

マレーシア農科大学
バイオテクノロジー学科拡充計画
計画打合せ調査団報告書

平成 4 年 5 月

国際協力事業団



国際協力事業団

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序 文

国際協力事業団は、マレーシア国関係機関との討議議事録（R/D）等に基づき、マレーシア農科大学バイオテクノロジー学科拡充計画に関する技術協力を平成2年6月1日から開始し、今般、平成3年4月22日から5月1日まで岡山大学農学部教授・河津一儀氏を団長とする計画打合せ調査団を現地に派遣しました。

同調査団は、本プロジェクトの本格的展開にあたり、詳細年次計画を検討し円滑な運営を行うため、マレーシア国政府関係者と協議及び現地調査を行いました。

本報告書は、同調査団による協議結果等を取りまとめたものであり、今後、本プロジェクトの運営にあたり活用されることを願うものです。

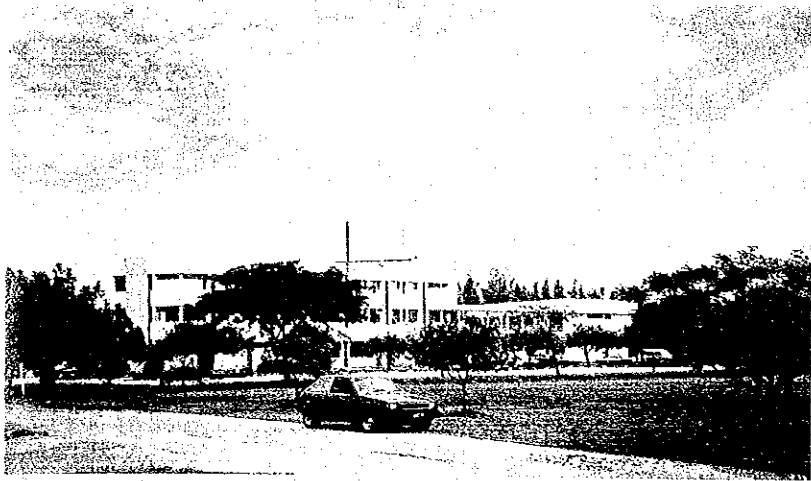
終わりに、この調査にご協力とご支援をいただいた内外の関係各位に対し、心より感謝の意を表します。

平成4年5月

国際協力事業団

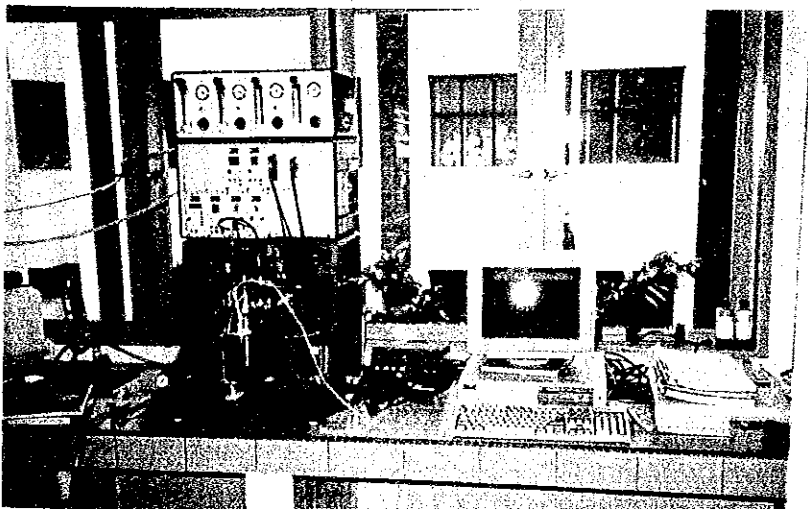
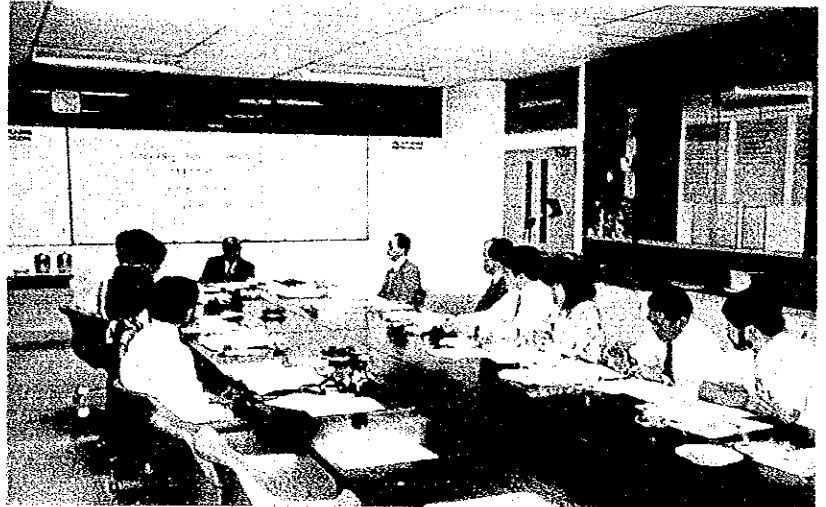
農業開発協力部

部長 有川 通世



◀ 学部建物 全景
(本館及び新館)

合同委員会 ▶



◀ 供与機材
(新館、実験室)

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1. 計画打合せ調査団の派遣

1-1 調査期間

平成3年4月22日(月)～5月1日(水)

1-2 調査項目

(1) マレーシア国政府関係機関及び実施機関との協議事項

1) 暫定実施計画の進捗状況

- a) 協力部門別活動
- b) 建物、施設等
- c) 専門家派遣
- d) 研修員受入れ
- e) 機材供与及び利用管理状況
- f) ローカルコスト負担状況

2) 暫定実施計画(TSI)及び詳細実施計画の作成

3) 実施運営上の留意事項、問題点及び解決方法

4) 合同委員会の開催及び協議結果

5) その他

1-3 調査団の構成

総 括	河 津 一 儀	岡山大学農学部教授
醜 醇	多 田 幹 郎	岡山大学農学部教授
遺伝子工学	一 瀬 勇 規	岡山大学農学部助教授
業務調整	美 馬 巨 人	国際協力事業団農業開発協力部農業技術協力課

1-4 調査日程

日順	月 日	曜日	調査日程	宿泊地	調査内容
1	4月 22日	月	移動	クアラルン プール	東京、大阪→クアラルンプール (CX-501、503、721)
2	23日	火		クアラルン プール	日本大使館、JICA事務所、 EPU表敬・打合せ
3	24日	水		クアラルン プール	UPM、専門家と打合せ(進捗状況等)
4	25日	木		クアラルン プール	UPM打合せ(TSI、供与機材の詳細打合 せ)
5	26日	金		クアラルン プール	UPM打合せ(協力計画の詳細打合せ)
6	27日	土		クアラルン プール	ミニッツ(案)作成
7	28日	日		クアラルン プール	団内打合せ
8	29日	月		クアラルン プール	ジョイント・ミーティング ミニッツ署名
9	30日	火		クアラルン プール	日本大使館、JICA事務所 報告
10	5月1日	水		クアラルン プール コタバル	クアラルンプール→大阪 (CX-502、720) クアラルンプール→コタバル(JICAのみ)
11	2日	木		クアラルン プール	水管理訓練センターと打合せ コタバル→クアラルンプール
12	3日	金		クアラルン プール	灌漑排水局と打合せ 日本大使館、JICA事務所 報告
13	4日	土	移動		クアラルンプール→東京(MH-092)

2. 調査概要

(1) 暫定実施計画(TSI)については、R/D時のものを分野別に更にブレイクダウンし、活動内容を時系列に記載したものを作成した。

しかし、詳細年次計画については、現段階で確定できない点も多く、各年度毎に協議することとなる。

(2) 専門家派遣に関して以下の問題点があり、改善を要望した。

1) カウンターパート(C/P)配置が不十分。C/Pが学生指導や海外研修(サバティカル)等で多忙な場合が多く、このため、研究意欲が概して低いことから、専門家の技術移転対象となり得ない点が専門家から指摘された。

このため、C/Pに最低1名以上の研究助手(テクニカル・スタッフ)の確保をUPM側に依頼し、了承された。

2) 新館の工事の遅れと実験室の割り振りが未決定で、専門家への実験スペース(実験台等)の確保が遅れている。

3) 長期あるいは短期の連続派遣専門家に関しては、A1フォームは分野別に1本で、5か年間取り付けているが、個別の短期専門家に関しては年度毎に分野を特定して要請をあげることとしたい。

