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インドネシア国  
ボゴール農科大学大学院計画  
巡回指導調査団報告書

平成2年12月

国際協力事業団

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国際協力事業団

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## 序 文

国際協力事業団は、インドネシア国政府との討議議事録（R/D）に基づきインドネシア・ポ  
ゴール農科大学大学院計画を1988年4月1日から5年間にわたり実施している。

本計画の協力開始後3年目に当たり、事業の進捗状況及び現状を把握し、相手国プロジェクト  
関係者及び日本人専門家に対し、適切な助言と指導を行うことを目的として、当事業団は1990年  
10月4日より10月14日まで東京大学農学部教授 志村博康氏を団長とする巡回指導調査団を現地  
に派遣した。

本報告書は、同調査団がインドネシア国政府関係者と協議を行うとともに、現地調査を実施し  
た結果をとりまとめたものであり、プロジェクトの円滑な運営のために活用されることを願うも  
のである。

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  
表す次第である。

平成2年12月

国際協力事業団  
農業開発協力部  
崎 野 信 義



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## 1. 巡回指導調査団の派遣

### 1-1 調査団派遣の経緯と目的

イ国政府は第4次国家開発計画に基づき、農業研究分野における大学院教育の充実を図るため、高等農業教育の最重要拠点とされているボゴール農科大学（IPB）の大学院の整備を進めることとなった。

その一環として、イ国は農業工学部の施設整備の無償資金協力を我が国に要請し、我が国はこれを受け、1986年3月に建物施設の引き渡しを行った。

更に、本施設を有効に利用し、IPBの教育研究機能の強化を図るため、イ国はプロジェクト方式技術協力を我が国に要請した。両国は1987年12月にR/Dに署名し、これに基づき、1988年4月より以下3項目を協力内容とする本件技術協力が開始された。

- 1) 共同研究を通じた大学教職員のレベルアップ
- 2) 大学院生に対する学位取得に必要な助言・指導
- 3) 関係機関との研究交流に対する助言・指導

当プロジェクトは協力開始後3年目を迎えており、更に円滑な協力活動を進めて行くには、この時期に中間エバリュエーションを実施する必要がある。そこで、今後のプロジェクト活動に資する助言・指導を行うことを目的に、巡回指導調査団が派遣された。

### 1-2 調査団の構成

	担 当	氏 名	所 属 先
団長	総 括	志 村 博 康	東京大学農学部農業工学科教授
団員	農業機械/収 穫ハバステクノロジ	森 嶋 博	東京大学農学部農業工学科教授
団員	農 業 土 木	宮 崎 毅	東京大学農学部農業工学科助教授
団員	業 務 調 整	三 角 幸 子	JICA農業開発協力部農業技術協力課

1-3 調査日程

調査日程

調査期間：平成2年10月4日から平成2年10月14日まで（11日間）

日順	月日	曜日	宿泊地	移動及び業務
1	10/4	木	ジャカルタ	往路（東京 → ジャカルタ） GA873便（11:00 - 16:15）
2	5	金	ボゴール	JICA事務所、日本大使館表敬訪問 移動（ジャカルタ → ボゴール） 専門家からの概況報告
3	6	土	〃	ボゴール農大関係者表敬訪問、大学施設見学、 C/Pからの概況報告
4	7	日	〃	セミナー準備
5	8	月	〃	セミナー
6	9	火	〃	セミナー
7	10	水	〃	進捗状況調査（C/P主体による報告）
8	11	木	〃	今後の協力についての協議
9	12	金	ジャカルタ	団長レター作成、 移動（ボゴール → ジャカルタ） JICA事務所帰国報告
10	13	土	機中泊	帰路（ジャカルタ→クアラルンプール経由→東京）
11	14	日		〃 JL722便（18:50 - 6:15）

1-4 主要面談者

<プロジェクト関係者>

インドネシア側

Prof. Dr. Sitanala Arsyad	Rector of IPB
Dr. Kamaruddin Abdullah	Excutive Secretary of JICA/IPB Project
Dr. Tineke Mandang	Coordinator
Dr. Moeljarno Djojmartono	Implementation coord. Team
Dr. Atjeng M. Syarief	〃
Dr. M. Azron Dhalhar	〃
Dr. Hadi K. Purwadaria	〃
Dr. Soedodo Hardjoamidjojo	〃

日本側専門家

中 村 忠 春	リーダー／農業土木
正 崎 雄 三	調整員
西 村 功	農業機械
古 賀 康 正	ポストハーベストテクノロジー
加 藤 和 憲	農業水利

相 良 泰 行 農産加工機械学（短期派遣）

〈そ の 他〉

太 田 慎 一	一等書記官	在インドネシア日本大使館
北 野 康 夫	所長	JICAインドネシア事務所
山 田 保	次長	”
米 田 一 弘	担当所員	”

## 2. 要 約

### 2-1 プロジェクト実施上の問題点

#### (1) プロジェクトの進捗状況

- 1) 大筋良く進行している。IPBスタッフおよびJICAエキスパートの共同努力により、顕著な学術的発展が見られるようになった。
- 2) 1988、1989両年度計画資機材は1989年度内に搬入されなかった。これらは、定められた研究課題遂行に不可欠なものであり、初期に配備されるべきものであった。したがって研究課題遂行にある程度影響を及ぼした。
- 3) しかし、その間、英語・インドネシア語の教科書・参考書の作成、トレーニングコースの実施（これらは1987.12.24R/D署名にある技術協力活動）等により、本プロジェクトの活動は休みなく進められ、顕著な成果を上げた。
- 4) また、この間、IPB-JICA共同セミナーが第一回(1988)、第二回(1989)、第三回(1990)と行なわれたが、その運営、発表論文の数と質すべてにおいて飛躍的進歩が見られた。
- 5) 共同セミナーを通して、本プロジェクトは単にIPB農業工学部に寄与するのにと留まらず、インドネシア全体の農業工学の発展に寄与している。IPBは次第に東南アジア農業工学のセンター的役割を果たす力を身に付けてきていると見てよい。

#### (2) 問題点と対策

- 1) 定められた研究課題の遂行・達成状況には、研究課題の間でかなり差異が生じている（幾つかの研究課題は既に世界的学術レベルに達しているが）。
- 2) アンバランスの生じた主な理由は、資機材の配備等よりはむしろ、日本側のエキスパート派遣の先発・後発の差異、派遣専門家濃淡の差異、派遣専門家のガイダンス機会の差異等にあるように思われる。

#### (3) 供与資機材の利用状況

- 1) 1988、1989両年度計画の資機材は、1990年度初期に一部配備され、残りも近く搬入される予定である。
- 2) 配備された資機材はおおむね直ちに活用され、資機材の遅れに伴う研究課題遂行のアンバランスを急速に解消しつつある。

### 2-2 指導内容

#### 日本側および現地の取るべき対応策

- 1) 1988年7月30日に定められた研究課題（付属資料 5参照）は、その遂行と達成においてアンバランスが生じていることを十分に考慮して、現時点で、見直すことが必要であると

考えられる。

- 2) I P BスタッフとJ I C Aスタッフとの間で腹藏なく意見を交換し、十分な相互理解の上に、見直し案を作成するのがよい。見直し後の研究課題は、最終的に、本年度のI P B - J I C A共同委員会 (Joint Committee)で決定するのがよい。見直しの方向は、進んだ研究には一層の発展を、歩みの遅い研究にはすみやかな活性化を、それぞれ与えるものであることが望まれる。
- 3) 次年度計画は見直しの方向に沿うことが必要であるが、特にエキスパート派遣計画では、水利関係、農業機械関係を強化することが必要である。
- 4) 学術上のレベルを持続的に高め、維持するためには、特に農業工学にあっては、実験的研究に習熟したスタッフ、適切な資機材を揃える事が大切である。資機材は研究活動は勿論、トレーニングコース、講義（演習、実験を合わせて）にも不可欠である。
- 5) J I C Aプロジェクトは学位取得を目的とするものではないが、プロジェクトに参加しているカウンターパートは大学の研究者として学位取得を強く希望している。したがってその実現かたを心し、支援することが、研究課題遂行の上で、極めて大切である。
- 6) 本プロジェクトにおいては、カウンターパートが同じ大学研究者であることを心し、平等の立場で意見交換し、互いの人格を尊重して、共同の仕事にあたる事が大切である。これが本当の共同研究であり、それが本プロジェクトの基調であることを、あらためて強調したい。

以 上

### 3. プロジェクトの活動状況と今後の留意事項

#### 3-1 プロジェクト活動全般について

##### (1) プロジェクト活動状況

プロジェクトの活動状況を述べるにあたり、背景として先ず次のような事情があることを認識しておかなければならない。

- ① カリキュラムは学期制で、一つの科目は基本的には1週に講義2時間（2単位）に実験・演習3時間（1単位）というような組合せで16週で3単位を与えるような仕組みである。
- ② 農業機械／ポストハーベストテクノロジーについては大学における基本的な実験設備が殆どない。
- ③ 従って農業機械／ポストハーベストテクノロジー関係は殆ど講義のみでカリキュラムが組まれるという変則的なものとなっている。
- ④ 大学院における教育はラボワークにおける研究を通じてなされる、という標準的な大学院教育をするためには、カリキュラムの整備が必要であり、そのためには何よりも先ず基本的な実験設備の整備をせねばならない。
- ⑤ 世銀の融資によるFTDC(Food Technology Development Center)やその他各種の援助により立派な実験設備が供与されている例を見るが、過大な設備である場合が多く、その運転や維持・整備・修理もできないものがままある。原理的・基本的な設備で維持可能なものを選定しなければならない。また消耗品も補給可能なものでなければならない。
- ⑥ 実験設備にあわせ実験書や教科書の作成整備が不可欠である。

以上を念頭においてプロジェクトの活動状況を概観すると、次のようになる。

- ① 予算上の制限から研究課題ごとに機材調達の順位がある。
  - ② 資機材調達の甚だしい遅れがある。
  - ③ 従って研究課題によっては主要実験設備が全く無く、派遣専門家の在任中、実質上研究遂行が不可能なものがあつた。
  - ④ このような状況にも係わらず研究課題によってはそれをカバーする派遣専門家の創意工夫及び献身的努力があり、カウンターパートとの相互努力の結果大きな研究成果を上げたものもある。
  - ⑤ 教科書や教材の整備は派遣専門家が講義や講習を受持ち、その準備を通じて大きな整備を見た。
  - ⑥ 専門家の活動により、大学院教育は実験を通じての研究によってなされる、というフィロソフィーが着実に定着し始まり、一つずつ成果をあげるようになってきた。
- また、本プロジェクトの討議議事録（R/D）では、日本側は共同研究を通じて指導・助言

を行い、①アカデミックレベルの向上 ②修士・博士の学位の取得 ③IPBとインドネシア国の各研究機関との学術交流に協力することが記されている。これらの協力に関しては、次のような成果をあげている。

①については1988年度の第1回合同セミナーと1990年度の第3回合同セミナーを比較して知られるごとく、発表論文の数及び内容の両面において著しい進歩向上があったと評価される。また研究の幾つかは国際的学会において発表され評価を受けている。

②については本プロジェクト関係者から修士3名、博士1名の学位取得者を見ている。

③1988年から3回を重ねた合同セミナーを通じ、また中堅技術者の研修を通じてIPBとインドネシア国内各研究機関との学術交流が進み、これを原動力としてインドネシア農業工学会の活性化が促進されている。

こうした協力は、日常での指導・助言のみならず、①セミナーの開催や②研修コースの開設、③教材の開発によって、さらに効果をあげている。

①については1988年度から毎年度1回ずつ合同セミナーを開催している。1988年度は発表数が19課題だったのに対し、1990年度は56課題の発表があり大きな成果をあげている。

②については中堅技術者養成対策費によりインドネシア側ローカルコスト負担を補助し、研修を行った。インドネシア国内の各大学や研究機関からスタッフ、大学院生等多くの参加をみ、参加者の学術レベルの向上を図り、教育カリキュラムの編成等について認識を深めることに成果をあげている。

③についてはIPBスタッフおよびJICAエキスパートの共同努力により、英語、インドネシア語の教科書・参考書が作製されている。その一例に土質力学の英語教科書（須藤前エキスパートらによる）があるが、これはイギリスで定評のある Graig の Soil Mechanics の流儀を汲み、かつレオロジーや土質動力学など最新の知識も盛り込んだ高レベルのユニークな教科書となっていた。IPBスタッフの著作活動は、本プロジェクト遂行にとって高い貢献度を有している。

