# KERTAS CADANGAN
# DANA PEMULA PROJEK KUMPULAN INOVATIF DAN KREATIF

## BAHAGIAN 1: MAKLUMAT ASAS PERMOHONAN

| PERKARA | BUTIRAN YANG PERLU DIISI DAN DILENGKAPKAN OLEH PEMOHON | | |
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| **NO. RUJUKAN PERMOHONAN** | 12/26/20237252 | | |
| **NAMA KUMPULAN** | PTC | | |
| **TARIKH KUMPULAN DITUBUHKAN** | 12/20/2023 | | |
| **NAMA PUSAT TANGGUNGJAWAB** | JABATAN TIMBALAN NAIB CANSELOR (PENYELIDIKAN & INOVASI) | | |
| **KETUA KUMPULAN** | **NAMA:** NUR AMALINA BINTI MOHD ROPI<br>**JAWATAN:** Kumpulan A dan JUSA : 41 ke atas<br>**NO. PEKERJA:** 14447<br>**EMEL:** nuramalina.mr@utm.my<br>**NO. TEL. BIMBIT:** 60145117304 | | |
| **MAKLUMAT AHLI KUMPULAN** *(senarai semua nama ahli Kumpulan (sama sepertimana dalam Kad Pengenalan))* | **NAMA AHLI KUMPULAN** | **KOD JAWATAN** | **NO PEKERJA/MATRIK** |
| | NAZRIN ABD AZIZ | DS51 | 16353 |
| | NOORAFIZAH BINTI DZAHIR | Q29 | 14303 |
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| **TAJUK PROJEK YANG DICADANGKAN** | **SUSTAINABLE ALTERNATIVE SOURCE OF TONGKAT ALI (EURYCOMA LONGIFOLIA) ROOTS THROUGH IN VITRO CULTURE OF ADVENTITOUS ROOTS** | | |
| **CARTA PERBATUAN AKTIVITI PROJEK** *(Gantt Chart Milestone & Dates)* | 1. Purchasing supplies and project materials : 31/1/2024 - 29/2/2024<br>2. Surface sterilization and explants preparation : 1/3/2024 - 30/4/2023<br>3. Adventitious root formation on semi-solid culture : 1/5/2024 - 31/7/2024<br>4. Adventitious root propagation in liquid culture : 1/8/2024- 31/10/2024<br>5. Documentation, report and publication : 1/10/2024 - 31/12/2024 | | |
| **SLIDE CARTA PERBATUAN** | | | |
| **TEMPOH MASA PROJEK** *(Maksimum 12 Bulan)* | Tempoh: 700 hari<br>Dari: 1/31/2024 Hingga: 12/31/2025<br>*(nyatakan tarikh mula projek dan jangkaan siap projek)* | | |

**BAHAGIAN 2: MAKLUMAT PROJEK INOVASI**

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| **BIDANG INOVASI DALAM KIK** | INOVASI PENYAMPAIAN PERKHIDMATAN |
| **KATEGORI INOVASI** | INOVASI PENAMBAHBAIKAN |