(3) 機材供与に関して

1) 初年度60,000千円(54,131千円)の機材をほぼすべて現地購入した。

現地購入に関しては、納入業者が未熟な点もあり、保守・管理等に若干の問題もあるが、納期、アフターサービス、価格の点で有利であり、今後とも継続したい。

また、利用・管理状況に関しては、納入後間もないこともあり、掘付けが完了していない機材もあるが、概ね良好に利用されていた。

2) 5か年間で250,000千円規模を目途に、機材の全体計画を再調整した。

バイオテクノロジー学科の基盤整備のために必要性(実用性)の高い機材を厳選することで、調整は可能と思われる。

3) 平成3年度(2年次)の機材として70,000千円の予算が確保できているので、機材リストの協議を行い、ほぼ優先順位を確定できた。

(4) 研修員に関して

- 1) 平成3年度研修員受入れ3名(計画より1名減)について、マレーシア側の了解が得られた。
- 2) 国費留学のJICA特別枠の人選を積極的に進めたい。

(5) ローカルコスト負担に関して(マレーシア側分)

- 1) 新館の完成が遅れている(設備工事及び備品の搬入が未了)。また工事内容が雑で、機材の搬入ができない部屋があり、工事仕様の不備が感じられる。
- 2) その他のローカルコスト負担(運転手、ガソリン、消耗品、専門家の部屋等)は概ね良好。

(6) モデルインフラ整備事業として、ファイトトロン実験棟(人工気象施設)建設の強い要望があった。この施設は組織培養研究の基盤となる試験試料の育苗のためのもので、バイオテクノロジー(以下、バイテクとも略記)技術の実用化に不可欠の施設といえる。

本調査団としては、本年度の実施は予算状況から困難の旨説明し、平成4年度実施を検討すべく、マレーシア側要望を持ち帰ることとした。

(7) プロジェクト活動の中間成果を確認するためのセミナー/ワークショップを1992年9月第1週に行うこととなった。

(8) 本プロジェクト活動が今後活発になるに従い、研究者の安全確保及び環境への配慮の観点から、放射性物質の管理体制や化学薬品類(突然変異誘発剤等)の排水処理等に問題点が見受けられる。

現在、マレーシア国においては、国レベルでの安全基準は策定されているとのことであるが、各大学においては、ほとんど、これら施設は整備されておらず、野放しの状況である。このため、放射性物質の保管施設の建設や、排水処理施設の整備等の環境整備のためのローカルコスト負担の必要性があると思われる。

3. 暫定実施計画の進捗状況

3-1 協力部門別活動

《酵素・発酵工学》

本年1月下旬から長期専門家として森原教授が、4月中旬から短期専門家として杉尾教授が赴任しているが、学年末、旧正月やハリラヤ等の行事のためカウンターパートと接触する機会が少なく、また新実験棟の完成の遅れのために、予定されている研究計画はほとんど進行していない。また、昨年8月の第一次短期専門家団派遣に際して討議された研究計画に対するUPM側の対応は十分とは言い難い。例えば、“有機酸発酵”はメインテーマとなっているにもかかわらず、3月に行われた卒業論文発表のテーマを見ても、有機酸に関するテーマは25課題中1題しかなく、また、この研究分野のカウンターパートであるDr. Ismail は本年9月からサバティカルを利用して10か月オーストラリアに出かけることになっている。

しかし、両専門家の努力により、UPM側の研究活動の実態が把握され、それに即応した実験計画が練られ、5月以降の活発な研究活動が期待できる。なお、新たに“環境微生物”が、今後の協力研究テーマの1つとして取り上げられることになった。

《植物組織培養》

昨年8月から10月にかけてDr. Hasanahが、研修員として岡山大学農学部で研修を受け、植物組織培養の基礎を修得して帰国した。引き続き専門家河津一儀教授が、11月から本年1月末まで現地に滞在して、Dr. Hasanah及び彼女の助手・Ms. Sitizakiaを指導した。赤色色素を産生するヨウシュヤマゴボウ及び熱帯植物‘senduduk’のカルス誘導に成功し、現在安定な細胞株生育条件を精査している。また、ステロイドを産生するParkiaのカルスの誘導に成功したので、カルスの最適生育条件を検討中である。

本年4月から、木村修専門家が着任し、青色色素を産生するカルスについて共同研究を開始した。同専門家は、chiliのプロトプラスト化及び、その再生系の確立について、Assoc. Prof. Dr. Zaliha、Dr. Norihanと共に研究を行う予定である。供与機材である顕微鏡、クロマトスキャナー、マニピュレーターを使用できるよう指導する予定である。

《分子生物学・遺伝子工学》

この協力分野では、分子生物学・遺伝子工学に関する技術移転を主目的としている。初年度に1名の研修員(Dr. Gun Yik Yuen)を受け入れ、DNAの取扱い技術を修得させた。この研

修内容が帰国後の研究に有効に活かされていることが確認された。専門家の派遣は3年度から開始されるが、その効果が十分に期待できる。

《生物反応プロセス》

この部門は、上の3部門の成果を待って開始することになっているので、現在、研修員の受入れも、専門家の派遣も行っていない。

3-2 建物、施設等

新研究棟の完成が遅れている。以下に現時点における問題点を列挙しておく。

- ・ 実験室内装工事が遅れており、実験台の設置及び配管工事の完成までには、かなりの時間がかかりそうである。また、工事が雑であり、窓枠・戸などに歪みが認められ、スコール時には雨水の侵入もみられる。
- ・ 組織培養実験棟における火災の後処理が遅れている。
- ・ 組織培養実験棟において供与機器の搬入を予定している部屋の準備ができていない。すなわち、クリーンルームの入口が狭いためクリーンベンチの搬入ができず、そのためクリーンベンチ内に設置すべき供与機材（マイクロマニピュレーター）が正しく設置できていない。
- ・ ラジオアイソトープが通常の実験室（2実験室で確認）で使用されている。

3-3 専門家派遣

現在派遣されている3名の専門家とUPMスタッフとの人間関係は友好的である。しかし、新館の内装設備工事が遅れており、そのため、新着任専門家への実験台の割当てが大幅に遅れている。専門家が着任しても、実験する場所が決まらず、いたずらに時を浪費することにならないかと懸念する。

専門家の意欲だけが先行して、いらだちを覚えられるようである。カウンターパートの不在（旧正月、ハリラヤ等による休暇及び講義とその準備、会議等により多忙のため）や専門家のための実験台が確保されていないことなどが、その理由と考えられる。

去る11月から1月末にかけて河津専門家が現地に滞在した間に、各専門家にC/Pを1人ずつ割り当てるように要望した。C/Pは、学生指導や会議で多忙であり、また海外長期研修（サバティカル）などで不在になることも多く、そのうえ研究意欲が概して低いことから、専門家の技術移転対象となり得ないこともことが指摘された。そこで、研究助手をC/Pと専門家のペアに1人以上配置することを要望し、確約を得た。

3-4 研修員受入れ

初年度の前期、後期それぞれ2人、計4人の研修員(組織培養1人、酵素・発酵工学2人、分子生物学・遺伝子工学1人)を受け入れ、研修の実を挙げて帰国した。本年度は当初計画より1人減の3人となったが、UPM側は了解した。

前期に学部長(巡回視察)とDr. Manaf(組織培養)、後期にDr. Norihan(組織培養・分子生物学)を受け入れる予定である。

国費留学のJICA特別枠の候補者の人選を積極的に行い、Dr. Baharuddin が指導している修士課程修了予定者が、第1候補に挙がっている。

3-5 資機材供与及び利用状況

《初年度供与資機材の利用状況》

初年度(平成2年度)に供与された資機材のうち、実験室に配備された実験機器についての使用・保守の状況は別表1のようである。

予定されたすべての機器は平成3年2月末までに搬入・検収された(FPLCは5月上旬に説明会が開かれる)。しかし、旧正月、ハリヤ等の休暇と新実験棟の完成の遅れで十分に利用されていたとは言えないが、今後、使用頻度は増加するものと期待される。なお、新実験棟の完成に伴う実験室の移転を待たねばならない点もあるが、個々の機器の適切な場所への設置、実効性の高い保守管理者の選定、使用規定の制定を行うことが望まれる。また、適切な使用記録簿を作成し、記帳を徹底させることが必要であろう。

《2年度供与資機材の選定》

2年次(平成3年度)の供与資機材として、マレーシア側から提出してきた要求リストに基づいて、派遣専門家及びカウンターパート等と協議して、リスト(別表2)を作成した。作成したリストは日本に持ち帰り、他の専門家(稲垣助教授、神崎助手)と協議し、供与予定機器として別表3に示す機器を選んだ。