## (2) 今後の留意事項

### 1) 資機材調達の遅れ

事務上の問題としては、専門家のIPBスタッフとの要請の詰め、インドネシア側での書類の迅速な決裁、JICA-外務省における決裁と資機材購送事務手続きの迅速化、インドネシア側の資機材引き取り業務の迅速化の何れもが要望される。なお資機材の現地購入は一部のものを除き極めて高価なものになるので例え少々速く調達できてもなるべく避けるべきである。

### 2) 現在ある機材の活用

無償供与の際、各研究室に入った機材は事実上他研究室が使いなくなる。インドネシア側では共通実験室用機材として供与したものはもちろん、各研究室専用の機材として供与した

ものでも、融通しあって効率的な利用を図っているが、絶対数が足りないことが絶対的な問題となっている。また補修部品の入手難から極くつまらないところの破損でも補修できず、高価な機器が使えぬ物もみられる。現有機材の整備活用に心掛けることも肝要である。

### 3) 専門家とカウンターパートとの協力

本技術協力は専門家とカウンターパートとの共同研究を通じ大学院教育のレベルアップすることに特色がある。従って両者は常に一体となって同じ研究課題に当たらねばならない。専門家はなるべく多くの時間をインドネシア側カウンターパートと同じ研究室で過ごすことが望ましい。

研究費の概念が日本とインドネシアでは異なるが、この点において検討が必要である。

また、プロジェクト技術協力は単なる単発専門家の集合体ではない。プロジェクトとしてリーダーの統率のもとで行動すべきものである。このことを忘れないで欲しい。

### 4) IPBスタッフとJICA専門家の意志疎通

団長レターに述べられている様に、両者間の腹藏無き意見交換は、このプロジェクトを推進する上で最も重要な要素である。この点の両者の努力には敬服すべきものがある。

IPBスタッフとしては、日本語のわかる数名が必要に応じてJICA専門家と話合い、特にデリケートな問題の処理に尽力している。また、両者の打ち合せの場合必要に応じて大学院生を同席させ、プロジェクトの成果を広げること意欲的である。一方、JICA専門家も英語による会話形式ではその意が十分に伝わらない恐れがある時には、速やかに書面を用意してその意を周知徹底させる努力を厭わない。このような双方の誠意は、本プロジェクトの大きな前進につながるものと確信できる。

但し、本プロジェクトはカウンターパートもエキスパート同様大学人として研究教育に携わっているプライドの高い人々であり、両者は共同研究を行なっているのであるから、意志疎通に熱心の余りエキスパートからの文書による連絡が上からの通達のような形式を取ったり、研究上の討議が人格的な尊重を欠いたりしないよう特に注意を払う必要がある。

### 5) 学位取得希望への対処

日本における学位取得を希望し、それを目標に研究課題を設定しているカウンターパートには、学位取得に至る手順が必ずしも明確ではない。例えば、東京大学に論文を提出して博士を取得するための手続きと、学術振興会（JSPS）の博士論文制度とはまったく別の話しであることが理解されていない場合がある。前者を利用するには東京大学の大学院教官と直接コンタクトを持つ必要があり、後者を利用するにはJSPSに申し込まなくてはならない。これらのことをカウンターパート各人に理解してもらうのは当然だが、東京大学論文博士の希望者に対してはカウンターパート・エキスパート・東京大学ポゴール委員会間の連絡調整がスムーズに進むよう、関係各位の特別な配慮が必要である。



### 3-2 農業土木分野について

#### (1) 農業土木分野の活動状況

##### 1) 農業土木研究体制の確立について

農業土木分野の研究体制の確立のためには、農業土木の支柱である水関係（農業水利学、水文学、水理学、水利造工学など）および土関係（農地工学、土壌物理学、土壌水文学、土質力学など）の各専門領域に対して適切なIPBスタッフとJICAエキスパートを配置することが必要である。現在、この人的配置はほぼ確立しており、大筋よく進行していると言える。

しかし、日本人エキスパートの配置について、土関係の充実度に比較して水関係が若干立ち遅れている感がある。予定されていたエキスパートが急病のために着任が延期されたこと、資機材の到着が遅れたこと等、止むを得ざる事情もあるが、研究テーマに適したエキスパートの配置およびカウンターパートとエキスパートとの十分な研究打ち合わせが、今後の水関係の研究展開のために望まれる。

##### 2) 学術的発展について

研究内容の発展は、顕著に進展していてその成果の一部は既に発表済みのも、具体的なテーマが定まっていってエキスパートと共同の研究が進展しつつあるもの、テーマは定まっているが、資機材が整わない、カウンターパートの配置替えがある、あるいはエキスパートの配置を待機しているなどの理由であまり進展していないものなどアンバランスが生じている。IPBスタッフ、JICAエキスパートともにこの事態は十分掌握しており、改善に努力している。

##### 3) 資機材の搬入について

1988、1989両年度計画資機材で、1989年度内に搬入されなかったものとして、例えば水理学関係の機材はすでに港に到着しているが未だ実験室に到着していない。また、水利造構学関係に必要な機材も到着していないため、カロリメーターテスト、フローテスト、コンクリート強度試験等は待機中である。したがって、これら機材搬入の遅れは研究課題の遂行に影響を及ぼしている。

#### (2) 今後の留意事項

##### 1) 研究課題によるアンバランスについて

状況の説明と基本的な対応策は団長レターに記されている。具体的には研究課題毎に次のような対応策が必要と思われる。

- ① 農地工学、圃場工学方面は、中村チームリーダーのもとで研究が進んでおり、リモートセンシングの土壌侵食防止技術への活用を目指している。建設予定のモデルインフラストラクチャー利用を希望している。全体として進んだ研究の一つであり、一層の発展が期待される。

- ② 土質力学、土壌物理学方面も、中村チームリーダーのもとで土壌のコンパクション、土壌水分の保水と移動等について実験が進行中であり、これもなお一層の進展が期待される。
- ③ 水理学、水文学方面はエキスパートの配置が予定より遅れているため、具体的な研究の進展が一時的に留まっており、現エキスパートが資機材受け入れなどの業務をカバーすべく待機中である。臨時的に短期専門家の派遣なども考える必要がある。
- ④ 水利学、灌漑排水学方面は、IPBとして公共事業省からの受託研究を行なうなど、既にカウンターパート主体の研究が進められており、エキスパートがこれを補佐している。今後の発展が期待される。
- ⑤ 水利造構学方面は、中村チームリーダーと加藤専門家が配置されているので最も強力な部門となり得るが、IPBカウンターパートの配置が流動的となっており、早急な適正配置が望まれる。

## 2) 次年度以降の活動内容に関して

基本的な事項は全て団長レターに述べられている。これを研究課題別に補足すれば以下のようである。

- ① 農地工学、圃場工学方面はJICAエキスパート及び東京大学農地工学研究室の指導を希望しているので、この方面での援助が必要である。
- ② 土質力学、土壌物理学方面はJICAエキスパート及び東京大学農業地水学研究室の指導を希望しているので、この方面での援助が必要である。
- ③ 水理学、水文学、水利造構学、灌漑排水学方面はJICAエキスパート及び東京大学農業水利研究室の指導を希望しているので、この方面での援助が必要である。特に、JICAエキスパートの派遣について配慮を要する。

※ボゴール農科大学と東京大学農学部は大学間協定を結んでいるため、インドネシア側として、特に東京大学からの指導を望んでいる。JICAは、東京大学農学部を核とする、本プロジェクトを支援するための国内委員会を設置する予定。

## 3) その他

実験室視察、ヒヤリング等により、IPB教職員が本プロジェクトの活用による研究の一層のレベルアップを強く期待していることが認められた。また、JICAエキスパートも本プロジェクトを単なる知識・技術の移転にとどまらず、共同研究による新しい研究分野の開拓と言う側面を徐々に重視しつつあることが認められた。

なお、本プロジェクトとIPB教育システムとの関係は次のようである。IPB側における既存の農業土木学的教育システムとしては、プリアント氏をヘッドとする Laboratory of Soil and Water Engineering、およびガリジト氏をヘッドとする Laboratory of Structure and Environment がある。Soil and Water Engineering 教室では、農業土木学の中心をな

す灌漑排水学、土壌物理学、水文学、水理学、水利造構学の Joint Research に対する熱意が高く、人材の養成に積極的に努めている。また、Structure and Environment 教室でも材料力学、造構学における人材養成に努力している。本プロジェクトは必ずしもこれら既存の教育システムに捕らわれずに研究体制を確立するものであるが、ある程度これら I P B 教育システムとの整合性にも配慮が必要である。

### 3-3 農業機械／ポストハーベストテクノロジー分野について

活動状況は 3-1 で述べた通りである。

今後の活動については、次のような事柄に留意する必要がある。

#### 1) 農業機械専門家の充実

I P B の農業工学科は国際的標準の通り農業機械が主要な位置を占める。ところが同大学スタッフは圃場機械に関する実験手法に長けた者が甚だ手薄である。この分野での専門家の充実が重要である。

#### 2) 労働科学関係資機材の充実

サム ヘロディアンが研究室の体制を整備すべく日本での労働科学の研修を終えて I P B スタッフに復帰した。I P B は単にインドネシアにおける労働科学研究の中心となるべきものだけでなく、熱帯農業における中心となるべき性格を持つ。日本での成果を活かすため同研究室の整備が重要である。

#### 3) ポストハーベストテクノロジーの活動について

ポストハーベストテクノロジー中、熱と物質移動については相良専門家の指導が実を結び、大きな成果を収めた。これは第 3 回合同セミナーにおけるその発表で相良専門家の手法による研究が多くみられたことでその一部が窺われる。この後修士・博士の審査・指導という形でこの分野を定着させたい。

穀物のポストハーベストテクノロジーについては古賀専門家の活躍でシステムのマクロなプランニングと評価の手法を研究として定着させたい他、穀物に関する調製加工の実験設備の整備と実験書の作成、実験指導をお願いしたい。

青果物のポストハーベストテクノロジーについてはハディ博士の研究室の重要テーマで研究を進めている。しかしインドネシアにおける将来有望な輸出資源となるべき熱帯果実の日本に適したサンテーションシステム、追熟・貯蔵システム、選別・包装システム等極めて弱体なところがみられる。これからの活動計画の重点課題である。

#### 4) 環境調節工学の重要性

ハウス栽培技術は熱帯においても重要な課題である。世界の農業工学における重要課題の一つであるこの分野に関し、I P B は現在全くその設備がない。出来ればハウス環境調節工学ことに換気冷房システムを含む分野で、長期専門家、少なくとも短期専門家の派遣を要請したい旨

強い要望があった。

5) システム工学について

日本においてはもちろんのこと、世界において農業分野へのシステム工学の導入がきわめて盛んである。IPBはこの分野においてインドネシアの指導的立場にあり、実際的な課題に対するデータベースの作成、エキスパートシステムの作成に実績を挙げている。またその成果は第3回合同セミナーを見ても明かである。IPBの農業工学科の一つの中心をなすこの分野の研究においてはパソコンが主体をなす。この部分の充実整備をインドネシア側は要望している。

## 4. プロジェクト投入実績

### (1) プロジェクトの投入実績

本プロジェクトに対する日本側の投入 — 専門家派遣、研修員の受入れ、機材の供与、ローカルコストの負担 — は、表-1 投入実績一覧表に示す通りである。

なお、本プロジェクトによる供与機材は、1988年度分が追々専門家とカウンターパートの手によりサイトに整備されつつある段階であり、1989年度分については、ジャカルタ港からの引き取りがまだ完了していなかった。

機材供与の遅れは、日本側、インドネシア側双方の手続きの遅れ、仕様の詰めに時間を要したこと等、様々な事情が原因となっているが、結果としてプロジェクトの進捗に影響を及ぼしたことは否定できない。

なお、インドネシア側はこの点を考慮して、機材の遅れが原因で着手できなかった、あるいは支障をきたした共同研究テーマについては、研究スケジュールをシフトさせることを要望した。“シフト”はすなわち協力期間の延長を意味するものではないことが確認されたので、これについては Joint Committee で検討するよう調査団から伝えた。

### (2) 供与機材の利用状況

既に配備された資機材は、おおむねよく利用されているようである。ただ、パソコン等汎用性のある機材に比べ、モデル実験施設や測定機器の利用は目に見えて繁用すると言うものではなく、計画的に、また場合に依っては集中的に使用することになる。この点について、カウンターパートの一人から「毎日機材を使い続けると言うわけにはいかない」との発言があったことは首肯できる。