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| 1 | OBJEKTIF & LATAR BELAKANG MASALAH:<br>*(Latar belakang masalah dan objektif dinyatakan)* |
| | Objective:<br>1. To determine the optimal type and concentration of auxin plant growth regulators in promoting the proliferation and growth of Eurycoma longifolia adventitious roots on semi-solid culture conditions.<br>2. To identify the optimal concentration of auxin plant growth regulators in promoting the proliferation and growth of Eurycoma longifolia adventitious roots in liquid culture conditions.<br><br>Problem Statement:<br>In conventional planting, Tongkat Ali (Eurycoma longifolia) typically takes 4 to 5 years to reach maturity and achieve a harvestable size. This long harvesting time, in combination with decreasing number of Tongkat Ali in the wild due to overharvesting and deforestation, have impeded the full potential of herbal industry in Malaysia to commercialize this globally known herb. This project propose an alternative source of Tongkat Ali roots through in vitro tissue culture technique which is a more reliable and importantly, sustainable approach. Adventitious root formation from in vitro culture utilizes rapid proliferation of plants from small tissue samples, enabling an earlier harvest and utilization of the desired plant material. This can significantly reduce the time required to obtain high biomass and valuable bioactive compounds. The currently available literature on Tongkat Ali propagation in in vitro culture utilize the indirect regeneration pathway where adventitious roots formation is only induced after callus formation from leaf explants. This project aims to directly induce adventitious root formation from leaf explants, thus shortening the time required for the overall process. This will be achieved by investigating and determining the optimal types and concentration of auxin plant growth regulators to directly induce and promote rigorous growth of adventitous root formation from Tongkat Ali leaf explants. |
| 2 | METODOLOGI DAN PERANCANGAN PROJEK:<br>*(Metodologi dan perancangan projek (bagi 1 tahun tempoh projek))* |
| | General procedure:<br>1.1 Plant materials<br>Tongkat Ali plants will be purchased from local nursery. Leaves will be used as plant materials for this study. Only healthy and juvenile apical leaves will be selected and used as explants in this study .<br>1.2 Surface Sterilization and explants preparation<br>The explants collected from the Tongkat Ali plant will be washed under running tap water for 30 min. The explants will be soaked in 15% (v/v) commercial Clorox (Sodium hypochlorite 5.25% (w/v)) solution supplemented with two drops of Tween-20 (Sigma) for 30 minutes. The explants will be then rinsed three times with 100 ml of sterile distilled water. After sterilization, the leaves will be cut into squares of 5 mm x 5 mm in size along the midrib.<br>In order to achieve Objective 1: To determine the optimal type and concentration of auxin plant growth regulators in promoting the proliferation and growth of Eurycoma longifolia adventitious roots on semi-solid in vitro culture conditions, the effects of different types and concentrations of auxins to induce adventitious roots from the explants on semi-solid culture conditions will be evaluated.<br><br>3.1 Adventitious Root Induction on Semi-solid Culture Condition<br>The prepared explants from Section 1.2 will be cultured on full strength semi-solid Murashige and Skoog (MS) medium supplemented with 50 g/L of sucrose and various types of auxin (NAA,IBA,IAA) and concentrations (1.0, 3.0, and 5.0 mg/L) of auxins. The pH of the medium will be adjusted to 5.8 Â± 0.1. Auxin free MS medium will be used as the control in each treatment. All cultures will be maintained at 25 Â± 1ÂºC in dark condition for one month. Observation on adventitious roots and callus formation will be carried out daily to determine the initial day of root formation. After one month of culture, several data will be recorded including the number of roots per explant, the length of root, the biomass weight and morphological observations of the explants or root formation. The type and concentration of auxin that can induce the highest number of roots per explant, and biomass weight will be considered as the best auxin to induce adventitious root formation on semi-solid culture condition.<br>In order to achieve Objective 2: To identify the optimal concentration of auxin plant growth regulators in promoting the proliferation and growth of Eurycoma longifolia adventitious roots in liquid culture conditions, the effects of different concentrations of an auxin to promote rigorous growth in liquid culture conditions will be evaluated.<br><br>3.2 Propagation of Adventitious Root in Liquid Culture Condition<br>The adventitous root (1 g) generated from Section 2.1 will be used to inoculate 50 mL full strength liquid MS medium in a 250 mL flask supplemented with 50 g/L sucrose and various concentration of the best auxin determined in Section 2.1. The liquid culture will be agitated at 100 rpm on a gyratory shaker in dark condition at 25 Â± 1ÂºC environment. After a month of culture, the weight of adventitious root biomass will be recorded. The concentration of the auxin that can lead to the highest biomass of adventitious root will be considered as the most optimal concentration to induce highest adventitious root biomass in liquid culture condition.<br><br>Statistical Analysis<br>For Objective 1, each treatment will consists of three replicates, each with 20 explants and the entire experiment will be repeated at least twice. For Objective 2, each treatment will consists of five 250 mL flasks and the entire experiment will be repeated at least twice. The data will be analyzed using Duncan Multiple Range Test with the significant differences between mean at p<0.05. All the statistical analysis will be performed using SPSS Statistic 17.0.<br><br>Project Planning<br>â€¢ Phase 1: Plant materials and explants preparation<br>â€¢ Phase 2: Adventitious root induction on semi-solid culture<br>â€¢ Phase 3: Propagation of adventitious root in liquid culture<br>â€¢ Phase 4: Project documentation, report and publication |

