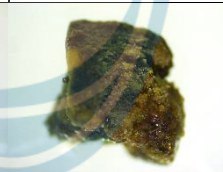
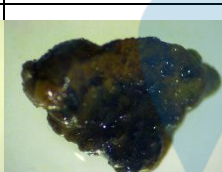
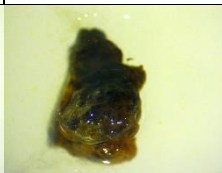
- Data Hasil Perlakuan OD 0,8; Konsentrasi Asetosiringon 50 ppm; Ulangan ke 3

Perlakuan dan Ulangan	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,8_50_U3_5								+
0,8_50_U3_4								+++
0,8_50_U3_3								+
0,8_50_U3_2								+
0,8_50_U3_1								K

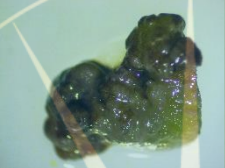
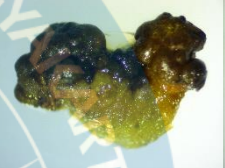
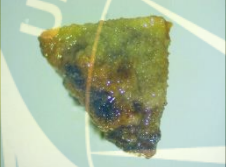
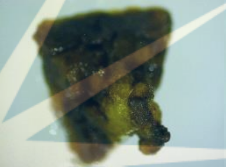
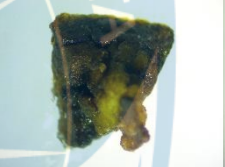
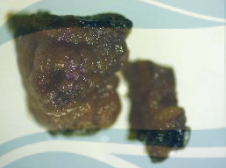
- Data Hasil Perlakuan OD 1,0; Konsentrasi Asetosiringon 50 ppm; Ulangan ke 1

Perlakuan dan Ulangan	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
1,0_50_U1_5								+
1,0_50_U1_4								+
1,0_50_U1_3								++
1,0_50_U1_2								K
1,0_50_U1_1								K

- Data Hasil Perlakuan OD 1,0; Konsentrasi Asetosiringon 50 ppm; Ulangan ke 2

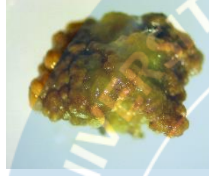
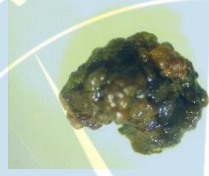
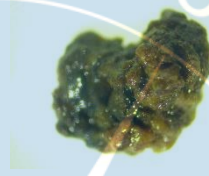
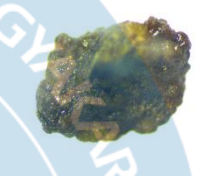
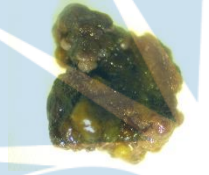
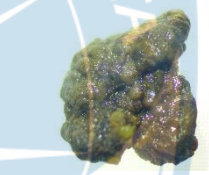
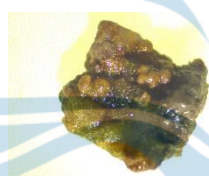
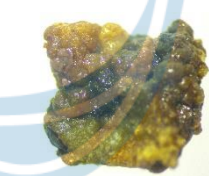
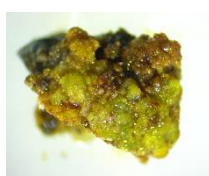
Perlakuan dan Ulangan	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
1,0_50_U2_5								-
1,0_50_U2_4								-
1,0_50_U2_3								-
1,0_50_U2_2								K
1,0_50_U2_1								K