1977年から1984年まで日本のプロジェクト方式技術協力が実施された「ボゴール農科大学農産加工計画(AP4)」及び無償資金協力の、「IPB農業工学部大学院拡充計画」で供与された機材は、その一部をこのプロジェクトで利用している。これらの利用状況は次のとおり。

1) AP4：委員会を作って管理運用しているが、容量過大で運転出来ない設備、一部が破損して修理されないでいるもの、研究室に持ち込まれたものなどがある。総合的な活用が望まれる。

2) 無償供与：概ね活用をみているが、中には製図板のように殆ど使われぬもの、僅かな部品の欠如で活用されぬもの、専門家の専門分野に対応して補充整備すべきもの等がある。エンジンの動力測定設備は内藤専門家の活躍で整備され実験書も整い活用されるようになった。ストレンメータはストレンアンプのチャンネル数が不足で他のプロジェクトから時々借用して実験に間に合わせている段階にある。携行機材により岡本専門家が補充したストレンゲージやブリッジボックスでおおいに歪計測技術が向上した例がある。またペンオシロのような

単純な記録計が無い。このようなものの補充で急速に研究が進むものがある。

表1 投入実績一覧

<インドネシア・ボゴール農科大学大学院計画>

会計年度	昭和62年度	昭和63年度	平成元年度	平成2年度	平成3年度	平成4年度	合計
1. 調査団派遣	事前調査 5名 62. 6.22~62. 7. 5 実施協議 6名 62. 12. 12~62. 12. 28	計画打ち合わせ 4名 63. 7. 10~63. 7. 21	実施設計 4名 1. 1. 7~ 1. 1. 18 ~ 1. 2. 16	巡回指導 4名 2. 10. 4~ 2. 10. 14			調査団数 5
2. 専門家派遣		名 6名 佐藤幹夫 63. 4. 12 ..... 山下寛幸 63. 4. 12 ..... 相良泰行 63. 4. 12 ..... 須藤清次 63. 4. 12 ..... 藤井克己 1. 1. 1 ..... 鬼頭孝治 63. 10. 23 .....	名 6名 中村忠春 2. 4. 11 ..... 正崎雄三 2. 4. 5 ..... 加藤和憲 2. 4. 18 ..... 西村 功 2. 5. 25 ..... 古賀康正 2. 6. 6 ..... 岡本嗣男 63. 6. 11~ 7. 3 ..... 宮内定基 63. 6. 11~ 8. 27 ..... 志村博康 63. 7. 11~ 7. 17 ..... 中野政詩 63. 7. 11~ 7. 17 ..... 渡辺終五 63. 7. 11~ 7. 17 .....	名 5名 岡本嗣男 1. 11. 11~ 11. 24 ..... 細川 明 2. 2. 6~ 2. 19 ..... 加藤和憲 1. 5. 9~ 2. 28 ..... 古賀康正 1. 11. 21~ 2. 20 ..... 林 尚孝 1. 7. 1~ 8. 31 .....	名 5名 瀬尾康久 2. 8. 16~ 9. 18 ..... 内藤俊男 2. 8. 1~ 10. 3 ..... 相良泰行 2. 10. 1~ 10. 31 .....	名 4. 6. 10 4. 4. 4 4. 4. 17 4. 5. 24 4. 6. 5	専門家数 長期 11名 短期 13名
3. 研修員受入		名 5名 Dr. Sitanara 63. 10. 15 ... 63. 10. 23 Ir. Suastawa 1. 2. 12 .....	名 6名 Mr. Nirwan 2. 2. 4 ..... Mr. Susilo 2. 3. 19 ..... Ir. Herodian 1. 2. 12 ..... Mr. Asep Sapei 1. 7. 22 ... 1. 11. 15 ..... Mr. Aris Priyanto 2. 3. 26 ... 2. 7. 3 ..... Mr. Sukndi 1. 2. 12 ..... Mr. Yamin 1. 2. 12 ..... Ms. Emmy Darmawati 2. 3. 19 ..... Mr. I. Hidayat 2. 3. 19 .....	名 3. 3. 19 3. 3. 19	名 3. 3. 19 3. 3. 19	名 3. 3. 19 3. 3. 19	研修員数 11名
4. 機材供与		計 7,173 千円	計 57,507 千円	手続き中			計 64,680 千円
本邦購送 現地調達		7,173 千円	52,646 千円 4,861 千円				52,646 千円 12,034 千円
5. ローカルコスト負担 現地業務費(定額分) その他		計 6,084 千円 5,084 千円	計 28,045 千円 9,639 千円 ※ 応急対策費 2,546 千円 現地セミナー 500 千円 中堅技術者 15,360 千円 現地語教科書 1,000 千円	※ 現地セミナー 1,265 千円 技術交換 1,132 千円 現地語教科書 729 千円			

※ 示達額





## 5. 第3回IPB-JICA Joint Seminarの開催について

本調査期間中に開催された第3回農業工学ジョイントセミナーは10月8日、9日の2日間にわたり開催され、全部で56課題の発表があり、大きな成果を納めた。今回のセミナーのねらいは、「特に両国の研究者がその研究成果を発表し、またその研究成果を農業工学大学院プログラムに反映させ、併せてインドネシアの農業発展に寄与するための方策を見いだすこと」(セミナー開催アナウンスメントより)におかれていた。

このセミナーの特徴は次のようであった。

- ① セミナー開催準備は非常に組織的に進められ、国内外へのアナウンスメント、発表者へのフォーマット指示、レジストレーション案内等すべて国際学会の水準に達していた。
- ② セミナー参加者は約150名、内日本人20名であり、インドネシア国内のかなり広範囲から参加したようである。巡回指導調査団の団員も、志村団長、森嶋・宮崎両団員が発表を行い、志村団長・森嶋団員は座長も務めた。
- ③ 発表会場はA会場(GMSK講堂)、B会場(A.M.Nasution Hall)とに別れ、A会場では生産関係(9つのサブセッション)、B会場では生産後関係(8つのサブセッション)というくくりかたで分類した。この分類は発表件数のバランスからみてほぼ成功していたが、内容的にみると、A会場では農業機械と農業土木が同一会場となったため、参加者の専門領域が必ずしも発表内容と合致しない傾向があった。
- ④ A会場はスクリーンが小さすぎてOHPにせよスライドにせよ会場からはほとんど読み取れなかった。また、プレゼンテーションも一枚のOHPに多くの情報を盛り込みすぎて、聴衆にとって分かりにくいものが多かった。研究発表のあり方について、JICA専門家の指導が望まれる。
- ⑤ A会場では音響条件が悪く、発表の音声も質問者の音声も極めて聞き取りにくいものであった。発表会場の設営については、プロジェクトとしての援助・指導が必要と思われる。
- ⑥ 発表内容はかなり高度な完成度の高いものから、現地のデータ紹介程度のもので様々であった。しかし、会場との質疑応答は、日本の通常の学会発表会と同等かそれ以上に活発であった。質疑応答についてはJICAエキスパートも一定の貢献をしたが、さらに多く発言するようになることが望ましい。

なお、エントリーした課題が多すぎて整理のため善意的に辞退したと言ういきさつがあるとしても、日本人専門家が発表者としてセミナーに参加できなかったことは残念であった。セミナーは、各専門家が如何なることをしてきた研究者であるか、これからどんな方法で何をしようと考えているのか、インドネシア側に理解してもらおう最もよい機会である。

派遣専門家はそれぞれ自分の専門とする分野における大学院教官レベルの専門家として赴任し

ているのであるから、赴任前の業績であれ、赴任後の成果であれ、あるいは自分がこれから担当しようと考えている分野についての展望やその方法論の披露であれ、何らかの発表をして研究者・教育者としての自己紹介をすることが不可欠であり今後はこうした機会を積極的に生かすことを期待したい。

付 属 資 料



Bogor, October 12, 1990

Prof. Dr. Sukadji Ranuwihardjo  
Director General,  
Directorate General of Higher Education,  
Ministry of Education and Culture

Dear Sir,

Re: Submission of the summary report by the Technical  
Guidance Team for the Academic Development of  
Graduate Program at the Faculty of Agricultural  
Engineering and Technology, INSTITUT PERTANIAN BOGOR.

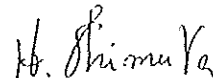
It is our pleasure to submit herewith the summary report on  
the Technical Guidance for the Japanese Technical Cooperation for  
the Academic Development of the Graduate Program at the Faculty  
of Agricultural Engineering and Technology, IPB (JTA-9a(132)).

The Japanese Technical Guidance Team, headed by Prof. Dr.  
Hiroyasu SHIMURA and organized by the Japan International  
Cooperation Agency, visited the Republic of Indonesia from  
October 4 to October 13, 1990.

During its stay in the Republic of Indonesia, the Team had a  
series of discussions with Indonesian authorities concerned and  
the Japanese expert team in respect of the desirable  
implementation of the technical cooperation.

On behalf of the Team, I would like to express my sincere  
appreciation for the heart warming cooperation and kindfull  
arrangement extended to us.

Very truly yours,



Prof. Dr. Hiroyasu SHIMURA  
Team Leader,  
Japanese Technical  
Guidance Team.  
Japan International  
Cooperation Agency

cc.:  
- Prof. Dr. Ir. Sitanala Arsyad  
Rector of Institut Pertanian Bogor  
- Mr. Y. KITANO  
Resident Representative,  
JICA Indonesia Office  
- Mr. S. OTA  
First Secretary,  
Embassy of Japan

SUMMARY REPORT OF THE JAPANESE TECHNICAL GUIDANCE TEAM FOR THE  
JAPANESE TECHNICAL COOPERATION FOR ACADEMIC THE DEVELOPMENT OF THE  
GRADUATE PROGRAM AT THE FACULTY OF AGRICULTURAL ENGINEERING AND  
TECHNOLOGY, INSTITUT PERTANIAN BOGOR (JTA-9a (132))

I. Introduction

The technical cooperation for the Academic Development of the Graduate Program at the Faculty of Agricultural Engineering and Technology, IPB (hereinafter referred to as "the Project") started on April 1, 1988, based on the Record of Discussions signed on December 24, 1987.

At the third year of the Project, in order to contribute to smooth implementation, the Japanese Technical Guidance Team (hereinafter referred to as "the Team"), headed by Prof. Dr. Hiroyasu SHIMURA, has been dispatched to the Republic of Indonesia from October 4 to October 13, 1990 (Ref. ANNEX I and II)

Objectives of the team activities are :

- (1) To review overall project schedule and grasp the progress of the activities.
- (2) To solve the problems on the implementation of the Project.
- (3) To consult to make an annual work plan 1991/1992

The purpose of this report is to summarize the results of the above activities and inform of it.

II. Present situation

- (1) Although there are several matters which should be settled in the Project, the Project has been performed well. Entering its 3rd year of implementation, efforts made by IPB staff and Japanese experts come to bear the fruit of outstanding academic developments.

- (2) Provision of equipment requested in the year 1988 and 1989 was rather behind the schedule. Since equipment is indispensable to carry out the joint research topics, lack of the equipment, which was expected to be installed at the initial stage of research activities, has influenced progress of the joint research.
- (3) In spite of these situations, as activities such as instructional material developments, seminars and training courses, which had been planned signed on December 24, 1987, have been carried out successfully.
- (4) Especially, compared with the 1st Joint Seminar held in the year 1988 and the 2nd Joint Seminar held in the year 1989, the 3rd Joint Seminar held on October 8 and 9 was really improved in respect of both its management and quality and quantity of the presentations.
- (5) Through organizing the seminars, the Project has been contributing to activating agricultural engineering research in the Republic of Indonesia, and further, such experience would improve potentiality which strengthen IPB as the center of agricultural engineering activities in Southeast Asia.
- (6) There are much difference in the progress and achievement of the research topics. Several topics have achieved in international academic level.
- (7) One of the main reasons which caused unbalance to research progress was that Japanese experts who could give proper advice and guidance were not always assigned in every field. The equipment which has already procured will be soon delivered to the project site, so the unbalance related to the equipment will be solved.

### III. Comments and recommendations

- (1) Considering the unbalance of research progress, joint research topics and its schedule described in the Tentative Schedule of Implementation signed on July 30, 1988 should be reviewed. At the time of reviewing the topics, the exchange of views and promotion of mutual understanding are indispensable for both Japanese experts and IPB staff. And the result should be finalized at the Joint Committee Meeting of this year. It would be desirable that this amendment would lead the advanced researches to further development and also would lead the slowly progressed researches to activating them.
- (2) In order to upgrade the academic level, existence of the academic staff who have much experience in experimental study is very important. Equipment should be used not only for research activities but also for training courses and lectures including experiments.
- (3) Japanese experts would support their counterparts to let them get MS or DR degrees.
- (4) Everyone related to the project is expected to be a person who respects each other and exchange own opinions as a researcher on an equal footing. This is the fundamental philosophy of the true joint research.