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| 3 | ELEMEN TEKNOLOGI & INOVASI:<br>*(Inovasi/teknologi yang dibawa juga istilah teknikal dinyatakan Validasi ke atas teknologi/inovasi)* | |
| | In vitro culture techniques is a reliable technique for rapid multiplication of plant material such as that of Tongkat Ali roots that would otherwise takes a lenghty time to achieve maturity in nature. Further optimization of important parameter such as the types and concentration of plant growth regulators during culture conditions can lead to a quicker generation of biomass compared to traditional cultivation methods, contributing to an overall increased efficiency of production. Considering the dwendling number of Tongkat Ali in the wild due to over harvesting and deforestation, adventitious root formation via tissue culture technique in this project also offers a sustainable alternative for industry supplies. The optimized technique developed in this project would serve as a stepping stone for engagement and collaboration with relevant industry player such as Biotropics Malaysia. | |
| 4 | RISIKO DAN MITIGASI:<br>*(Pertimbangan risiko dan mitigasi adalah relevan dengan pembangunan inovasi dan teknologi yang dibawa)* | |
| | 1) Risk : Contamination in the in-vitro environment.<br>Mitigation : Strict adherence to aseptic techniques and regular monitoring to prevent and address contamination<br><br>2) Risk : Power outages and equipment failure.<br>Mitigation : Install backup generators for immediate power and ensure regular maintenance<br><br>3) Risk : Variability in analytical results.<br>Mitigation : Calibrate equipment regularly, employ standard operating procedures, and validate analytical methods. | |
| 5 | IMPAK DAN MANFAAT:<br>*(impak yang positif kepada masyarakat/organisasi/komuniti)* | |
| | Impact: The optimization of in vitro culture techniques involves scientific research and innovation, contributing to the advancement of knowledge in plant tissue culture and regeneration.<br><br>Benefit : Collaborations with industry players, such as Biotropics Malaysia, strengthen ties between academia and the private sector, fostering knowledge exchange and potential commercialization of research findings. | |
| 6 | OUTPUT DISASARKAN OLEH PROJEK:<br>*(Output yang disasarkan adalah relevan dengan inovasi & teknologi yang dibawa)* | |
| | One (1) publication research paper<br>One (1) conference presentation | |
| 7 | PENGKOMERSILAN:<br>*(Ciptaan baharu, berupaya bersaing di pasaran dan boleh menjana pendapatan)* | |
| | The potential commercialization of tissue culture for Tongkat Ali roots involves the translation of scientific research and optimized techniques into a commercially viable through the development of a scalable production process to meet potential commercial demand. | |
| | STATUS PENGKOMERSILAN: BERPOTENSI UNTUK DIKOMERSILKAN | |
| 8 | PERANCANGAN BELANJAWAN PROJEK: | |
| | 1) Supplies and project materials (Tongkat Ali sapplings, Murashige & Skoog powder, sucrose, gelrite, auxin (IBA,IAA,NAA), 250 mL flasks, Petri dish, gloves, face masks, scalpel, scalpel blade, forceps, glass jar, storage container) : RM 2,500<br><br>2) Accessories and equipment (Glass bead sterilizer) : RM 3,500<br><br>3) Publication & Conference : RM 3,000<br><br>Grand Total : RM 9,000 | |
| 9 | SLIDE PEMBENTANGAN: **TIADA** | |

*Nota: Sila gunakan kertas yang berasingan jika ruang yang disediakan tidak mencukupi.*

## PERAKUAN DAN PENGESAHAN PENYERTAAN

**PERAKUAN PERMOHONAN**

Semua maklumat yang diisi adalah benar, pihak BPO berhak menolak permohonan atau membatalkan tawaran pada bila-bila masa sekiranya keterangan yang dikemukakan adalah tidak benar.

Nama: **NUR AMALINA BINTI MOHD ROPI**
Email: nuramalina.mr@utm.my
Tandatangan & cop: Tarikh: 12/31/2023 4:45:00 PM
(Ketua Kumpulan)

**PENGESAHAN KETUA PUSAT TANGGUNGJAWAB (PTJ)**

*(Diisi oleh pemilik utama projek)*

Saya mengesahkan bahawa projek inovasi ini adalah ***MILIK PENUH PTJ SAYA / ~~MILIK BERSAMA PTJ LAIN.~~**

Nama: **PROF. IR. TS. DR. ROSHANIDA BINTI A. RAHMAN**
Email: r-anida@utm.my
Tandatangan & cop: Tarikh:
(Ketua PTJ)

PENGESAHAN PENYERTAAN BERSAMA *(sekiranya ada)*

*(Diisi oleh pemilik bersama PTJ lain)*

Saya mengesahkan bahawa hasil inovasi ini adalah milik PTJ saya bersama PTJ lain.

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