《携行機材及び消耗品》

派遣専門家が必要とする携行機材が専門家の到着より遅れることは、今後、絶対に避けなければならない。そのためには、派遣要員が決まり次第、携行機材申請の手続きを促すようJICAから指導していただきたい。日本では容易に入手できる消耗品の入手が困難であるとのことであるが、これらの点は、日本側の問題点であり、今後、派遣専門家の日本への連絡を密にすることによって、解決できるものと思われる。

《機材供与全体計画》

プロジェクト期間5か年間の年次別供与計画は（別表3）のとおりであるが、現時点で5か年間の全体供与総額を250,000千円程度と予定しているため今後、若干の絞り込みが必要となる。

3-6 ローカルコスト負担事業

モデルインフラ整備事業として、ファイトロン施設（人工気象施設）建設の強い要望があった。この施設は、組織培養研究の基盤となる試験管内細胞から器官を再分化させ、育苗するためのもので、バイオ技術の実用化に不可欠の施設である。

本年度の実施は、予算状況から困難であると説明したが、平成4年度実施に向けて検討すべく、この要望を持ち帰ることにした。

別表 1

実験機器の使用・保守の状況

〔備品番号〕	〔機器・装置名〕	〔使用状況(備考)〕
JUBR-24	Single Fermenter Control System	◎(25、53と同時使用)
-25	Biostat MC-Cell Culture Fermenter	◎(24、53と同時使用)
-26	High Speed Refrigerated Centrifuge Microprocessor	×(電気工事未完)
-27	Table Top Ultracentrifuge TL100	△
-28	Programmable Spectrophotometer	△
-29	Radi-Frac Fraction Collector	☆(梱包を未開封)
-30	Radi-Frac Fraction Collector	☆(梱包を未開封)
-31	FPLC System	※(未講習)
-32	Water Purification System	◎
-33	Chromatogram Scanner	○
-34	Freeze Dryer	◎
-35	French Pressure Cell	○
-36	Electric Cell Fusion System	○
-37	Growth Cabinet	×(温度制御不調)
-38	Microflex Fully Automatic 35mm Camera	○
-39	Diaphot Inverted Phase Contrast Microscope	○
-40	Micromanipulator	×(設置場所不備)
-41	Fiber Optics Bifurcated Illuminator	◎(42と同時使用)
-42	Trinocular Stereoscopic Microscope	◎(41と同時使用)
-46	Shaker Incubator 3台	◎
-47	Ultra-low Temperature Freezer	◎
-48	CO ₂ Incubator	◎
-49	Chemap Baby Fermentor	◎
-50	Autoclave (HA-300M)	◎
-51	Autoclave (HA-240M)	×(電源工事未完)
-53	SPC Input and Measured Value Output Module	◎(24、25と同時使用)

- ◆使用状況欄の記号は以下の状況を示す。◎：よく使用している。○：使用したことがある。
△：使用できる状況である。※：使用できる状況であるが、使用説明の講習会が開かれていないので使用できる者がいない。×：機器本体あるいは機器の設置環境に問題があり使用できない。☆：新実験棟への移転を控えて梱包のまま放置されている。
- ◆JUBO-012～023の機材はJICA職員及び専門家の部屋に置かれ、有効に使用されている。
- ◆Autoclaveに関しては、当初Sanyo製の購入が予定されていたが、通関の関係上Hirayama製の機械が納入されている。
- ◆JUBO-52 Generatorについては、近日中に据付工事が完了する。

別表 2

平成 3 年度購入予定機器リスト

番号	機 器 名	メーカー(型式)	総価格 (マレイシアドル)
1.	ペプチドシーケンサー (Peptide Sequencer)	Appl. Biosystem(473A)	\$447,750.00
2.	発酵タンク(Fermentor) (集菌装置を含む)	B. Braun Bioteck(本体: Biostat V50) Beckman(集菌装置: JCF-Z)ほか	\$273,000.00
3.	ガスクロ(GC)	Shimadzu(GC14)ほか	\$ 55,910.00
4.	蛍光及びノマルスキー顕微鏡 (Fluorescence & Nomarski Microscope)	Nikon(本体: FX-VRD) Nikon(Fluorescence: EF-S) Nikon(Nomarski: DIC-S)	\$102,149.00
5.	クリーンベンチ(Biohazard)	Gelman Science(BH-120)	\$ 15,900.00
6.	電気泳動装置 (Electrophoresis)	Pharmacia(Phast System)	\$ 42,450.00
7.	細胞破碎装置(Cell Mill)	Retsch(MM-2)	\$ 8,800.00
8.	微量高速遠心機 (Microcentrifuge)	Kubota(本体: 1700) Kubota(ローター: RA-150AM)	\$ 15,140.00
9.	DNA合成装置 (DNA synthesizer)	Appl. Biosystem(391-EP)	\$ 55,970.00
10.	DNA増幅装置(PCR)	Perkin Elmer(PJ 2000)	\$ 22,800.00
11.	高分子化合物濃縮装置 (Hollow Fiber)	Amicon(CH2PRA)ほか	\$ 20,207.00
12.	抗原抗体反応測定装置 (Elisa Reader)	Biotek(EL340) Sharp(PC4641) NEC(pinwriter P3200)	\$ 39,147.00
13.	フーリエ変換赤外スペクトログラフ (FT-IR)	Perkin Elmer(1725X)	\$179,940.00
14.	GMサーベーター (GM survey meter)	Aloka(TGS-133)	\$ 8,000.00
15.	高速液クロ(HPLC)	Shimadzu(本体: LC-6A) Shimadzu(検出器: SPD-6A)ほか	\$ 33,000.00
	エアコン	Sanyo(SapTC243GS)	\$ 5,600.00
	エアコン	National(CS-5TV11)	\$ 12,800.00
	消耗品		\$ 50,000.00

\$1,388,563.00 = 73,593,839 Yen

フラクションコレクターは既に3台購入されているためリストから外し、マレイシア側から強く要求のあったフラクションコレクター(大容量用)及び抗原抗体反応測定装置(Elisa Reader)のオプションとして要求のあったプレート自動洗浄装置については、使用頻度が限定されることもあって、後年度に要求することとして除外した。なお、予算的に可能であるならば、GMサーベーターと高速液クロ(HPLC)を購入するという事で本リストに加えた。(総価格はオプションを含む)

別表3

機材購送年度別実績・計画調査

プロジェクト名：マレイシア農科大学バイオテクノロジー学科学拡充計画

協力期間：1990.6.1～1995.5.31

担当部：農業開発協力部
1991年1月作成

1年度目(平成2年度)	2年度目(平成3年度)	3年度目(平成4年度)	4年度目(平成5年度)	5年度目(平成6年度)
(本部購送)	(本部購送)	(本部購送)	(本部購送)	(本部購送)
コンピュータ 小計 1,480千円	小計 0千円	小計 0千円	コンピュータ 小計 2,000千円	小計 0千円
(現地調達) Autoclave 2台 Deep Freezer 1台 Anaerobic Incubator 1台 High Speed Refrigerated Centrifuge 1台 Table Top Ultracentrifuge 1台 UV-VIS Spectrophotometer 1台 Chromatogram Scanner 1台 Growth Cabinet 1台 Microflex Fully Automatic Micromanipulator 1台 Diaphoto TDM 1台 Light Guide 1台 Stereomicroscope 1台 Freeze Dryer 1台 Fermentor 2台 Shaker Incubator 1台 Electroporator 1台 Fraction Collector 1台 FPLC 1台 Water Purification System 1台 French Pressure Cell 1台 Data Acquisition 1台 Copy Machine 1台 Vehicle 2台 Facsimile Machine 1台 Generator 1台 Consumable Materials 1式	(現地調達) Polymerase Chain Reaction 1台 Peptide Sequencer 1台 Fermentor 1台 Hollow Fiber Membrane System 1台 Cell Counter and Analyzer 1台 Normanski Microscope 1台 Biohazard Cabinet 1台 ELISA Reader and Micro-titer Plate Washer 1台 Flat Plate Membrane System 1台 Two Dimensional Electrophoresis with Automated Phast System 1台 Gas Chromatography 1台 FT-IR Spectrophotometer 1台 Preparative Fraction Collector 1台 Fluorescence Microscope 1台 Vibrogen Cell Mill 1台 Rotor for High Speed Centrifuge 1式 Air Conditioner 2台 Consumable Materials 1式	(現地調達) DNA Sequencer 1台 DNA Synthesizer 1台 Isoelectric Focusing System 1台 Electrophoretic Unit and Power Pack 1台 Liquid Scintillation Counter 1台 HPLC 1台 Automated Electrophoresis Phast System 1台 Air Lift Fermentor 1台 Ultrafiltration System 1台 Fluorescence Spectrophotometer 1台 Circular Dichroic Spectrophotometer 1台 Consumable Materials 1式 Copy machine 1台 小計 75,000千円	(現地調達) Eppendove Centrifuge 1台 X-ray Film Processor 1台 Inverted Microscope and Video Camera 1台 Different Type of Membrane Module 1台 Data Acquisition 1台 LC-MS Analyzer 1台 Programmable Deep Freezer 2台 Investigator 2-D Electrophoresis System 1台 Transblot SD System 1台 Fermentor 1台 Light Microscope 10台 Spectrophotometer-Visible 10台 Paper Electrophoresis Unit 1台 Homogenizer 1台 Electrofuser 1台 Viscometer 1台 CO ₂ O ₂ Analyzer 1台 Consumable Materials 2台 Vehicle 2台 小計 53,000千円	(現地調達) Biohazard Cabinet 1台 Air Lift Fermentor 1台 Ultrafiltration System 1台 Preparative Fraction Collector 1台 Fluorescence Microscope 1台 Fermentor 1台 Programmable Deep Freezer 1台 Bio Image Visage 60 Analyzer System 1台 各種機材スベアパーツ 1式 Consumable Materials 1式 小計 30,000千円
小計 59,383千円	小計 70,000千円	合計 75,000千円	合計 55,000千円	合計 30,000千円
合計 (実績及び予定) 60,863千円	合計 (見込み) 70,000千円	合計 (見込み) 75,000千円	合計 (見込み) 55,000千円	合計 (見込み) 30,000千円