ANNEX I

MEMBER'S LIST OF  
JAPANESE TECHNICAL GUIDANCE TEAM

Assignment & Name	Present position
(1) Team Leader Dr. Hiroyasu SHIMURA	Professor, Faculty of Agricultural Engineering, Dept. of Agriculture, The University of Tokyo.
(2) Agricultural machinery and Post harvest technology Dr. Hiroshi MORISHIMA	Professor, Faculty of Agricultural Engineering, Dept. of Agriculture, The University of Tokyo
(3) Agricultural Soil and Water Engineering Dr. Tsuyoshi MIYAZAKI	Associate Professor, Faculty of Agricultural Engineering, Dept. of Agriculture, The University of Tokyo
(4) Coordinator Ms. Sachiko MISUMI	Technical Cooperation Div., Agricultural Development Cooperation Dept., Japan International Cooperation Agency (JICA)

ANNEX II

SCHEDULE OF THE JAPANESE TECHNICAL GUIDANCE TEAM

Date	Schedule
Oct. 4 (Thr)	Arriving at Jakarta (GA-873)
5 (Fri)	Courtesy call to the Embassy of Japan and JICA Indonesia Office.
6 (Sat)	Investigation Courtesy call to IPB Meeting with Implementation Coordinator Team.
7 (Sun)	Preparation of the Third Joint Seminar.
8 (Mon)	The Third Joint Seminar (JICA-IPB).
9 (Tue)	The Third Joint Seminar (JICA-IPB).
10 (Wed)	Reporting on progress of joint research topics by researchers concerned.
11 (Thd)	Discussion about the annual work plan 1991/1992.
12 (Fri)	Reporting the results of the Team to JICA Indonesia.
13 (Sat)	Departure from Jakarta.





RESEARCH TOPICS AND TENTATIVE SCHEDULE

Research Topics	Expert	Counterpart and Support- ing Staff (1990/1991)	Technician	YEAR				
				88	89	90	91	92
<hr/>								
A. Optimum Utilization of Agricultural Machinery on Farm for Crop Production.	I. Nishimura S. Yonekawa							
1. The influence of mechanical tillage on soil physical and dynamic properties for increasing crop production		1. Tineke Mandang. 2. R.G. Sitompul 3. Wawan Hermawan (S2) 4. I.N. Suastawa	1. Etje Al-Saih 2. Wanna	(3 years)	xxxxxxx			
2. A study on the relationship between soil moisture and tractor capacity in dryland farming		1. Frans J. Daywin 2. Desrial Dastaman 4. E. Nemaken Sembiring	1. Abbas 2. Etje Al-Saih	(3 years)	xxxxxxx			
<hr/>								
B. System Analysis and Management for Agricultural Products	I. Nishimura							
1. Development of management and information system of Agricultural production			1. Moeljarno Dj. 2. I Wayan Astika	(3 years)	xxxxxxx			
2. Management of sugarcane mechanization		1. B. Pramudya 2. I Wayan Astika		(2 years) *	xxxx			
<hr/>								
C. Labour Science and Farm Work Science	I. Nishimura /T. Naito							

Research Topics	Expert	Counterpart and Support- ing Staff (1990/1991)	Technician	YEAR				
				88	89	90	91	9
1. Measurement of human energy efficiency during the operation of agricultural machine and tools		1. Kusen Morgan 2. Agus Sutedjo 3. Sam Herodian (S2)	1. Karjio	(3 years)	xxxxxxx			
2. Dynamics anthropometry research for designing purpose of simple tools		1. Kusen Morgan 2. Dewa Made S.	1. Parma	(3 years)	xxxxxxx			
D Energy and rural Electrification	Y.Koga/ Y..Seo							
1. Development of integrated energy utilization system for thermal unit operation in agriculture		1. Kamarudin A. 2. E.Hartulistiyoso 3. Y.Aris Purwanto 4. Samsuri (S3) 5. Jasnid Edy (S2)	1. Endang S.	(3 years)	xxxxxxx			
2. Biomass/energy modeling and technology development		1. Endah Agustina 2. Y.Aris P. 3. I Wayan Astika 4. B.Nuryadin (S1)	1. Kusnadi	(2 years)	xxxx			
3. Input-output energy analysis for rice production system in Indonesia		1. Kamarudin A. 2. A.K.Irwanto (S3)	1. A.Suryana	(3 years)	xxxxxxx			
E Farm Structure and Strength of Material	K.Kato							

Research Topics	Expert	Counterpart and Support- ing Staff (1990/1991)	Technician	YEAR				
				88	89	90	91	9
1. Environmental control for growing fruits and vegetable in green house		1. Gardjito (S3) 2. Mieske W. 3. Arief Sabdo Y.		(3 years)	xxxxx			
2. The use agricultural by product forms agricultural building materials		1. Sriyani Mudiastuti (S2) 2. A.N. Sanusi	1. Achmad	(2 years) *	xxxx			
F Optimum Development Model of Watershed for agricultural use	T. Nakamura/ K. Kato							
1. Study of watershed model appropriate for agricultural use in Indonesia		1. Aris Priyanto (S3)		(3 years)	xxxxxxxx			
2. Development of remote sensing technology for rural planning and Land/resources surveying		1. Sukandi S. (S3)		(3 years)	xxxxxxxx			
G Efficient Use of Irrigation in Indonesia	T. Nakamura/ K.Kato/ K.Maekawa							
1. Modeling food crop response to irrigation and stimulation for increasing production		1. Soedodo H. 2. Yanuar J.P.(S2)	1. Syahri	(3 years)	xxxxxxxx			
2. Microcomputer controlled open channel flow monitoring system		1. Aris Priyanto	1. Lili Rusmana	(3 years)	xxxxxx			

continued ...

Research Topics	Expert	Counterpart and Support- ing Staff (1990/1991)	Technician	YEAR				
				88	89	90	91	9
3. Hydrological evaluation of water resources and its utilization to irrigation		1. Soedodo H. 2. M. Azron D. 3. Dedi Kusnadi K. 4. Totok Prawitasari (S2)		(3 years)	xxxxxx			
H Evaluation of Optimum T. physical Condition on Nakamura Farm or Crop Production								
1. Evaluation of various methods predicting reference crop-soil physical problems for production-SPAC		1. M. Azron D. 2. Erizal 3. Asep Sapei (S3)	1. Trisnadi (3 years)	xxxxxx				
I Post Harvest Technology	Y. Koga/ Y. Seo							
1. Thermophysical properties of tropical agricultural product		1. Kamarudin A. 2. M. Yamin 3. E. Hartulistiyoso 4. Samsuri (S3)	1. Endang S.	(3 years)	xxxxxx			
2. Studies on thermodynamic properties of water in agricultural product with special reference to drying process		1. Kamarudin A. 2. Aga G. (S2)		(3 years)	xxxxxx			

continued ...



Research Topics	Expert	Counterpart and Support- ing Staff (1990/1991)	Technician	YEAR 88 89 90 9
3. Development of post harvest technology of tropical fruits and vegetables for exportation (sanitation, pre-cooling and storage)		1. Hadi K.P. 2. Atjeng M.S. 3. Putiati M. 4. Sapto K. (S2) 5. Agus M. (S2)	1. Sulyaden (3 years) xxxxxxx	
4. Development of optimum handling, processing and storage system for secondary crops in Indonesia		1. Rizal Syarief 2. John Kumendong 3. Hadi W. (S2) 4. Sri Arbani R. (S2)	(2 years) xxxxxx	
5. Assesment and prediction of post harvest Loss of grains		1. Hadi K.P. 2. Kamarudin A. 3. Moeljarno Dj. 4. Rr.Muhami (S2)	1. Suroso (2 years) xxxxxxx	
J Food Engineering	Y.Koga/ Y.Seo			
1. Fundamental study on transport phenomena and quality design in bread baking process		1. M.Aman W. 2. Ansori R./Atjeng M.S. 3. Subarna 4. Gatot P. (S2)	(3 years) xxxxxxx	

continued ...

Research Topics	Expert	Counterpart and Supporting Staff (1990/1991)	Technician	YEAR				
				88	89	90	91	92
2. Freeze drying characteristic and transport properties of shrimp paste		1. Kamarudin A.... 2. Frans Wenur (S3)		(2 years) xxxx				*
		No.1: Coordinator of Research Topic		*) The extension of this topic will be decided later				

付属資料- 3

PROGRESS REPORT  
ON  
RESEARCH ACTIVITIES

October, 1990



JICA - DGHE/IPB PROJECT: JTA-9a(132)  
Academic Development of the Graduate Program  
The Faculty of Agricultural Engineering and Technology  
Bogor Agricultural University  
(Institut Pertanian Bogor)



## P R E P F A C E

ADAET Project is a form of Technical Assistance by the Government of Japan through a Japan International Cooperation Agency (JICA). The objective of the Project as stated in the R/D are to upgrade graduate level education and research capability and contributing to improvement of the practical research system related to agriculture in the Republic of Indonesia.

The scope of activities of the Project covers the area of :

- 1) Provision of technical guidances through joint research : a) upgrade the academic level, b) to help graduate students for obtaining MS and DR degrees, and c) to promote academic exchanges between IPB and other institutions in Indonesia.

- 2) To carry out through joint research : a) seminar/workshops, b) training/instructions and c) instructional material development .

The ADAET Project covers the field of 1) Agricultural Engineering, 2) Post Harvest Technology, and 3) Food Science.

In the R/D project has determined the research topics and tentative schedule. It is planed, for the fiscal year of 1988 to 1992, to carry out 24 topics covering the above mentioned three fields of study (table 1).

This report compiles most of the progress reports of the joint research in detail. Each report covers all information related to the joint research, such as a) topic, b) objective, c) research durations, d) research coordinator, e) JICA expert f) research methods, g) research results, h) achievements, i)

problems and j) future plan. In general the report indicate that most of the joint research are being conducted and progressing well. Three topics are completed and some topics are postponed due to several infavorable conditions such as in adequite budget and equipment.

RESEARCH TOPICS AND ANNUAL WORK PLAN

Research Topics	Expert	Counterpart and Supporting Staff (1990/1991)	Technician	Year				
				1988	1989	1990	1991	1992
A. Optimum Utilization of Agricultural Machinery on Farm for Crop Production.	I. Nishimura							
1. The influence of mechanical tillage on soil physical and dynamic properties for increasing crop production		1. Tineke Mandang 2. R.G. Sitompul 3. Wawan Hermawan (S2) 4. I.N. Suastava	1. Etje Al-Saih 2. Wanna		(3 years) :XXXXXXXX:XXXXXXXX:XXXXXXXX:			
2. A study on the relationship between soil moisture and tractor capacity in dryland farming		1. Frans J. Daywin 2. Desrial 3. Arif Dastaman 4. E. Namaken S. (S3)	1. Abbas 2. Etje Al-Saih		(3 years) :XXXXXXXX:XXXXXXXX:XXXXXXXX:			
B. System Analysis and Management for Agricultural Products.	I. Nishimura							
1. Development of management and information system of Agricultural production.		1. Moeljarno D. 2. I Wayan Astika			(3 years) :XXXXXXXX:XXXXXXXX:XXXXXXXX:			
2. Management of sugarcane mechanization.		1. B. Pramudya 2. I Wayan Astika			(2 years) :XXXXXXXX:XXXXXXXX:			
C. Labour Science and Farm Work Science.	I. Nishimura							
1. Measurement of human energy efficiency during the operation of agricultural machine and tools.		1. Kusen Morgan 2. Agus Sutedjo 3. Sam Herodian (S2)	1. Karjio		(3 years) :XXXXXXXX:XXXXXXXX:XXXXXXXX:			
2. Dynamics anthropometry research for designing purpose of simple tools.		1. Kusen Morgan 2. Deva Made S.	1. Parma		(3 years) :XXXXXXXX:XXXXXXXX:XXXXXXXX:			
D. Energy and Rural Electrification.	Y.Koga							
1. Development of integrated energy utilization system for thermal unit operation in agriculture.		1. Kamaruddin A. 2. E. Hartulistiyoso 3. Y. Aris Purvanto 4. Samsuri (S3) 5. Jasmid Edy (S2)	1. Endang S.		(3 years) :XXXXXXXX:XXXXXXXX:XXXXXXXX:			