- Data Hasil Perlakuan OD 1,0; Konsentrasi Asetosiringon 50 ppm; Ulangan ke 3

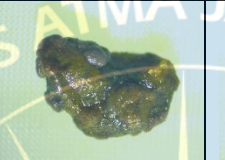
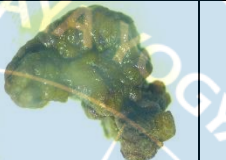
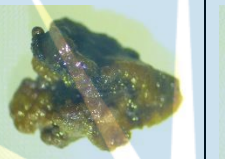
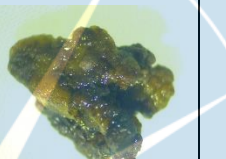
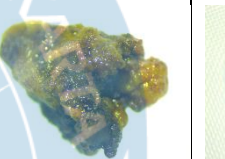
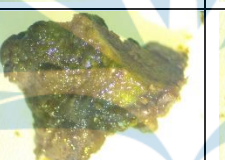
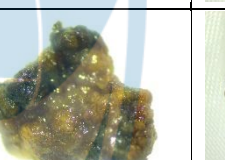
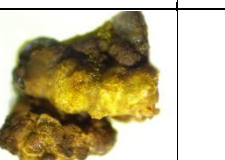
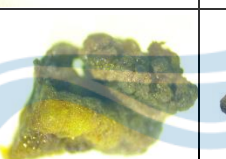
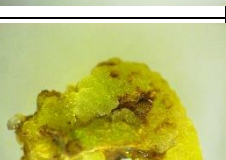
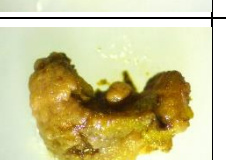
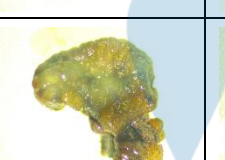
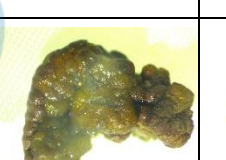
Perlakuan dan Ulangan	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
1,0_50_U3_5								++
1,0_50_U3_4								+
1,0_50_U3_3								-
1,0_50_U3_2								K
1,0_50_U3_1								K

Lampiran 13. Hasil Transformasi Genetik dengan Perlakuan Variasi Konsentrasi Asetosiringon

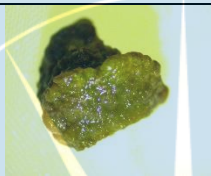
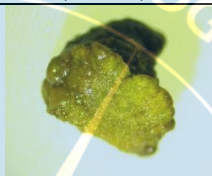
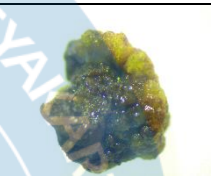
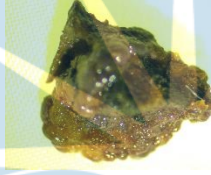
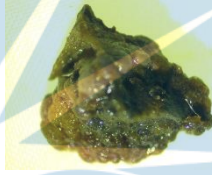
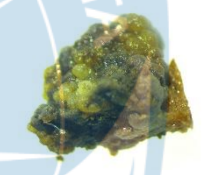
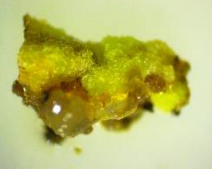
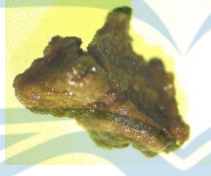
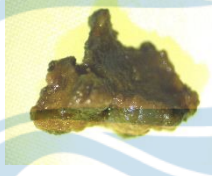
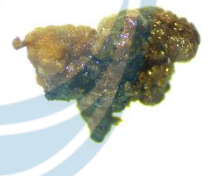
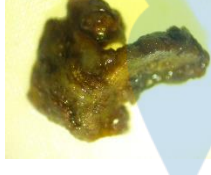
- Data Hasil Perlakuan OD 0,6; Konsentrasi Asetosiringon 25 ppm; Ulangan ke 1

Perlakuan dan Ulangan	Sebelum CIM (H-7)	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,6_25_U1_5									-
0,6_25_U1_4									+
0,6_25_U1_3									+++
0,6_25_U1_2									-
0,6_25_U1_1									+++

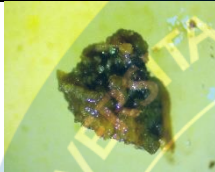
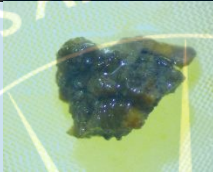
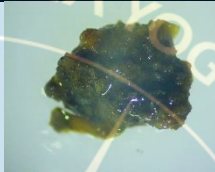
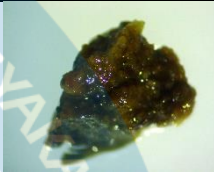
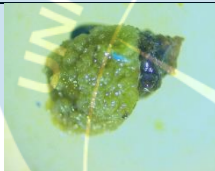
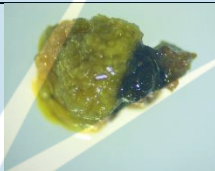
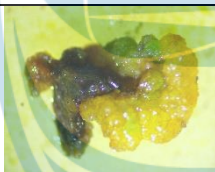
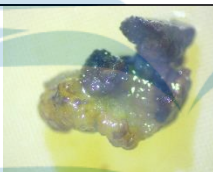
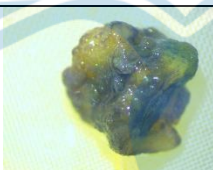
- Data Hasil Perlakuan OD 0,6; Konsentrasi Aseosiringon 25 ppm; Ulangan ke 2