4. 暫定実施計画 (T S I)

各分野の主要となる研究プログラムの詳細について協議し、T S Iに盛り込んだ。しかし、年次別詳細計画は、本協力が研究プロジェクトのため作成が難しく、5か年間の全体活動計画の記載にとどまっている。

《各分野の研究プログラム課題(暫定)》

A. 酵素と発酵工学

- 1) リパーゼ、アミラーゼ、その他の酵素の基礎研究と応用
 - a) 好熱性微生物から高生産菌株のスクリーニング
 - b) 酵素生産のための培養条件の検討
 - c) 蛋白質/酵素の精製と性質
- 2) 微生物による有機酸の生産
 - a) 高生産菌株のスクリーニング
 - b) 生産のための培養条件の検討
 - c) 有用な単離菌の性質、分類、同定
- 3) 酵素の基礎技術の確立と発酵工学
 - a) 微生物の保存方法の習得

B. 組織培養

- 1) 組織培養システムでの二次代謝と役割
 - a) 色素や有用な二次代謝を生産する最適熱帯植物の調査(例 クレロデンドロン パニキ ユラタムの皮には青い色素が含まれている)
 - b) 上述以外の硬い植物の誘発
 - c) 色素の生産や有用な二次代謝の高い能力を持つ細胞の選別
 - d) 二次元の電気泳動工学の修得(二次代謝に関する酵素検出の有用な技術)
 - e) 検出、定量分析と二次代謝の同定技術の修得
- 2) ビトロ技術を使い熱帯植物の新規菌株の生育
 - a) 原形質体再生システムの確立
 - b) 細胞融合技術の修得(P E G方法と電圧法)
 - c) 培養した植物細胞のイソチーム分析の技術修得(異なる種類の細胞融合による生育し得

る雑種の生産のデモンストレーションの有用な技術)

- d) アグロバクテリウム ツメファシェンスに感染させる技術修得
- e) 遺伝子操作技術修得

C. 分子生物学と遺伝子工学

1) 総合遺伝子工学の基礎技術確立

- a) 遺伝子工学の有用ベクターDNAの抽出と精製の修得
- b) E.Coli とその他の有用な原生核生物の最適変換と調整
- c) 酵素の制限修飾の実用を含むDNA組み換え技術修得
- d) 総合RNAとm.RNAの抽出と精製の修得
- e) ユーカリオウト細胞の溶菌はんとコロニーの雑種形成、南プロット雑種形成、北プロット雑種形成を含む雑種形成技術の修得
- f) DNAの連続技術修得
- g) 分子生物学のPCR応用の修得

2) 上述の遺伝子工学技術を使った有益な遺伝子のDNAクローニングと構造の分析

- a) 有用な遺伝子のための原生核生物とユーカリオウトのスクリーニング
- b) 有用な遺伝子のDNAクローニングと構造分析
- c) E.Coli のクローン遺伝子記号
- d) クローン遺伝子生産物の構造と機能の研究
- e) 熱帯植物の遺伝子多型性の分析

D. 1) 固定化された酵素、植物、動物細胞のバイオリアクター技術

- a) 固定化された酵素、植物、動物細胞のプレパラート
- b) バイオリアクターの設計の修得
- c) 有用物質生産のための固定化された酵素と細胞の連続操作
- d) 精製と分離技術の修得(ダウンストリーム製法)

5. 合同委員会の協議結果

第2回合同委員会が4月29日、UPM副学長Dr. Knalid b. M. Norの議長のもとに開催された。主たる目的はTSIの署名であったが、席上、本プロジェクトの進捗状況についてマレーシア側から報告があり、将来計画についても紹介された。（別添資料並びに附属資料参照）

問題点としては、人工気象施設（ファイトロン施設）をモデルインフラ整備事業として日本側に実施を要請することが再度確認された点のみで、TSIの変更内容を確認のうえ、署名をもって閉会した。

別添資料

UPM-JICA PROJECT FOR THE DEVELOPMENT OF THE
DEPARTMENT OF BIOTECHNOLOGY, UPM

Joint Meeting

Date: 29 April 1991
Time: 10.00 am
Place: Meeting Room
Faculty of Food Science and Biotechnology
Universiti Pertanian Malaysia

Agenda:

1. Introduction and welcome by the Chairman
2. Response remark by the JICA Team Leader
3. Review of progress of project
4. Discussion of Tentative Schedule of Implementation (TSI)
5. Other matters
 - (i) Model infrastructure development (Phytotron Laboratory)
6. Signing of minutes

UPM-JICA DEVELOPMENT OF
THE DEPARTMENT OF BIOTECHNOLOGY
PROGRESS REPORT - YEAR 1 (1990 - 1991)

INTRODUCTION

The Government of Japan through the Japanese International Cooperation Agency (JICA) agreed to fund a technical cooperation project for the Development of the Department of Biotechnology at the Faculty of Food Science and Biotechnology, Universiti Pertanian Malaysia. The Record of Discussion between UPM and JICA was signed on 19 April 1990.

Okayama University of Japan is given the charge of implementing the project under the leadership of Professor K. Kawazu.

The technical cooperation project, although designed as a development project, has focussed itself to the enhancement of research capabilities of the department. Thus, 4 research areas have been identified:

- A. Enzyme and Fermentation Technology
- B. Tissue Culture Technology
- C. Molecular Biology and Genetic Engineering
- D. Bioprocess Engineering

PROJECT

Important elements of the project include:

- 1. Despatch of Japanese experts
- 2. Counterpart training
- 3. Provision of equipments and machinery

DESPATCH OF EXPERTS

Experts serve as Advisors to the projects. Presently two long term experts are in UPM:

Prof. K. Morihara	(Enzyme & Fermentation)	20.1.91 - 31.1.92
Mr. O. Kimura	(Tissue Culture)	1.4.91 - 31.3.92

In the first year of the project, six short term experts have served the projects. The Coordinator of the project, Mr. N. Miyashita, arrived at the project of 20.6. 1990.

COUNTERPART TRAINING

Four Malaysian lecturers have gone to Japan for training and consultation with their Japanese counterparts. A total of 288 man days was involved as follows:

1. Dr. Gan Yik Yuen 19.8.90 - 29.10.90
2. Dr. Hasanah Mohd. Ghazali 19.8.90 - 11.11.90
3. Dr. Baharuddin Ghani 5.11.90 - 24.1.91
4. Dr. Lee Kong Hung 5.11.90 - 24.1.91

PROVISION OF EQUIPMENTS AND MACHINERY

All equipments planned for the first year have been purchased at a cost of \$1,090,265. The laboratory equipments are being commissioned and tested for laboratory use.

In addition to the above equipments, the JICA project was also involved in the minor renovation works for tissue culture and analytical laboratories. A refrigerator, an air conditioner and an emergency generator set were also purchased by the project.

CONCLUSION

In general the progress of the project has been satisfactory. The TSI has been met fully.

The Faculty is very pleased to place on record its appreciation and thanks to the JICA especially to Proj. K. Kawazu (Project Leader), Prof. Morihara (Team Leader), Mr. N.Miyashita (Coordinator) for the cooperation and understanding. The Faculty also wishes to thank the Malaysian Government agencies such as the EPU, PSD and the Ministry of Education for their cooperation.

FUTURE PLAN (1991 - 1992)

RESEARCH ACTIVITIES

The first two research areas i.e.