Research Topics	Expert	Counterpart and Supporting Staff (1990/1991)	Technician	Year					
				1988	1989	1990	1991	1992	
2. Biomass/energy modeling and technology development.		1. Endah Agustina 2. Y. Aris P. 3. I Wayan Astika 4. B. Nuryadin (S1)	i. Kusnadi		(2 years) :XXXXXX:XXXXXX:				
3. Input-output energy analysis for rice production system in Indonesia.		1. Kamaruddin A. 2. A.K. Irvanto (S3)	1. A. Suryana		(3 years) :XXXXXX:XXXXXX:XXXXXX:				
E. Farm Structure and Strengit of Material.	K. Kato								
1. Environment control for growing fruits and vegetables in green house.		1. Gardjito (S3) 2. Mieske W 3. Arief Sabdo Y.			(3 years) :XXXXXX:XXXXXX:XXXXXX:				
2. The use agricultural by product for agricultural building materials.		1. S. Mudiastuti (S2) 2. A.H. Sanusi	i. Achmad		(2 years) :XXXXXX:XXXXXX:				
F. Optimum Development Model of Watershead for agricultural use.	T. Nakamura/ K. Kato								
1. Study of watershed model appropriate for agricultural use in Indonesia.		1. Aris Priyanto (S3)			(3 years) :XXXXXX:XXXXXX:XXXXXX:				
2. Development of remote sensing technology for rural planning and land/resources surveying.		1. Sukandi S. (S3)			(3 years) :XXXXXX:XXXXXX:XXXXXX:				
G. Efficient Use of Irrigation in Indonesia.	T. Nakamura/ K. Kato								
1. Modeling food crop response to irrigation and simulation for increasing production.		1. Soedodo H. 2. Yanuar J.P. (S2)	1. Syahri		(3 years) :XXXXXX:XXXXXX:XXXXXX:				
2. Microcomputer controlled open channel flow monitoring system.		1. Aris Priyanto	1. Lili Rusmana		(3 years) :XXXXXX:XXXXXX:XXXXXX:				
3. Hydrological evaluations of water resources and its utilization to irrigation.		1. Soedodo H. 2. M. Azron D. 3. Dedi Kusnadi K. 4. Totok Pravitasari (S2)			(3 years) :XXXXXX:XXXXXX:XXXXXX:				

Research Topics	Expert	Counterpart and Supporting Staff (1990/1991)	Technician	Year				
				1988	1989	1990	1991	1992
H. Evaluation of Optimum physical Condition on Farm for Crop Production.	T. Nakamura							
1. Evaluation of various methods predicting reference crop-soil physical problems for production - SPAC.		1. M. Azron D. 2. Erizal 3. Asep Sapai (S3)	1. Trisnadi		(3 years) :XXXXXX:XXXXXX:XXXXXX:			
I. Post Harvest Technology	Y. Koga							
1. Thermophysical properties of tropical agricultural product.		1. Kamaruddin A. 2. M. Yamin 3. E. Hartulistiyoso 4. Samsuri (S3)	1. Endang S.		(3 years) :XXXXXX:XXXXXX:XXXXXX:			
2. Studies on thermodynamic properties of water in agricultural product with special reference to drying process.		1. Kamaruddin A. 2. Aga G. (S2)			(3 years) :XXXXXX:XXXXXX:XXXXXX:			
3. Development of post harvest technology of tropical fruits and vegetables for exportation (sanitation, pre-cooling and storage).		1. Hadi K.P. 2. Atjeng M.S. 3. Putiati M. 4. Sapto K. (S2). 5. Agus M. (S2)	1. Sulyaden		(3 years) :XXXXXX:XXXXXX:XXXXXX:			
4. Development of optimum handling, processing and storage system for secondary crops in Indonesia.		1. Rizal Syarif 2. John Kumendong 3. Hadi W. (S2) 4. Sri Arbani R. (S2)			(2 years) :XXXXXX:XXXXXX:			
5. Assessment and prediction of post harvest loss of grains.		1. Hadi K.P. 2. Kamaruddin A. 3. Moeljarno D. 4. Rr. Muhani (S2)	1. Suroso			(2 years) XXX:XXXXXX:XXX		
J. Food Engineering	Y. Koga							
1. Fundamental study on transport phenomena and quality design in bread baking process.		1. M. Aman W. 2. Ansori R./Atjeng M.S. 3. Subarna 4. Gatot P. (S2)			(3 years) :XXXXXX:XXXXXX:XXXXXX:			
2. Freeze drying characteristic and transport properties of shrimp paste.		1. Kamaruddin Abdullah 2. Frans Wenur. (S3)			(2 years) :XXXXXX:XXXXXX:			*
No.1 : Coordinator of Research Topic.				*) The extension of this topic will be decided later				



A

OPTIMUM UTILIZATION OF AGRICULTURAL MACHINERY  
ON FARM FOR CROP PRODUCTION

A.1. a. RESEARCH TOPICS :

The influence of mechanical tillage on soil physic and dynamic properties for increasing crop production.

b. OBJECTIVE :

To measure physical and dynamic properties of soil in relation to soil tillage i.e. mechanical tillage; emphasizes in studying phenomena exist during the process of cutting, lifting and throwing the soil.

c. RESEARCH DURATION :

No.	Activities	Year (FY)				
		1988	1989	1990	1991	1992
1.	Preparation	xxxxxx				
2.	Basic experiments		xxxxxx			
3.	Manufacturing of soil bin		xxxxxx	xxx		
4.	Installation and testing			xxx		
5.	Preliminary study			xxxxxx		
6.	Experiments			xxx	xxxxxx	xxxxxx
7.	Data analysis			xxx	xxx	xxxxxx
8.	Progress report		x x	x x	x x	x x
9.	Seminar		x x	x x	x x	x x
10.	Final report					

d. RESEARCH COORDINATOR : Dr.Ir. Tineke Mandang, MS.

e. JICA EXPERT : Prof. Isao Nishimura

f. RESEARCH METHODS :

- Research will be conducted in to phases :
  1. Laboratory experiments using soil bin test apparatus
  2. Field experiments as a study comparison

- There are two main activities :
  1. Observation of physical and dynamic properties of soil samples (various kind of soil)
  2. Observation of soil reaction due to the mechanical action
- Parameter to be measured :
  1. Bulk density
  2. Moisture content
  3. Texture
  4. Friction among the particles of soil
  5. Adhesion
  6. Cohesion
  7. Soil-metal friction
  8. Cutting resistance
  9. Shearing and compression resistances
  10. Horizontal and vertical resistances
  11. Soil hardness

g. RESEARCH RESULTS :

Whole waiting for the completion of soil built test, several basic experiments have been completed and some applied research are being conducted in the field.

1. Study on physical and dynamic properties of latosol soils. Experiments had been conducted several times and the soil parameter measured was as follows :

- \* Shearing force
- \* Friction force
- \* Cone index (penetration resistance)

Using penetrometer SR-2 type with cone area  $2 \text{ cm}^2$ , the result showed that the value of soil parameter increased up the depth become greater.

2. Studies on compactibility of latosol soil using soil compression apparatus

The study was designed to evaluate the compaction characteristic of latosol soil at the different level of moisture content. The result showed that soil bulk density increased as the moisture content was obtained at 36 %. Soil bulk density will then decrease whenever the moisture content reaches 36 %.

### 3. Studies on the Effect Dynamic Load and the Intensity of Tractor traffic on Soil Compaction

The result of the research showed that dynamic load treatment (which was qualitatively different) did not give that significantly different in soil compaction, at the moisture content ranged from 36.5 percent to 40.05 percent. The average soil bulk density of without load treatment was 1.49 g/cm<sup>3</sup> with penetrometer resistance was 17.03 kg/cm<sup>2</sup> and with load treatment by mold-board plow result in the average bulk density and penetrometer resistance 1.44 g/cm<sup>3</sup> and 14.41 kgf/cm<sup>2</sup> respectively. Further more, with load treatment by disc plow result in average bulk density and penetrometer resistance 1.34 g/cm<sup>3</sup> and 16.71 kgf/cm<sup>2</sup> respectively.

The important point of this study that the soil bulk density, as well as penetrometer resistance increasing generally up to the depth of 15 cm. Based on soil physical aspect, the soil compaction caused by tractor traffic under certain condition, is able to be overcome by soil tillage, especially by plowing and harrowing.

### 4. Studies on soil compaction as influenced by mechanical tillage in sugar cane plantation

The result showed that the longer the cultivating period the higher the penetrometer resistance of soil, and the difference was statistically significant. Soil penetrometer as the cultivating period become longer, and this tendency was clearly recognized only up to the depth of 30 cm. Data showed that over 30 cm depth, there was no any significant change in penetrometer resistance. The soil penetrometer resistance performing soil hardness was measured using penetrometer SR-2 type with 2 cm<sup>2</sup> diameter of cone.

Bulk density of soil increased due the mechanical tillage and the data showed that the longer the cultivating period the greater the bulk density. It was found that bulk density of soil of uncultivated area (up to the 20 cm depth) was 0.91 g/cm<sup>3</sup> and increased up to 1.25 g/cm<sup>3</sup> after years cropping (cultivating). The soil density at the greater depth increased from 1.24 g/cm<sup>3</sup> to 1.45 g/cm<sup>3</sup> after 5 years cropping.

It can be concluded that there is a significant change in soil parameter (soil compaction) in sugar cane mechanization after of cultivating.

h. ACHIEVEMENTS :

1. Degree : Undergraduate
2. Presentation in the seminar :
  - Annual seminar on joint research, 1990
  - Joint seminar, 1990

i. PROBLEMS ENCOUNTERED :

1. Lack of equipments for 2 years (Soil bin apparatus just arrived).
2. Insufficient in supporting equipments/instrument that necessary in measuring the parameters of soil.
3. Time limitation in conducting research
4. Involvement of personnel (researcher)
5. Limitation in research budget

j. FUTURE PLAN (see schedule)

1. To continue experiments under the topic research especially experiment that uses soil bin test apparatus for determining soil parameters.
2. Studies on soil-tillage tool relationship; mechanical aspect, geometry of tools, etc.
3. Studies on the effect of dynamic load and the intensity of tractor traffic on soil compaction.

k. UTILIZATION OF RESEARCH EQUIPMENT

Name of equipments	Intensity of utilization
1. Simple soil bin test	3
2. Penetrometer	3
3. Soil moisture tester	3
4. Triaxial shear apparatus *	3
5. Uni axial compression apparatus *	3
6. Tensile shear box	p
7. Soil-metal friction apparatus	p
8. Angle meter	p
9. Ec. meter	p
10. Image processor analyzer	p
11. Other	p

3 = Frequent  
p = being proposed  
\* = share facilities

A.2. a. RESEARCH TOPICS :

A study on the relationship between soil moisture and tractor capacity in dryland farming.

b. OBJECTIVES :

To study the influence of soil moisture on the performances of the tractor namely : the capacity, traction and costs. To optimize the tractor power in dryland farming especially for land preparation (soil tillage).

c. RESEARCH DURATION & SCHEDULE :

NO.	ACTIVITIES	YEAR (FISCAL YEAR)				REMARK
		1989	1990	1991	1992	
1.	Preparation	xxxx				
2.	Built tree point linkage dynamometer	xxxix				
3.	Instalating and testing	xx:xx				
4.	Instrument and built simple instruments	xx:xx				*)
5.	Preliminary study	x:xxx				
6.	Experiments	xxxxxx				
7.	Data analysis		xxx:xx			
8.	Progress report	x:x	x:xxx	xx:xx		
9.	Continuing experiments			xxxxxx		Additional Research
10.	Seminar	x	x	x	x	
11.	Final report				x	

\*) Some of the instruments borrow from COAET, Serpong-Jakarta like :  
 Strain amplifier DPM-611 A 3 units, DPM-613 B 4 units  
 Bridge Box ..... 5 units, Data Recorder Automatic

- d. RESEARCH COORDINATOR : Ir. Frans J. Daywin, MSc
- e. JICA EXPERT : Prof. Isao Nishimura
- f. RESEARCH METHODS :

- Research already been conducted in two phases :

- Laboratory Experiments :
  - to built three point linkage dynamometer
  - to built slip censor
  - to built depth censor
- Field Experiments :
  - Preliminary research had already been conducted by using ring type dynamometer by using two 2WD 72 HP tractors.
  - The tractor capacity is measured in three and four level of soil ,moisture content (dry, medium and high moisture in percentage dry basis) and three different depth of plowing.