Perlakuan dan Ulangan	Sebelum CIM (H-7)	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,6_25_U2_5									-
0,6_25_U2_4									+
0,6_25_U2_3									++
0,6_25_U2_2									++
0,6_25_U2_1									+

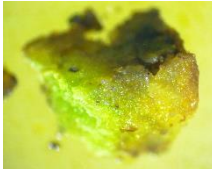
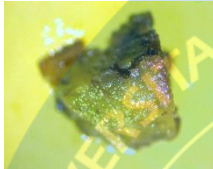
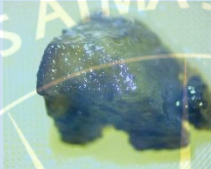
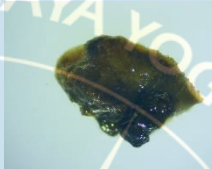
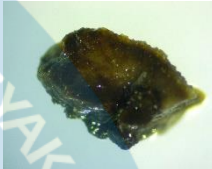
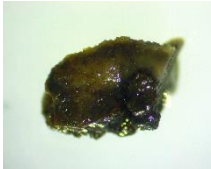
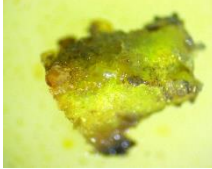
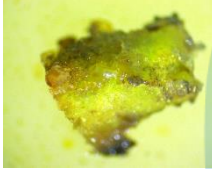
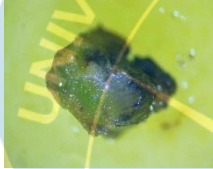
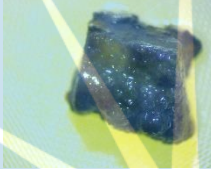
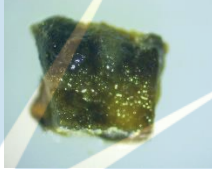
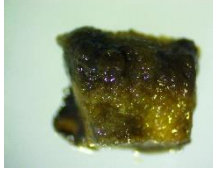
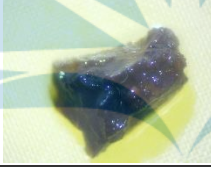
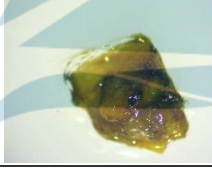
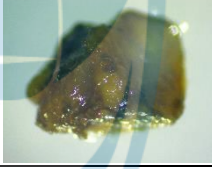
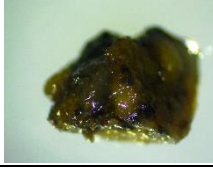
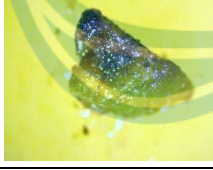
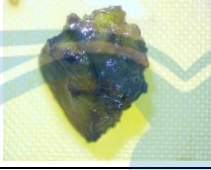
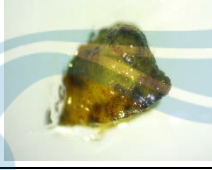
- Data Hasil Perlakuan OD 0,6; Konsentrasi Aseosiringon 25 ppm; Ulangan ke 3

Perlakuan dan Ulangan	Sebelum CIM (H-7)	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,6_25_U3_5									++
0,6_25_U3_4									+++
0,6_25_U3_3									-
0,6_25_U3_2									+
0,6_25_U3_1									+

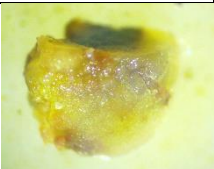
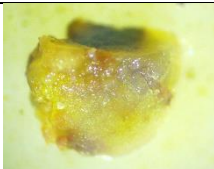
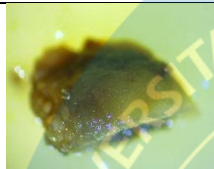
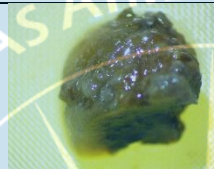
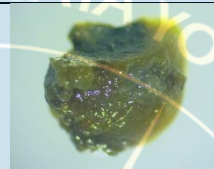
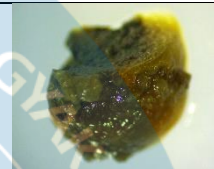
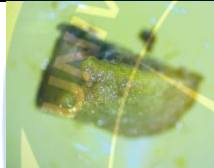
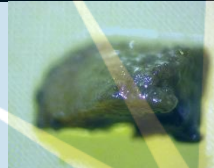
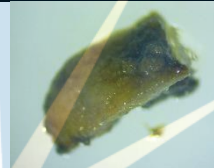
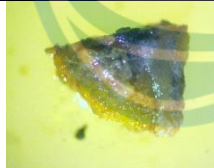
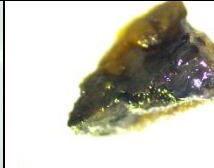
- Data Hasil Perlakuan OD 0,6; Konsentrasi Asetosiringon 75 ppm; Ulangan ke 1