- A. Enzyme and Fermentation Technology
- B. Tissue Culture Technology

which have been initiated in the first year will be enhanced. Specific projects have been identified to be carried out.

In the field of Molecular Biology and Genetic Engineering, the learning of techniques will be given priority.

Each research project will be assigned a technical staff (laboratory assistant or research assistant) to work with the Malaysian lecturer and Japanese expert.

DESPATCH OF EXPERTS

Despatch of long term and short term experts were agreed (Appendix 1).

COUNTERPART TRAINING

It was agreed that counterpart training be continued involving 3 persons for the 2nd year.

PROVISION OF EQUIPMENTS

A list of necessary equipments for the successful implementation of the project were identified. The budget allocated for the 2nd year was Y 70,000,000 or about \$1.3 million.

OTHER ITEMS

1. A model infrastructure development of a Phytotron Laboratory was discussed in order to provide planting out of tissue culture plants. The Japanese team agreed to take up the matter with the relevant authorities in Japan.
2. A seminar/workshop was planned for the 1st week of September 1992 to discuss programmes of collaborative research projects.

RECORD OF DISCUSSIONS
STEERING COMMITTEE MEETING
24TH APRIL 1991

BETWEEN JICA AND THE DEPARTMENT OF BIOTECHNOLOGY
FSMB, UPM ON THE TECHNICAL COOPERATION FOR
DEVELOPMENT OF THE DEPARTMENT OF BIOTECHNOLOGY
AT THE FACULTY OF FOOD SCIENCE AND BIOTECHNOLOGY
UNIVERSITI PERTANIAN MALAYSIA

Those present:

UPM	JICA
Prof. Mohd Mahyuddin Mohd Dahan (Chairman)	Prof. K. Kawazu
Dr. Mohd. Nasir Azudin (Dpty Dean, FSMB)	" K. Morihara
Prof. Madya Dr. Gan Yik Yuen	" M. Tada
Dr. Abd. Manaf Ali	" Y. Ichinose
Dr. Baharuddin Abd. Ghani	" T. Sugio
Dr. Hasanah Mohd. Ghazali	Mr. O. Kimura
Dr. Mohd. Ismail Karim	Mr. N. Miyashita
En. Mohd. Ali Hassan	Mr. K. Mima
Prof. Madya Dr. Zaliha Christine Alang (Secretary)	

STEERING COMMITTEE MEETING 1
PROGRESS IN THE FIRST FISCAL YEAR 1990-91

Welcoming remarks and introductions were made by the Chairman.

The proposed agenda for discussion of progress in 1990-91 was adopted with provision to proceed directly to the proposed agenda for day 2 (25/4/91) (discussion of TSI 1991-92) if time permitted.

Overall progress in 1st fiscal year has been good and according to schedule. Equipment, training, expert dispatch and collaborative research have all made satisfactory progress and each will be discussed in more detail according to the agenda. One new feature has been the introduction of research group monthly meetings - pioneered by Prof. Morihara with the enzyme / fermentation research group which has already held two meetings. The Department of Biotechnology intends to extend this to other research groups - the next being the plant tissue culture research group which will meet soon, and later this year - the molecular biology / genetic engineering research group will begin holding regular meetings.

1. Equipment 1990/91

A summary of the current status of first year equipment is given in Appendix i.

All of the budget allocated has been spent.

Difference in Japanese yen total expenditure due to increasing purchase power of the Yen during 1990/91.

Hirayama autoclaves replaced the Sanyo models as the latter have not yet been tested or approved as required by the local Dept. of Machinery.

All equipment has arrived in UPM, and most are installed and ready for use. A few items, especially those in labs in the new building, still require connection to 3-phase wiring while others need mains water supply and piping.

Record books for each item have been prepared and manuals are available. Simple working instructions for each equipment have been prepared or are in preparation. Regular use of equipment was emphasised, especially during the warranty period to ensure that equipment is maintained in excellent condition and also to justify the choice of items purchased to the JICA authorities. In Jan./Feb. 1992 JICA needs to compile a formal statement on year 2 usage of equipment purchased in year 1 of the project. For this, dates, hours and frequency of use are required, as well as number of papers published involving use of this equipment.

Any faults or problems with equipment should be immediately recorded and reported to the supplier for repair.

It was suggested that "in house" training in the use of equipment be carried out jointly with the supplier, to encourage wider usage and to minimize costly and time-consuming repairs caused by incorrect operation of equipment.

1991/92 equipment purchases should be made wisely as the equipment budget for each project is decreasing due to increased requests to JICA worldwide.

It was suggested that the more expensive equipment be purchased in year 2 and smaller items in years 3 and 4. Selection of moderately-priced items from companies with a good record for back-up services is probably most appropriate.

2. Counterpart training 1990/91

Four lecturers from the Dept. of biotechnology went to Japan in the first fiscal year of the project - namely Dr. Hasanah, Dr. Gan, Dr. Lee and Dr. Baharuddin. A full report of their visit has been submitted to JICA and a summary is presented here in Appendix ii.

It was recommended that a research assistant be assigned to each research project to ensure smooth progress of the research.

3. Dispatch of experts

This has progressed smoothly and according to schedule. Currently two long term experts are in the Faculty - Professor Morihara (enzyme / fermentation) and Mr. Kimura (plant tissue culture).

4. Collaborative research

Four main research groups have been formed :

A. Enzyme / fermentation Leader : Dr.Mohd Ismail Karim

B. Tissue culture Leader : Dr. Z.C.Alang

C. Molecular biology / genetic engineering
Leaders: Dr.Baharuddin (bacteria)
Dr.Gan (plants)

D. Bioprocess engineering Leaders: Dr.Abd.Manaf (hybridomas)
Dr.Mohd.Ali (fermentation)

Project A. began in 1990 and a summary of the research activities is presented in Appendix iia.

Project B. begins formally in May 1991 (second fiscal year). However some work has been started as the result of a training visit in mid-1990. A summary of the progress in this project in 1990/91 is given in Appendix iib.

Project C. will begin 1992 but some preliminary work will be started in 1991.

Project D. will only begin in 1993.

5. Other matters

The approval and purchase of a Genset back-up generator for the faculty by JICA authorities is greatly appreciated.

The meeting was informed of the loss of some tissue culture facilities by fire in January 1991. Plans for renovation and replacement of facilities were presented (Appendix iv).

STEERING COMMITTEE MEETING 2

DISCUSSION OF TSI FOR SECOND FISCAL YEAR - 1991-92

1. Dispatch of experts (1991-91)

The latest schedule for dispatch of Japanese long term and short term experts (1991-94) was presented and approved (Appendix v).

2. Counterpart training

The proposed schedule for counterpart training was presented and approved (Appendix vi).

3. Equipment order (1991-920)

A list of proposed equipment in order of priority requested by UPM was presented together with several price quotations for each item from local companies (Appendix vii).

The Japanese and Malaysian Team Leaders were asked to analyze the quotations and to agree on the selection of equipment as soon as possible. The JICA office is to be informed of agreed purchases by mid-May at the latest.

4. Construction

A proposal for the construction of a phytotron facility was presented to the meeting. Since the budget requested was considerably higher than the maximum allowed for JICA construction projects (model), those concerned were asked to have further discussions and to submit a modified proposal in the next meeting.

5. Research

Proposals for research activities in 1991/92 were presented for enzyme/fermentation, tissue culture and molecular biology/genetic engineering groups. However it was suggested that further discussion be held with JICA counterparts and final proposals should be presented in the next meeting.

The next meeting was rescheduled to Friday 26th April at 10.00a.m..

6. Other matters

Invitations

Two invitations were issued during the meeting :

- dinner hosted by JICA on MONDAY 29th April at 8.00p.m.

- high tea hosted by the Dean of the Faculty on SUNDAY 28th April at 3.00 - 5.00p.m.

Invitation cards with further details will be sent soon.

The meeting adjourned with thanks to all present at 4.00p.m.

STEERING COMMITTEE MEETING 3
Friday April 26th
PREPARATION OF MINUTES OF JOINT MEETINGS

JICA team members as in Meeting 1

UPM team : Professor Mohd Mahyuddin (Chairman)
Dr. Baharuddin A. Ghani (Protein/fermentation)
Dr. Hasanah Mohd Ghazali (Tissue culture)
Prof. Madya Dr. Gan Yik Yuen (Genetic engineering)
Dr. Abd. Manaf Ali (Bioprocess engin.)
Prof. Madya Dr. Z. C. Alang (Secretary)

1. Revised TSI

The Chairman informed the meeting that he had read and agreed with the draft revised TSI but that he requested UPM research project leaders to confirm the "Project activities" schedule.

The schedule was approved with minor modification.