The component measured are :

1. Field capacity, with disk plow and moldboard plow
  2. Soil draft, specific soil draft, drawbar-HP ( $P_{DB}$ ), brake-HP ( $P_{BR}$ )
  3. Rolling resistance
  4. Slip
- Prediction formula of soil draft
  - Prediction formula of the relationship between drawbar power, tractive efficiency and slip.

Parameter already been measured :

- Soil specific gravity
- Soil texture
- Soil compaction by using soil compaction apparatus
- Moisture content
- Soil cohesion and internal friction angle by using triaxial apparatus
- Speed of tractor
- Depth of plowing
- Cone index by using soil penetrometer SR-2

Research equipment required :

- Soil penetrometer (already available)
- Soil moisture tester (already available)
- Triaxial shear apparatus (already available)
- Soil compaction apparatus (already available)
- Three point linkage dynamometer (already been built)
- Slip censor (already been built)
- Data recorder (already been available)

- Strain amplifier :

- 2 DPM-613 B 2 units (already available)
- DPM -613 B 3 units (already available) through JICA Expert (Dr. Kito)
- DPM - 611 A 3 units
- DPM - 613 B 4 units borrow from CDAET, Serpong and already
- Bridge Box 5 units sent back or return to Serpong
- Automatic Pen Recorder

g. RESEARCH RESULT :

Some preliminary reports and progress reports already been submitted and percentage at the joint Research Seminar JICA-IPB 1989 & 1990 (first & second joint seminar) and one day seminar February 1990. Some progress reports still in progress and will be presented at the third Joint Seminar October 1990.

h. ACHIEVEMENTS :

1. Degree : Undergraduate
2. Presentation in the Seminar :
  - Annual Seminar on Joint Research, 1990
  - Joint Seminar, 1989 & 1990

i. PROBLEMS ENCOUNTERED : Additional strain amplifier DPM-613 B 3 units still be needed. Additional Automatic Pen Recorder 4 channel very help full if available for data analysis

j. FUTURE PLAN :

1. Design and construct depth sensor
2. Studying the influence of static and dynamic weight of the driving wheel weight on wheel slippage using moldboard plow. In this research a three point hitch dynamometer will be used with 7 channel strain amplifier for measuring horizontal force (draft) and vertical force and dynamic weight of the
3. Studying the effect of the driving wheels width, the velocity and the depth of the plowing by using moldboard plow on traction performances.

Additional Instruments still will be needed through JICA-DGHE/IPB Project (ADAET) : JTA-9a (132)

1. New type three point hitch which can measure six component
2. Three (3) channel strain amplifier Kyowa DPM 613 B
3. Slip ring for measuring torque force of the tractor
4. Pen Recorder (4-pen) and continues pen recorder printer digital type (automatic).



B

SYSTEM ANALYSIS AND MANAGEMENT  
FOR AGRICULTURAL PRODUCT

B.1. a. RESEARCH TOPIC :

Development of management and information system of Agricultural Production.

b. OBJECTIVES :

- To analyze the mechanization systems used in food and secondary crop productions.
- The model and to simulate the mechanization systems
- To develop an information system/network

c. RESEARCH DURATION : 3 years

d. RESEARCH COORDINATOR : Dr. Moeljarno Djojmartono, MSA

e. JICA EXPERT : Prof. Isao Nishimura

f. RESEARCH METHODS :

1. Rice and for primary secondary crops will be selected as the observed commodities in this study
2. Survey and measurement will be conducted in a certain mechanization level at major producing areas.
3. Model on the mechanization systems for individual crop or multiple crops
4. Development and testing of information system/network for several major producing areas (Java and some places in Sumatra or Sulawesi)
5. Application and extension the system in more remote areas, such as transmigration areas.
6. Application and expansion of the system in developing new machines design

g. RESEARCH RESULT :

Two limited programs have been developed. One is a simulation program developed by Ms. Emmy on tillage operation. Another is an expert system program to diagnose bulldozer engines troubles. The later program is actually a conversion program from EXSYS shell software to CRYSTAL shell. the CRYSTAL shell software is a part of equipment provided by JICA project.

h. ACHIEVEMENTS :

1. Degree : Undergraduate
2. Presentation in the seminar :
  - Annual Seminar on Joint Research, 1990
  - The expert system program was presented in the Joint Seminar, 1990.

i. PROBLEMS ENCOUNTERED :

Limited man-power. However, now we have already recruited two new staff, so that we hope that man-power won't be a problem anymore.

j. FUTURE PLAN :

- Further develop the simulation program on tillage operation. Data collector on soil physic and soil mechanics data for various types of agricultural soil in Indonesia. To develop the data in a data base form and link the data base to the simulation program
- To develop further the expert system program by adding data presentation capability through a photobase system. A photobase system is an important facility to present better information.
- Consideration on developing simulation program using graphical programming language.

B.2. a. RESEARCH TOPIC :

Management of sugarcane mechanization.

b. OBJECTIVES :

The main objectives of research is try determine the optimum degree of mechanization for sugar cane production in sugar industry.

c. RESEARCH DURATION : 2 years

d. RESEARCH COORDINATOR : Dr.Ir. Bambang Pramudya, M.Eng.

e. JICA EXPERT : Prof. Isao Nishimura

f. RESEARCH METHODS :

The research activity will be divided into two categories. The first category is data collection. In this phase the in field measurement will be conducted. Two location where the sugar production operation is fully mechanized will be selected. The in field sugar production operations will be measured in terms of capacity, energy, time, cost and losses.

The second category is data processing and modeling. In this phase the collected will be analyzed into factors affecting the sugar production operations. Later on, mechanized sugar production model will be developed. Finally a computer simulation will be used to evaluate the optimum sugar cane production mechanization.

g. RESEARCH RESULT :

One part of the management problem in sugarcane mechanization; the harvesting operation and transportation have already been analyzed in 1989. This result is also a dissertation doctor by Mr. Bambang Pramudya. The analysis was using system simulation on Turbo Pascal language.

h. ACHIEVEMENTS :

One of the research result is a dissertation for Dr. Bambang. The dissertation was defended in 1989. Part of the research result has already been presented in JICA One Day Seminar, held on February 19, 1990

i. PROBLEM ENCOUNTERED : No problem

j. FUTURE PLAN :

- To develop other model and simulation on different sugarcane mechanization/operation such as land preparation, tillage, cultivation and irrigation.
- To develop packet program sugarcane production machinery selection and maintenance.



C

LABOUR SCIENCE AND FARM WORK SCIENCE

C.1. a. RESEARCH TOPICS :

Measurement of human energy efficiency during the operation of agricultural machine and tools.

b. OBJECTIVES :

To obtain an optimum efficiency calculation of power of the operators needed in designing man operated machines.

c. RESEARCH DURATION :

- Plan : 2 years
- Implementation : 7 months

d. RESEARCH COORDINATOR : Ir. Kusen Morgan, MS.

e. JICA EXPERT : Prof. Isao Nishimura.

f. RESEARCH METHODS :

- The research will be conducted by measuring of O<sub>2</sub> consumption and CO<sub>2</sub> of the operator
  - Time study
  - Motion analysis
- The total energy expenditure of the operator can be calculated from the O<sub>2</sub> consumption of operator, using : respirometer, breath analyzer and barometer. The efficiency of the operator energy is the ratio of the load given and the total energy expenditure, in percent. The field research using the real machine will be conducted by heart-beat counter method. The conversion of the data from heart-beat method to the oxygen consumption method will be carried out in laboratory.

g. RESEARCH RESULTS :

The research are still conducting. The research title are :

1. Work load measurement of hand tractor operator
2. Work load measurement of knapsack shower operator
3. Work load measurement of hand pump operator
4. Noise measurement of hand tractor
5. vibration measurement of hand tractor handle

h. ACHIEVEMENTS :

1. Degree : Undergraduate
2. Presentation in the Seminar :
  - Joint Seminar, 1990



i. PROBLEMS ENCOUNTERED :

- The equipment and instrument for measurement are very limited in type and amount
- Most of importance equipments are not available
- Budgeting

j. FUTURE PLAN :

- Continuing the present research
- Conducting new research
  - time and motion study
  - developing of hand tractor simulator
  - work load measurement of pedal operation.

The future program is depends on the equipment availability.

C.2. a. RESEARCH TOPICS :

Dynamic anthropometry research for designing purpose of simple tools

b. OBJECTIVES :

To obtain accurate anthropometry/biomechanics data required to design simple agricultural equipment in order to achieve convenience and optimum power efficiency of the user

c. RESEARCH DURATION : - Plan : 3 years  
- Implementation : 7 months

d. RESEARCH COORDINATOR : Ir. Kusen Morgan, MS.

e. JICA EXPERT : Prof. Isao Nishimura

f. RESEARCH METHODS :

In the preliminary research, the measurement of anthropometrics/biomechanics data of the tool user will be accomplished. The data obtained will be used to design the tools (hocs, ares and soil fork), developing the prototypes is included. The testing of the field capacity, power requirement, efficiency, and convenience will be executed in the field and laboratory.

g. RESEARCH RESULTS :

The research is still conducting. The research title is : The anthropometric measurement of hand tractor handle.

h. ACHIEVEMENT :

1. Degree : Undergraduate
2. Presentation in the Seminar :  
- Joint Seminar, 1990

i. PROBLEMS ENCOUNTERED : - The equipment are not available

j. FUTURE PLAN : The future program is depends on the equipments availability

D

ENERGY AND RURAL ELECTRIFICATION

D.1. a. RESEARCH TOPICS :

Development of integrated energy utilization system for thermal unit operation

b. OBJECTIVES :

Solar energy is a potential new and renewable energy resources in Indonesia which can be utilized for developing rural and agrobased industries., such as drying, refrigeration and other heat process industries such as sugar making, and small food industries. The testing of several experimental system will be conducted in the studies and therefore some basic equipment for construction as well as for performance testing is required. At present we are studying three solar drying systems as topic of graduate researches, one solar cooling system. Since these system are still in the developmental process, modification and redesign work are still necessary. Therefore, we need some construction materials and some measuring instruments which still lacking.

c. RESEARCH DURATION : 3 Years

d. RESEARCH COORDINATOR : Dr. Kamaruddin Abdullah

e. JICA EXPERT : Dr. Y. Sagara, Dr. Y Koga

f. RESEARCH METHODS :

Research on the development of integrated energy utilization system for thermal unit operation in agricultural was conducted by designing some equipment for agricultural product processing. Some designed was developed in order to obtain the applicable equipment that can be used in farm level.

g. RESEARCH RESULTS :

The design of steam jet cooling and solar collectors for drying have already designed and the performance has been improving respectively.

h. ACHIEVEMENT :

1. Degree : Undergraduate, Master
2. Presentation in the seminar :
  - Annual Seminar on Joint research
  - Joint Research 1989, 1990
  - International seminar

i. PROBLEMS ENCOUNTERED :

Some equipments still required to improve the research implementation.

j. FUTURE PLAN :

Some modification on the equipment will be accomplished in order to obtain higher performance. Field survey will be scheduled to study the possibility of the application in the farm level.

k. RESEARCH COMMUNICATION :

- a. Discussion of research progress among the team member and JICA expert.
- b. Publication
- c. Seminar

D.2. a. RESEARCH TOPICS :

Biomass energy modeling and technology development.

b. OBJECTIVES :

Developing the biomass energy model for Indonesia and biomass energy conversion technology.

c. RESEARCH DURATION : 1989 - 1990 (2 years)

d. RESEARCH COORDINATOR : Ir. Sri Endah Agustina, MS.

e. JICA EXPERT : Dr. Koga Yasumasa

f. RESEARCH APPROACH METHODS :

- Developing the mathematical model and simulation, and laboratory testing and measurement

g. RESEARCH RESULTS :

- Mathematical model for biomass energy supply-demand in west JAVA (paper presented in Research seminar held at AE Dept. on February 19 th, 1990 was attached). Based on the model the mathematical model of biomass energy supply-demand for Indonesia have been developed the required data has been compiling.
- Research the influences of fuel wood volumetric on the stove efficiency has already finished.

h. ACHIEVEMENTS :

1. Degree : Undergraduate, Master
2. Presentation in the Seminar :
  - Annual Seminar on Joint Research, 1990

i. PROBLEM ENCOUNTERED : -

j. FUTURE PLAN :

- Data processing and model simulation
- Attending and presenting a paper (title : the influences of fuel wood geometric on the stove efficiency) on 3 rd joint seminar (October 8-9, 1990)

k. EQUIPMENT UTILIZATION : (attached)

D.3. a. RESEARCH TOPIC :

Input-Output Energy Analysis for rice production system in Indonesia.

b. OBJECTIVES :

1. To obtain a model for energy planning in rice production in Lampung and in Indonesia.
2. To determine the condition of rice self sufficiency
3. To determine the optimal condition for energy input for agricultural production, particularly rice.

c. RESEARCH DURATION : 3 (three) years (1988-1990)

d. RESEARCH COORDINATOR : Dr. Kamaruddin A. (assisted by  
Ir. A. Kohar Irwanto, MSc.(S3))

e. JICA EXPERT : Dr. Y. Koga/Dr. Y. Seo

f. RESEARCH METHODS :

In 1984, Indonesia had proclaimed to achieve rice self sufficiency. However, there are reports that the agricultural land, particularly on Java had been decreasing each year due to the transformation and conversion to other purposes such as for industries and residential areas. In addition to this government subsidy have been reduced recently (e.g. fertilizer, pesticide, irrigation, subsidies) and this may reduce the production capacity. By studying the various input to agriculture in the form of direct and indirect energy one may obtain useful relation on how rice self sufficiency could be maintained in future.