Perlakuan dan Ulangan	Sebelum CIM (H-7)	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,6_75_U1_5									+
0,6_75_U1_4									++
0,6_75_U1_3									++
0,6_75_U1_2									++
0,6_75_U1_1									+

- Data Hasil Perlakuan OD 0,6; Konsentrasi Asetosiringon 75 ppm; Ulangan ke 2

Perlakuan dan Ulangan	Sebelum CIM (H-7)	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,6_75_U2_5									-
0,6_75_U2_4									++
0,6_75_U2_3									+
0,6_75_U2_2									++
0,6_75_U2_1									++

- Data Hasil Perlakuan OD 0,6; Konsentrasi Asetosiringon 75 ppm; Ulangan ke 3

Perlakuan dan Ulangan	Sebelum CIM (H-7)	Setelah CIM (H-0)	Setelah Kokultivasi (H+2)	Setelah eliminasi (H+6)	Setelah recovery 1 Minggu (H+13)	Setelah Seleksi 1 Minggu (H+20)	Setelah Seleksi 2 Minggu (H+27)	Setelah seleksi 3 Minggu (H+34)	Parameter Viabilitas
0,6_75_U 3_5									++
0,6_75_U 3_4									++
0,6_75_U 3_3									++
0,6_75_U 3_2									+
0,6_75_U 3_1									++

Keterangan :

- +++ Terdapat kalus berwarna hijau dan terdapat pertumbuhan kalus
- ++ Terdapat kalus berwarna hijau pada area yang lebih luas
- +
- Terdapat kalus berwarna hijau
- Kalus mati
- K Kontaminasi

Lampiran 14. Hasil Turnitin Naskah Skripsi

Turnitin Originality Report

Processed on: 12-Feb-2026 09:22 WIB
ID: 2877189933
Word Count: 10505
Submitted: 1

1901801998_Maria Ivana_Turnitin.docx By Maria Ivana

Similarity Index	Similarity by Source
5%	Internet Sources: 5% Publications: 2% Student Papers: 1%

1% match ()
[Christin, Sylvana. "PENGARUH LAMA WAKTU INFEKSI TERHADAP FREKUENSI TRANSFORMASI GEN AtRKD4 PADA TANAMAN KACA PIRING \(*Gardenia jasminoides* J. Ellis\) OLEH *Agrobacterium tumefaciens* EH4105", 2020](#)

1% match (Internet from 22-Nov-2020)
<https://idoc.pub/documents/4-biologi-2007-2878-d47e9woo3yn2>

< 1% match (Internet from 12-Jan-2021)
<https://text-id.123dok.com/document/7qv4881g-induksi-proliferasi-tunas-adventif-kenaf-hibiscus-cannabinus-l-secara-in-vitro-melalui-penambahan-zat-pengatur-tumbuh-2-4-d-dan-bap.html>

< 1% match (Internet from 18-Mar-2021)
<https://text-id.123dok.com/document/qvp4p8rq-s-bio-1203139-chapter3.html>

< 1% match (Internet from 28-Jun-2022)
<https://adoc.pub/konstruksi-vektor-biner-dan-transformasi-gen-lisozim-pada-ru.html>

< 1% match ()
[Purwanti, Frida, Isnawati, Isnawati, Trimulyono, Guntur. "Efektivitas Antibakteri Ekstrak Lichen *Parmelia Sulcata* terhadap Pertumbuhan Bakteri *Shigella dysenteriae* dan *Bacillus cereus*", 'Universitas Negeri Surabaya', 2017](#)

< 1% match (Internet from 19-Nov-2024)
https://eprints.walisongo.ac.id/id/eprint/25063/1/1908016019_Lengkap%20Tugas%20Akhir%20-%20Siti%20Nur%20Hasanah.pdf