The Malaysian side requested that research projects on Protein and Fermentation, Tissue Culture, Molecular Biology and Genetic Engineering continue to be referred to as "A, B, C and D" respectively.

It was agreed that the first joint seminar will be held during the first week of September 1992. The exact dates of the three-day seminar will be decided later. The objective of the seminar will be to discuss progress of the joint research projects. The Dean, in consultation with the Team Leader (Professor Morihara) will formalize the seminar Organizing committee and plan the activities for the seminar. Attendance will be by invitation only.

2. Other matters

Proposal for construction of a phytotron facility

A proposal for the above-mentioned facility was presented. The phytotron (Appendix vii) is required to complete the facilities for tissue culture research. It would comprise a single storey, fully air-conditioned building complete with 4 - 6 environmental growth cabinets able to control temperature, daylength and humidity. The facility will enable detailed studies on the conditions required for successful transfer of tissue-cultured plants from the test-tube to the nursery / field. Eventually the facility will house 10 - 12 such cabinets.

The Japanese team leader agreed to forward the proposal to JICA Head Office for their consideration.

There being no further matters, the meeting adjourned at 12.00 noon with thanks to all present.

附 属 資 料

1. R / D

2. T S I

3. ミニッツ

RECORD OF DISCUSSIONS
BETWEEN THE JAPAN INTERNATIONAL COOPERATION AGENCY
AND THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF MALAYSIA
ON TECHNICAL COOPERATION
FOR DEVELOPMENT OF THE DEPARTMENT OF BIOTECHNOLOGY
AT THE FACULTY OF FOOD SCIENCE AND BIOTECHNOLOGY
UNIVERSITI PERTANIAN MALAYSIA

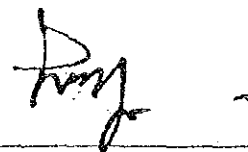
With regard to the recommendations of the Minutes of Discussions of the Preliminary Study on Technical Cooperation for Development of the Department of Biotechnology at the Faculty of Food Science and Biotechnology, Universiti Pertanian Malaysia, dated January 16, 1990, the resident representative of the Japan International Cooperation Agency (hereinafter referred to as "JICA") in Malaysia and the authorities concerned of the Government of the Malaysia had a series of discussions for the purpose of working out the details of technical cooperation for development of the Department of Biotechnology at the Faculty of Food Science and Biotechnology, Universiti Pertanian Malaysia (hereinafter referred to as "the Project").

As a result of the discussions, both sides agreed upon the details of the technical cooperation program and agreed to recommend to their respective governments desirable measures to be taken by both governments, as referred to in the documents attached hereto.

Serdang, Selangor
April 19, 1990



Mr. Kazuo Okabe
Resident Representative in Malaysia,
Japan International Cooperation
Agency,
Japan



Professor Tan Sri Dato'
Dr. Nayan bin Ariffin
Vice-Chancellor,
Universiti Pertanian Malaysia,
Malaysia

ATTACHMENT

I. COOPERATION BETWEEN BOTH GOVERNMENTS

The Government of Japan and the Government of Malaysia will cooperate with each other in implementing the Project based on the Master Plan in I of the Annex.

II. MEASURES TO BE TAKEN BY THE GOVERNMENT OF JAPAN

In accordance with the laws and regulations in force in Japan, the Government of Japan will take, at its own expense, the following measures through JICA according to normal procedures under its technical cooperation scheme.

1. Dispatch of Japanese Experts

The Government of Japan will provide the services of Japanese experts as listed in II of the Annex.

2. Provision of Equipment

The Government of Japan will provide such equipment, machinery and other materials (hereinafter referred to as "the Equipment") as listed in III of the Annex.

(The Equipment will become the property of the Government of Malaysia upon delivery by CIF to the Malaysian authorities concerned at the ports and/or airports of disembarkation, and will be utilized for implementation of the Project in consultation with the Japanese experts.)

3. Training of Malaysian Counterpart Personnel in Japan

The Government of Japan will train the Malaysian counterpart personnel in Japan.

(The Government of Malaysia will take necessary measures to ensure that the knowledge and experience acquired by the Malaysian counterpart personnel will be utilized effectively for the Project.)

III. MEASURES TO BE TAKEN BY THE GOVERNMENT OF MALAYSIA

In accordance with the laws and regulations in force in Malaysia, the Government of Malaysia will take, at its own expense, the following measures.

1. Assignment of Malaysian Counterpart Personnel

The Government of Malaysia will secure the services of qualified Malaysian counterpart personnel as listed in IV of the Annex.

2. Provision of Land, Buildings and Incidental Facilities

The Government of Malaysia will provide such land, buildings and incidental facilities as listed in V of the Annex.

3. Supply and Replacement of Equipment and Machinery

The Government of Malaysia will supply and/or replace equipment, machinery, vehicles, instruments, tools, spare parts and other materials necessary for implementation of the Project except for the Equipment referred to in II-2 above.

4. Allocation of All Running Expenses

The Government of Malaysia will meet all running expenses necessary for implementation of the Project, including :

- (1) transportation facilities and travel allowances for official travel of the Japanese experts within Malaysia;
- (2) housing and other allowances referred to in General Circular No. 1 of 1979 of the Government of Malaysia;
- (3) expenses necessary for transportation of the Equipment within Malaysia, as well as for installation, operation and maintenance thereof; and
- (4) customs duties, internal taxes and any other charges imposed on the Equipment in Malaysia.

IV. ADMINISTRATION OF PROJECT

Administration of the Project will be organized in the following manner, in accordance with the organization chart in VII of the Annex.

1. Vice-Chancellor of Universiti Pertanian Malaysia (UPM)

The Vice-chancellor of UPM will bear overall responsibility for project implementation.

2. Dean of the Faculty of Food Science & Biotechnology

The Dean of the Faculty of Food Science and Biotechnology will be responsible, as Head of the Project, for administrative and managerial matters of the Project.

3. Japanese Experts

(1) The Japanese team leader will provide necessary recommendations and advice to the Head of the Project on technical and administrative matters concerning project implementation.

(2) The Japanese experts will give necessary technical guidance and advice to the Malaysian counterpart personnel on matters pertaining to project implementation.

4. Joint Committee

For effective and successful implementation of the Project, a joint committee will be established with the functions and composition as described in VI of the Annex.

V. CLAIMS AGAINST JAPANESE EXPERTS

The Government of Malaysia shall undertake to bear all claims, if any should arise, against the Japanese experts assigned in the Project, resulting from, occurring in the course of, or otherwise connected with, the discharge of their official functions in Malaysia, except for those arising from the willful misconduct or gross negligence of the Japanese experts.

VI. PRIVILEGES, EXEMPTION AND BENEFITS GRANTED TO JAPANESE EXPERTS

The Government of Malaysia will grant privileges, exemptions and benefits as referred to in General Circular No.1 of 1979 of the Government of Malaysia to the Japanese Experts and their families in Malaysia.

VII. MUTUAL CONSULTATION

There will be mutual consultations between the two governments on any major issues arising from or in connection with this document.

VIII. TERM OF COOPERATION

The duration of technical cooperation for the Project will be five (5) years beginning in June 1, 1990.

ANNEX

I. MASTER PLAN

1. Goal of the Project

The goal of the Project is to expand research activities in the field of biotechnology in Malaysia.

2. Objective of technical cooperation

The objective of the technical cooperation is to enhance the Department of Biotechnology in UPM through technical guidance and advice to the academic staff for promoting and strengthening education and research activities in the field of biotechnology.

3. Cooperation activities of the Project

In order to attain the above-mentioned objective, the following cooperation activities will be implemented

- (1) Increasing research capability of the academic staff of the Department
 - 1) To elevate the technical competence of the academic staff and the technical staff by means of technical guidance and advice as well as by joint research
 - 2) To heighten the academic level of the tutors through instruction on researches leading to post-graduate degrees
- (2) Overall guidance and advice on the following technical fields :
 - 1) Enzyme and fermentation technology
 - 2) Tissue culture
 - 3) Molecular biology and genetic engineering
 - 4) Bioprocess engineering
- (3) Seminars/workshops on the above-mentioned fields in order to share and confirm the outcomes of research activities and the progress of the Project

II. LIST OF JAPANESE EXPERTS

1. Team leader
2. Project coordinator

3. Experts in the fields of :

- (1) Enzyme and fermentation technology
- (2) Tissue culture
- (3) Molecular biology and genetic engineering
- (4) Bioprocess engineering

Notes : 1) One of the experts listed in 3 above will be designated as the Team Leader by JICA.

2) An array of short-term experts in the fields mentioned above may be dispatched in place of a long-term expert.

3) Short-term experts in other related fields will be dispatched, as necessary, for smooth implementation of the Project.