METHODOLOGY

According to the study of Giles and later developed further by Moens for the case of Indonesia, power input to agriculture resulted in the proportional increase in crop yield. By studying the relationship between the available power from man, animal and machinery in rice production we can determine the best strategy for mechanization in order to maintain rice self sufficiency level in Indonesia. This data will also provide the guidelines on how much machine should be produced each year by the industry so as to avoid overproduction or in order to catch up with the necessity to increase food crop production. In order to study the problem on both at macro and micro level another approach of determining the amount of energy input was also required. Using the first approach one still uncertain to know how many of the available power are really active in rice production. therefore, the energy input accounting method was also considered

necessary yield. In the study of energy input, there are two ways of obtaining the data, one through field surveys and another by means of the I/O table.

g. RESEARCH RESULTS :

From the previous studies, several data from Lampung had been accumulated. Using this as a the energy flow pattern as well as eergy efficiency for the three stages of agricultural developments, i.e. the traditional, the transitional, the transitional and the well developed satge had been obtained. The mathematical models developed provided 6 scenarious for energy input to achieve the rice self sufficiency in Lampung.

The research, however, will be continued to make further refinement of the model finally develop an optimization model.

h. ACHIEVEMENTS :

This topic is continuing research in our Laboratory on Energy and Agricultural Electrification. Several surveys (including the collection of secondary data) and energy flow analysis had been completed partially and a basic model had been developed. Currently we are also working through the AEMTRC (ASEAN - EEC Energy Management, Research and Training Center) with fellow ASEAN scientists to study the study the ASEAN Energy Model for the year 2010. Our group agricultural development. Several papers on this subject had been presented in the national, regional as well as international seminars :

a. A.K. Irwanto, K. Abdullah, E. Agustina and O. Kitani : "Energy Balance of Rice Production in Indonesia (1977-1981)", in Alternative Energy Resources for Agriculture, Edited by Kamaruddin A. and Osamu kitani, Nodai Research Institute, 1988.

b. Kamaruddin Abdullah : "Rural Energy Development in Indonesia", Meeting of the International Energy Workshop", 20-22 June 1989, IIASA (International Institute of Applied Systems Analysis9, Laxenburg, Austria.

c. A. Kohar Irwanto, kamaruddin Abdullah : "Energy flow for rice production in Lampung, south Sumatera", in indonesian. Paper presented in the Indonesian Society of Agricultural Engineers Congress, Malang, Jan. 1989.



i. PROBLEMS ENCOUNTERED :

Although we had succeed in developing model for energy analysis we still think that further refinement and validation for in the part of the mathematical model as well as in Programming are still necessary. It is highly expected that some JICA experts could help up to solve this problem.

j. FUTURE PLAN :

This research is planned to be continued by Mr. Kohar Irwanto as his graduate research (S3 program) at the IPB graduate school. We expect that Prof. Osamu Kitani from the Univ. Tokyo will continue to assist Mr. Kohar Irwanto and became a co chairman for his graduate committee.



# E

## FARM STRUCTURE AND STRENGTH OF MATERIAL

E.1. a. RESEARCH TOPICS :

Environment control for growing fruits and vegetables in green house.

b. OBJECTIVES :

1. To design low cost plastic (green house/protective shelter) for growing fruits and vegetables.
2. To design the ventilations system and cooling system to control the environment suitable for crop growth and production
3. To analogue the environmental factors such as temperature, humidity, radiant heat, etc. as affected by the materials used for covering the shelter, construction and ventilation system.

c. RESEARCH DURATION :

1. Plan : 2 (two years), starting 1989 through 1991
2. Implementation : Have not been started

d. RESEARCH COORDINATOR : Ir. Gardjito, MSc.

e. JICA EXPERT : -

f. RESEARCH APPROACH METHODS :

An experimental green house on protected shelter will be constructed using various types of plastic (polymer) materials. The structure should be designed for flexible changes of covering materials. The green house will be facilitated with equipments and instruments for controlling the environment and crop growth. Hydroponic cultivation method will be used for growing some horticultural crops. For research purposes, short life horticultural crops such as tomato, cucumber, strawberry, etc., are among the alternatives to be chases. Automatic watering device will also be provided. Adiabatic process or evaporature cooling system will be considered for controlling the inside temperature and humidity of green house. A micro computer will be used for the environmental control and energy balance calculation through computer modeling. Other equipments a apparatus such as temperature and humidity recorder, hotwire anemometer, data logger, are also required.

g. RESEARCH RESULT :

1. No experiments have been conducted for this topic due to lack of facilities, equipment, and instrumentation suitable to the objective of the research.

2. Pending to the approval of the equipment proposed through the JICA, a field observation (survey) was conducted to several private corporation dealing with fruits and vegetables using green house/protector shelter to find the possibility of joint research, i.e., using their facilities (if any) so that at least a preliminary experiments concerning this research topic can be started as soon as possible.

h. ACHIEVEMENTS : No achievements have been gotten yet

i. PROBLEM ENCOUNTERED :

1. Lack of facilities (green house/protector shelter), equipments and instrumentation.
2. Lack of budget for the operation of the experiments
3. So far no expert (from JICA) specialized in the field of environment control is available in order to jointly conduct this research topic.

j. FUTURE PLAN :

1. To make extra efforts in order that this research topic can be started on implemented as soon as possible.
2. A long term expert, or at least a short term expert, specialized in the field of environment control is required in the near future.

k. UTILIZATION OF EQUIPMENTS :

1. No equipments concerning this research topic have been available.
2. The only apparatus available from JICA is aradio meter (Pier heliometer) which have been used for research activities conducted by undergraduate students related to solar collector and for instructional purposes.

E.2. a. RESEARCH TOPICS :

appropriate technology in production in construction panel products as building material made of Agriculture Fibers Products as reinforcement with mortar.

b. OBJECTIVES:

This research is aimed to find out the influences of some orientation of fibers of the surface layer and the thickness of particle board and cement board on its mechanical properties. The research is also intended to see the influence of the portland cement to mix with another natural resources as aggregate, coarse sand, fine sand or mix clay stone and others. To achieve the goal namely increasing the quality and searching in the method and type of products is necessary to studies on physical and mechanical properties of two cottagers

1. Agriculture fibers products. and portland cement
2. Mortar - fire, coarse sand, and portland cement

c. RESEARCH DURATION :

Flow Chart of the Research

Raw Material	1	2	3
	Fibron Material	Cement	Aggregate/Sand/Mortar
	Adding		
a. Urea formal Dehida	1. Nipah		Gradasi of stone :
b. Melamin Formal Dehida	2. Hevea Brazilians 3. Albigia Falcota	(CR) Regular (CS) Japanese standard	- find aggregate - standard sand from Japan
	A	B	C
Result	Particle Board : 1 a, 2 a, 3 a	Cement Board 1 BR	Mortar to predict strain and stress as mechanical and physical properties of mortar according to the environment as RH, T as a basic building materials for example permeability strain, stress stiffness, etc.
	Building Materials		
	Intensify and potential as a packaging material in the post harvest agriculture production	Intensify and potential as building material reinforcement as concrete for dani Spillway, water gat etc.	

d. RESEARCH COORDINATOR : Ir. Sri Mudiastuti

e. JICA EXPERT : Dr. Kato

f. RESEARCH METHODS :

1. Experimental design in Laboratory of

A. Water : a. Oil and organic material in the water

B. Cement : a. Specific gravity of cement

b. -

c. Setting time of cement

d. Sandiness test of cement

e. Calorimeter test

f. Flow test

g. Flexure strength test

h. Compressive strength test

i. Curing test 3,7, and 28 days

C. Course and aggregates :

a. Sieving test & fineness modulus

b. Specific gravity & adsorption of aggregate

c. Organic material or fineness aggregate

d. Specific surface and moisture content of aggregates

g. RESEARCH RESULTS :

1. Find the building materials as the best one, compared with the material to used in now days.

2. Mixing mortar to support point 1, as a good degradation

3. Find the correlation of strain and stress in actual condition to support the contractor to find their decision in connector with the application to build the construction

h. ACHIEVEMENTS :

1. Degree : Undergraduate

2. Presentation in the Seminar :

- Annual Seminar on Joint Research, 1990

- Joint Seminar, 1990

i. PROBLEMS ENCOUNTERED :

1. Limitation of basic experiment result

2. Comparative study among Indonesian and Japanese method

3. Instrumentation has not yet come

J. FUTURE PLAN :

Dr degree in building material to find out the relation between the rheology of the material and the method of concrete materials to support the strength and strain material buildings.



F

OPTIMUM DEVELOPMENT MODEL OF  
WATERSHED FOR AGRICULTURAL USE

F.1. a. RESEARCH TOPICS :

Watershed model development appropriate to Indonesia.

b. OBJECTIVES :

The objectives of these studies is to develop a general watershed model appropriate to Indonesia.

c. RESEARCH DURATION :

- 1982 : Preliminary for sedimentation of Brantas River (East Java).
- 1984 : Relationship of land-use and water yield and fluctuation of 6 sub-watersheds of Bengawan Solo (Central Java).
- 1985 : Watersheds model development for Citanduy watershed (West Java).
- 1986 : Grid methods for erosion prediction in Bengawan Solo watershed (Central Java).
- 1987 : grid method for erosion prediction in Way Rarem (Lampung, Sumatra Island).
- 1988 : Watershed modeling of Konto River watershed (East Java)- not yet finish
- 1989 : Hydrological and erosion model for Cimanuk sub-watershed (West Java)
- 1990 : Erosion prediction in Bengawan Madiun watershed (East Java).
- 1991 : Jrantus watershed in Central Java (still in planning).

d. RESEARCH COORDINATOR : Ir. H. Aris Priyanto, MAE.

f. RESEARCH METHODS : -

g. RESEARCH RESULTS : -

h. ACHIEVEMENTS : -

i. PROBLEMS ENCOUNTERED :

Until now, the budget of those studies come from Ministry of Forestry and Ministry Public Work GOI and did not use budget from JICA Project or its Counter Budget. But a beginning of ADAET, JICA Project, the above research program was planned to be speed up and the area of the research able to be broaden by using Remote Sensing Technique, that will be developed under the research program of F.2.

F.2. program may need a large amount of budget, to provide hardware and software. If it is impossible, F1 will be continued and financed by available;e budget of different institution of GOI.

j. FUTURE PLAN : see schedule.

a. RESEARCH TOPICS :

Development of remote sensing technology for rural planning and land/resources surveying

b. OBJECTIVES :

Remote sensing technology involves a lot of interdisciplinary factors as well as possibility of operational utilization. The objective of the study is to establish a methodology of overall evaluation by physical planning condition especially for rural planning and land condition. soil and water conservation program by evaluation of soil erosion by using remote sensing technology. Concept of multi-stage investigation and its application by analogue and digital image analysis. Land cal planning condition. Themathic mapping for evaluation stability of the land 8land slide, soil erosion, danger due to flood, Etc.). Them, thematic mapping for evaluating productivity of the land (Land slope, soil texture, drainage, Etc.) and workability (reclamation, possibility of mechanization etc.).

c. RESEARCH DURATION :

The first year :

February 1989 - February 1991

Preparation of the research and training for completed methodology and research proposal. Mr. Sukandi Sukartaatmadja was trained in Japan.