III. LIST OF EQUIPMENT

1. Equipment, apparatus, instruments, tools, spare parts and other materials necessary for project implementation
2. Audio-visual aids, books and other printed matter
3. Vehicles
4. Other necessary equipment and materials related to the Project

IV. LIST OF MALAYSIAN COUNTERPART PERSONNEL

1. Dean, Faculty of Food Science and Biotechnology
2. Deputy Dean, Faculty of Food Science and Biotechnology
3. Head, Department of Biotechnology
4. Academic staff in the fields of :
 - (1) Enzyme and fermentation technology
 - (2) Tissue culture
 - (3) Molecular biology and genetic engineering
 - (4) Bioprocess engineering

V. LIST OF LAND, BUILDINGS AND INCIDENTAL FACILITIES

1. Land and buildings for the following sectors and other incidental Buildings :
 - (1) administrative sector
 - (2) research sector
 - (3) educational sector

2. Facilities such as :
 - (1) offices for the Japanese team leader, project coordinator and other experts
 - (2) class/seminar rooms, teaching/research laboratories, lecture halls/theaters and workshops
 - (3) storage space for machinery, equipment and materials
 - (4) parking space

VI. JOINT COMMITTEE

1. Functions

The joint committee will meet at least once a year, and whenever necessary, and work :

- (1) to formulate the Annual Work Plan of the Project in line with the Tentative Schedule of Implementation planned under the framework of this Record of Discussions,
- (2) to review the overall progress of the Project as well as the achievement of the above-mentioned Annual Work Plan, and
- (3) to discuss and exchange views on major issues arising from or in connection with the Project.

2. Composition

- (1) Chairman : Vice-chancellor, UPM or his representative
- (2) Malaysian side :
 - 1) Dean, Faculty of Food Science and Biotechnology, UPM
 - 2) Deputy Dean, Faculty of Food Science and Biotechnology, UPM
 - 3) Head, Department of Biotechnology, UPM
 - 4) Representative of the Ministry of Education
 - 5) Representative of Economic Planning Unit

(3) Japanese side :

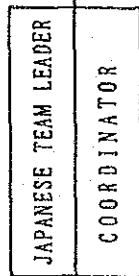
- 1) Team Leader
- 2) Project Coordinator
- 3) Experts appointed by the Team Leader, if necessary
- 4) Representative of JICA

Notes : 1) Officials of the Embassy of Japan and faculty members designated by the Chairman may attend the Joint Committee as observers.

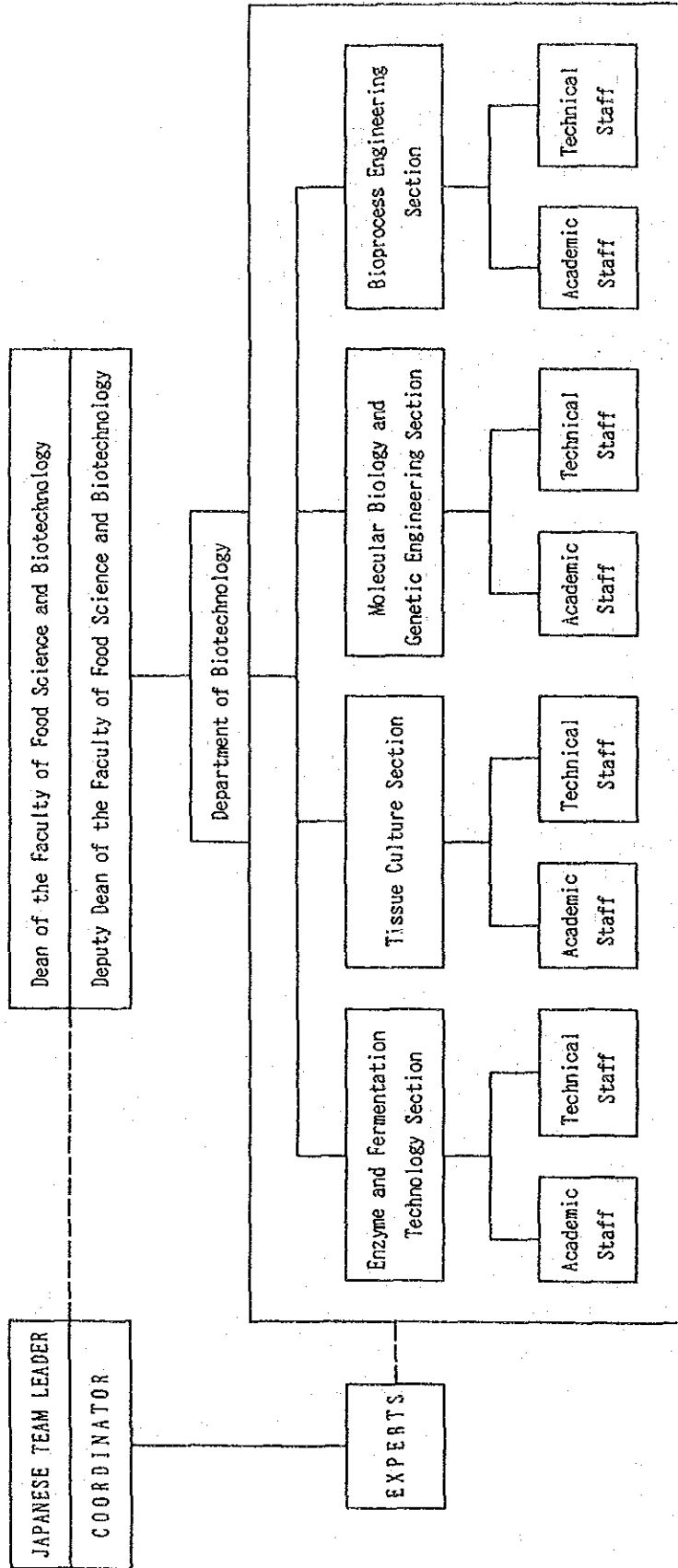
2) The Chairman can co-opt any other person from among the members of the Malaysian side to sit at any committee meeting.

VII ORGANIZATION CHART FOR THE IMPLEMENTATION OF THE PROJECT

(JAPANESE SIDE)



(MALAYSIAN SIDE)

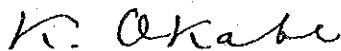


TENTATIVE SCHEDULE FOR IMPLEMENTATION OF
THE TECHNICAL COOPERATION PROGRAM
FOR DEVELOPMENT OF THE DEPARTMENT OF BIOTECHNOLOGY
AT THE FACULTY OF FOOD SCIENCE AND BIOTECHNOLOGY
UNIVERSITI PERTANIAN MALAYSIA

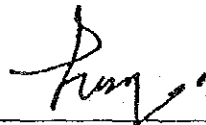
The Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Malaysian authorities concerned have jointly formulated the Tentative Schedule for Implementation of the Technical Cooperation Program for Development of the Department of Biotechnology at the Faculty of Food Science and Biotechnology, Universiti Pertanian Malaysia (hereinafter referred to as "the Project").

This Schedule has been formulated on the basis of the Attached Document of the Record of Discussions for the Project signed between the resident representative of JICA in Malaysia and the Malaysian authorities concerned on condition that the necessary budget will be allocated by both sides for implementation of the Project, and that the above-mentioned Schedule and Program be subject to change within the framework of the Record of Discussions, whenever necessary, in the course of project implementation.

Serdang, Selangor
April 19, 1990



Mr. Kazuo Okabe
Resident Representative in Malaysia,
Japan International Cooperation
Agency,
Japan



Professor Tan Sri Dato'
Dr. Nayan bin Ariffin
Vice-Chancellor,
Universiti Pertanian Malaysia,
Malaysia

I. Project Activities

(1) Technical and research guidance/advice to the involved staff of the Department and joint research activities in the following fields ;

Categories	1990	1991	1992	1993	1994	1995
1) Enzyme & Fermentation Technology (-Microbiological conversion of primary tropical products, -Development & utilization of enzymes catalyzing the above reaction)						
2) Tissue Culture (-Production of useful substances using cultured cells, -Development of novel strains of tropical plants through cell culture)						
3) Molecular Biology & Genetic Engineering (-Structural & functional analyses of enzymes, -Genetic engineering of bacteria & yeasts, -Genetic analysis of tropical plants)						
4) Bioprocess Engineering (-Bioreactor technology for plant and animal cells)						

- (2) Seminars/workshops in the above-mentioned fields to be jointly organized by UPM and the JICA Team

	1990	1991	1992	1993	1994	1995
Seminars and Workshops			o		o	

II. Japanese Contribution

Categories	1990	1991	1992	1993	1994	1995
1) Dispatch of Experts						
<Long-term>						
- Enzyme & Fermentation Technology		—	4-			
- Tissue Culture		—	-4	—		
- Molecular Biology & Genetic Engineering			-3 4	—	4-	
- Bioprocess Engineering					-2	4
- Project Coordination						
<Short-term>						
2) Dispatch of Teams						
- Technical Guidance Team			o	o		
- Consulting Team		o				
- Evaluation Team					o	
3) Training of Counterpart personnel in Japan						
4) Provision of Machinery and Equipment						

- Note : * One of the experts will be designated as the Team Leader by JICA.
 * An array of short-term experts in the fields mentioned above may be dispatched in place of a long-term expert. (Example: [---3---] shows that three short-term experts will cover the long-term assignment.)
 * Short-term experts in other related fields will be dispatched, as necessary, for smooth implementation of the Project.

III. Malaysian Contribution

Categories	1990	1991	1992	1993	1994	1995
1) Counterpart personnel in the following fields						
- Enzyme and Fermentation Technology						
- Tissue Culture						
- Molecular Biology and Genetic Engineering						
- Bioprocess Engineering						
2) Administrative personnel						
3) Land and Buildings						
4) Expenses for project implementation						

MINUTES OF DISCUSSION
BETWEEN THE JAPANESE CONSULTATION SURVEY TEAM
AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF THE MALAYSIA
ON THE PROJECT FOR THE DEVELOPMENT OF THE DEPARTMENT OF BIOTECHNOLOGY
AT THE FACULTY OF FOOD SCIENCE AND BIOTECHNOLOGY,
UNIVERSITI PERTANIAN MALAYSIA

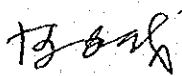
The Japanese Consultation Survey Team (the Team) organized by the Japan International Cooperation Agency (JICA) and headed by Professor Dr. Kazuyoshi Kawazu, Okayama University, visited Malaysia from 22 April, 1991 to 1 May, 1991, in order to formulate the Tentative Schedule for Implementation (TSI) of the Technical Cooperation Program for Development of the Department of Biotechnology at the Faculty of Food Science and Biotechnology (the Faculty), Universiti Pertanian Malaysia (the Project) as well as to discuss major issues related to implementation of the Project.

During its stay in Malaysia, the Team exchanged views and had a series of discussion with the authorities concerned. The first year activities of the Project were reviewed and both parties were pleased with the progress of the initial stage.

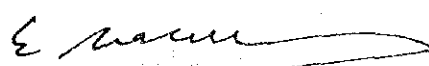
As a result of the discussions, both parties have jointly worked out a revised TSI for the Project attached in ANNEX I. The TSI has been formulated on the basis of the Record of Discussions for the Project signed between the resident representative of JICA in Malaysia and the Malaysian authority concerned on condition that the necessary budget will be allocated by both sides for implementation of the Project, and that the above-mentioned Schedule and Program be subject to change within the framework of the Record of Discussions, whenever necessary, in the course of project implementation.

Both parties have also agreed to recommend to their respective Governments that the major issues attached in ANNEX II be examined and the necessary steps be taken accordingly towards the smooth and successful implementation of the Project.

Serdang, Selangor, April 29, 1991



Professor Dr. Kazuyoshi Kawazu
Team Leader
Consultation Survey Team
Japan International Cooperation
Agency



Professor Dr. Khalid b. M. Nor
Deputy Vice Chancellor
Universiti Pertanian Malaysia

I. Project Activities

- (1) Technical and research guidance/advice to the involved staff of the Department and joint research activities in the following fields ;

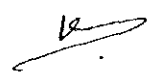
Categories	1990	1991	1992	1993	1994	1995
A. Enzyme & Fermentation Technology						
1) Fundamental research and application of lipase, amylase or other enzymes						
a) Screening of high producers from thermophilic microorganisms						
b) Determination of the cultural conditions for production of enzymes						
c) Purification and characterization of enzyme/protein						
2) Study of beneficial microorganisms						
a) Screening of high potential microorganisms						
b) Determination of the cultural conditions of the microorganisms						
c) Characterization, classification and identification of the useful isolates						
3) Establishment of some fundamental techniques of enzyme and fermentation technology						
a) Mastering preservation methods of microorganisms						
B. Tissue Culture						
1) Secondary metabolite production and role in tissue culture systems						
a) Search for suitable tropical plants which produce pigments or other useful secondary metabolites (ex. <u>Clerodendron paniculatum</u> whose peel contains blue pigment)						
b) Induction of callus of plants described above						
c) Selection of stable cell lines having high ability of producing pigment or useful secondary metabolites						

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Categories	1990	1991	1992	1993	1994	1995
d) Mastering technique of two dimensional electrophoresis (useful technique for detecting enzymes concerned with secondary metabolism) e) Mastering techniques of detecting, quantitatively analyzing and identifying secondary metabolites 2) Development of novel strains of tropical plants through <u>in vitro</u> technique a) Establishment of protoplast regeneration system and planting out procedures b) Mastering cell fusion technique (PEG method and electric pulse method) c) Mastering a technique of infecting with <u>Agrobacterium tumefaciens</u> d) Mastering gene manipulation technique						
C. Molecular Biology and Genetic Engineering						
1) Establishment of fundamental techniques on general genetic engineering a) Mastering extraction and purification of useful vector DNA in genetic engineering b) Mastering preparation and transformation of competent <u>E. coli</u> or other useful prokaryotes c) Mastering DNA recombination techniques including practical use of restriction/modification enzymes d) Mastering extraction and purification of total RNA and mRNA from eukaryotic cells e) Mastering hybridization techniques including plaque and colony hybridization, Southern blot hybridization and Northern blot hybridization f) Mastering DNA sequencing techniques g) Mastering PCR application in molecular biology						

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Categories	1990	1991	1992	1993	1994	1995
2) DNA cloning and structure analysis of some useful genes using genetic engineering techniques described above						
a) Screening prokaryote and eukaryote for some useful genes						
b) DNA cloning and structural analysis of the useful genes						
c) Expression of cloned genes in <u>E. coli</u>						
d) Investigation of the structures and function of the cloned gene products						
e) Analysis of genetic polymorphism in some tropical plants						
D. Bioprocess Engineering						
1) Bioreactor Technology of immobilized enzyme and cell						
a) Preparation of immobilized enzymes and cell						
b) Mastering bioreactor design						
c) Continuous operation of immobilized enzyme or cell for production of useful substance						
d) Mastering purification and separation technology (Downstream processing)						

(2) Seminars/workshops in the above-mentioned fields to be jointly organized by UPM and the JICA Team

Categories	1990	1991	1992	1993	1994	1995
Seminars and Workshops			o		o	

1996



II. Japanese Contribution

Categories	1990	1991	1992	1993	1994	1995
1) Dispatch of Experts						
<Long-term>						
- Enzyme & Fermentation Technology		—4—				
- Tissue Culture	—				—n—	
- Molecular Biology & Genetic Engineering			—	—		
- Bioprocess Engineering					—n—	
- Project Coordination						
<Short-term>						
2) Dispatch of Teams						
- Technical Guidance Team				○		
- Consulting Team		○				
- Evaluation Team					○	
3) Training of Counterpart personnel in Japan						
4) Provision of Machinery and Equipment						

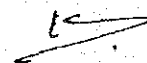
- Note : * One of the experts will be designated as the Team Leader by JICA.
- * An array of short-term experts in the fields mentioned above may be dispatched in place of a long-term expert. (Example: [---4---] shows that four short-term experts will cover the long-term assignment. [---n---] stands for numbers of expert not yet fixed.)
- * Short-term experts in other related fields will be dispatched, as necessary, for smooth implementation of the Project.

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III. Malaysian Contribution

Categories	1990	1991	1992	1993	1994	1995
1) Counterpart personnel in the following fields						
- Enzyme and Fermentation Technology						
- Tissue Culture						
- Molecular Biology and Genetic Engineering						
- Bioprocess Engineering						
2) Administrative personnel						
3) Land and Buildings						
4) Expenses for project implementation						

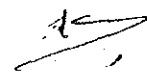
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I. Overall Issues

1. Japanese side requested the Faculty in addition to assigning one academic staff to each Japanese Expert, at least one technical staff be also assigned in order to carry out technical guidance, advice and joint research smoothly.
Malaysian side agreed with this request.
2. Malaysian side requested strongly to supplement a portion of the local cost expenditures for the execution of the physical infrastructure such as construction work on a phytotron laboratory for carrying out planting out procedures of tissue culture technology.
The Team promised to convey the request to the Government of Japan.
3. Both sides agreed to organize a seminar/workshop in the 1st week of September, 1992 for discussing and confirming the progress of research activities of the Project.

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JICA