The second year :

February 1990 - February 1991

Completed instrument for image analysis. Start research by using small plot for to know erosion with trial the organic mater. Collecting physical parameter in the watershed Cisadane. And preparation of satelite data; by land sat and analysis of land cover classification. Completed research model for prediction of sedimentation yield in upper watershed Cimanuk and attend joint seminar.

The third year :

Using instrument for image analysis continuity research for all upper watershed Cisadane. By landsat monitoring ofland cover and physical condition and to discussion. The result of organic mater for control erosion and by using land use map (Remote sensing technology)

d. RESEARCH COORDINATOR : Ir. Sukandi Sukartaatmadja, MS.

e. JICA EXPERT : Prof. Tadaharu Nakamura

f. RESEARCH METHODS :

1. Experimental using small plot for study organic matter and erosion in to get value of physical parameter.
2. Using image analysis for evaluation stability of the land (land slide, soil erosion)
3. Ground check (Ground Survey) and making questioner and discussion
4. Mapping

g. RESEARCH RESULTS :

1. Experiment in the small plot.  
Small plot : 2 x 22 meter and number of plot 6.  
Treatment used organic matter farm cow and chicken.  
Analysis of soil physic and observation of soil loss.
2. Land cover classification on upper Cisadane watershed. By used USSLE formula to soil loss classification
3. Collecting data of sedimentations and discharge from Cimanuk River and Cisadane River.
4. Report on analysis of sediment transport relation to the physical condition in upper Cimanuk Watershed.

h. ACHIEVEMENT :

1. Degree : -
2. Presentation in the seminar :  
- Joint Seminar, 1990

i. PROBLEMS ENCOUNTERED :

1. Instrument for image processing system not find in Lab. Soil and Water Engineering
2. Limitation on data observation
3. Budgeting not on time

j. FUTURE PLAN :

By using result of land cover classification survey to upper Cimanuk watershed about the organic matter and physical of land condition. Collecting of soil sample and analysis the soil physic and organic matter. Analysis the sediment transport of Cisadane river and analysis physical condition for rural planning of upper Cisadane watershed. Continue of soil physics research by using small plot and terrace system.

1. Seminar participation
  - a. The Japanese society of irrigation, drainage and reclamation engineering, July 1989 in Tokyo japan.
  - b. JICA
  - c. Member of JSIDRE

d. Influence of organic matter on conservation of latosol

2. Presentation to academic magazines

a. The seventh Afro-Asian Regional Conference of ICID  
October 15-25 1989 Tokyo Japan

b. JICA

c. Indonesian Representative

d. Irrigation engineering and land reclamation remote sensing for agriculture



# G

## EFFICIENT USE OF IRRIGATION IN INDONESIA

G.1. a. RESEARCH TOPICS :

Modeling Food Crop Response to Irrigation and Simulation for Increasing Products.

b. OBJECTIVES :

1. Determination of the parameters that may influence the food crop response factor to irrigation, such as ; soil moisture, soil temperature, crop and air, and weather factors
2. Simulation of combined factors to determine the most efficient application of irrigation water for increasing crop production.

c. RESEARCH DURATION : Plan : 3 year  
Implemented : 2 year

d. RESEARCH COORDINATOR : Dr. Soedodo Hardjoamidjojo, MSc.

e. JICA EXPERT : -

f. RESEARCH METHODS :

1. Data collecting of food crop response factor from several region in Indonesia. Researcher have been supervising to these field experiments.
2. The parameters that may influence the food crop response was measured, such as : soil moisture, crop, air and weather factors.
3. The model develops mathematical equation which represent the crop response, the irrigation application system and the crop yield.
4. Evaluation of the model involves determining their accuracy to predict the output parameter for given condition and the as certain their relative usefulness as a toll for management of an irrigation system. In order to evaluate the model, a green house experiment will be conducted with several portable dysimeter and other instruments which is related.
5. Simulation of combined factors to determine the most efficient application of irrigation water for increasing production.

g. RESEARCH RESULT :

1. The result of crop response factor, water requirement and the crop yield was presented in the 3 rd JICA - IPB Joint Seminar, in October 1990.



2. Prototype of the portable lysimeter have been developing, still in progress.

3. The food crop response model has been developing.

4. Optimization of irrigation water application to produce the maximum crop yield.

b. ACHIEVEMENTS :

1. Degree : Master

i. PROBLEM ENCOUNTERED :

Due to very limited of the available data on food crop response. it is needed a much time to waiting for several field experiments on food crop response which is conducted from other fund.

j. FUTURE PLAN :

Conducting on experiment in order to evaluate the model ; with several portable lysimeter and other instrument in a green house. If the facilities is not completed yet, we will to evaluate interfield condition at Darmaga without green house, so we can make a progress.

G.2. a. RESEARCH TOPICS :

Automatitaton of Irrigation System.

b. OBJECTIVES :

This program was planned for future large scale irrigation system in Indonesia as well as small scale of commercial agricultural commodities. For large scale to improve water distribution for tertiary block, while for small scale related to drip or trickle or sprinkler irrigation for small are of commercial agriculture.

c. RESEARCH DURATION : -

d. RESEARCH COORDINATOR : Ir. H. Aris Priyanto, MAE.

e. JICA EXPERT : -

f. RESEARCH METHODS :

Implementation of this program need laboratory model scale and field experiments (for larger scale). For this purpose , it need :

- (1) small scale laboratory model, sensor (tranducers) and other equipments
- (2) Computer program (software) development
- (3) Field experiment

g. RESEARCH RESULTS :

For large scale will be developed based on the result of irrigation water-use optimization model that had been conducted in several areas in, East Java, Central Java as West Java.

h. ACHIEVEMENTS : -

i. PROBLEMS ENCOUNTERED :

At present : Some materials for laboratory small scale model development has been provided but it still need other equipments (instruments).

For large scale was planned to be developed at the Infrastructure Project Area (JICA Project) or at Cikabayan area (new Dept. of Agricultural Engineering and Experiment Field).

j. FUTURE PLAN : -

G.3. a. RESEARCH TOPIC :

Hydrological Evaluation of Water Resources for Utilization of Irrigation.

b. OBJECTIVES :

1. Evaluation of the watershed conditions such as soil type, Land Use, Topography, etc. from aerial photography ;
2. Evaluation of the Watershed hydrological characteristics related to water resources ;
3. Determination of the relationships between the evaluated watershed hydrological characteristics on water resources and the irrigation water utilization in an irrigation scheme.

c. RESEARCH DURATION : 2 (two) years, 1990-1992

d. RESEARCH COORDINATOR : Dr. Soedodo Hardjoamidjojo, MSc.

e. JICA EXPERT : not yet confirmed

f. RESEARCH METHODS :

1. Collect topographic maps of the watersheds in the West Java, including the soil type, land use, rainfall, etc.
2. Analyze the collected data for determining the water balance in the area concerned;
3. Determine/create the model on the relationships between the outflow (using unit hydrograph method) to the inflow to the irrigation scheme concerned ;
4. After repeating the above steps to several against irrigation schemes, a simulation can be made to relate the watersheds and rainfall characteristics to the flow and the utilized irrigation water for the irrigation scheme concerned.

g. RESEARCH RESULTS :

1. Since the research just started this year (1990), no significant results have been achieved so far.
2. Ir. Totok Prawitosari (a graduate student/master's degree student) in doing some literature study for this purpose.

h. ACHIEVEMENTS : none

i. PROBLEMS ENCOUNTERED :

1. Limited travel budget (from IPB)
2. Some equipment are still proposed to be provided by JICA.

j. FUTURE PLAN :

1. after some progress has been made, a paper will be written and presented in the next Joint Seminar.
2. the results of this research will be presented in Graduate Seminar at the IPB Graduate School.

# H

## EVALUATION OF OPTIMUM PHYSICAL CONDITION ON FARM FOR CROP PRODUCTION

H.1. a. RESEARCH TOPICS :

Evaluation of various methods predicting reference crop soil physical problems for production - SPAC

b. OBJECTIVES :

1. To select the most suitable method for predicting reference crop evaporation which suitable with climate data in Indonesia.
2. To determine Crop Coefficient for various crops based on the selected method for predicting reference Crop Evaporation transportation

c. RESEARCH DURATION : 3 years

d. RESEARCH COORDINATOR : Dr.Ir.M. Azron Dhalhar, MSAE.

e. JICA EXPERT : Prof. T. Nakamura

f. RESEARCH METHODS :

<u>Month</u>	<u>Activities</u>
1 st - 3 rd	- Installation of weighing lysimeter - Installation of weather measuring instruments
4 th - 7 th	- Measurement of reference crop evapotranspiration (ET <sub>o</sub> ) for grass. - Measurement of weather elements such as air temperature, relative humidity, sunshine duration, rainfall, wind velocity, class a pan evaporation - Computer prediction of ET <sub>o</sub> using several methods - Selecting the best method of prediction ET <sub>o</sub> , compare with ET <sub>o</sub> measured
8th - 18 th	- Measurement of ETC for various crops such as corn, soybean and peanut. - Computing crop coefficient (kc) for each crop examined.

g. RESEARCH RESULTS :

1. For paper presenting in 1989 JSIDRE seminar, seminar in Lab. of soil physics and hydrology Tokyo University and seminar of irrigation and drainage, Ibaraki University :

1. 1. Soil physical properties of wet paddy field soils from Bogor serpong, Jonggol and Sukamandi. ie. : Texture, soil phases consistency, bulk density, specific gravity and permeability.

1. 2. Soil mechanical properties of wet paddy field soils from Bogor, Serpong, Jonggol, Sukamandi. i.e. : triaxial test, cone index and compaction test.
2. For paper presenting in 2 nd joint seminar : Soil compaction properties of wet paddy field soil from Bogor, Serpong, Jonggol and Sukamandi.
3. For paper presenting in one day seminar :
  - 3.1. Soil physical of wet paddy field soils (bogor, Serpong, Jonggol and Sukamandi) and upland soils (Bogor, Serpong and Jonggol)
  - 3.2. Soil mechanical properties of wet paddy field soils (Bogor, Serpong and Jonggol)
4. For paper submitted to journal JSIDAE :  
Soil compaction properties of wet paddy field soils from Bogor, Serpong, Jonggol and Sukamandi)

h. ACHIEVEMENTS :

1. Degree : Undergraduate
2. Presentation in the seminars

i. PROBLEMS ENCOUNTERED :

The detail confirmation of program may not be known since we has to wait for the program for advisors.

- j. FUTURE PLAN : Wait for the program from advisors (Prof. M. Nakano, Prof. T. Nakamura , etc)

### K. UTILIZATION OF EQUIPMENT :

No.	Item	Utilization *)			
		Research n	Research (other)	Education	Training/Extension
1.	Soil compaction test	3	3	2	2
2.	Specimens preparation set for triaxial	3	3	2	2
3.	Shrinkage limit test set	-	-	-	-
4.	Liquid limit test set	3	3	3	2
5.	Three phases volumeter	3	3	3	2
6.	Soil hardness tester	3	-	2	2
7.	Soil mechanical analysis	3	-	2	-
8.	Falling had parameter	3	-	3	-
9.	Tool set	3	-	-	-
10.	Rain gage	-	3	-	-
11.	Pycnometer	3	2	2	2
12.	Slide regulator	3	2	2	2
13.	Elective burner	3	-	2	2
14.	Pocket calculator casio set	3	-	-	-
15.	PH meter "cardy"	2	-	-	-
16.	Tensio meter	2	-	2	2
17.	Sample cylinder	3	3	2	2
18.	Word processor	3	-	-	-
19.	Aggregate analyzer	2	-	-	-
20.	Quick respond infiltrrometer	1	-	-	-
21.	Suction cup for pf	3	-	-	-
22.	U Power Supply	3	-	-	-
23.	Direct shear	1	-	-	-
24.	Consolidometer	1	-	-	-
25.	CBR Test Set	1	-	-	-
26.	Balance	1	2	2	2
27.	Unsaturated permeameter	1	-	-	-
28.	Plastimeter	2	-	-	-
29.	Falling cone LL test	2	-	-	-
30.	Dessicator	2	-	2	-

- \*) 1. Has not been installed (just arrived)  
 2. Already use once/twice  
 3. Used Frequently.



## 1. Seminar participation

No.	Name of seminar, Date and Place	Seminar Sponsor	Participant List	Content of Presentation
1.	2 nd Joint Seminar, 7-8 Augt. 1989. IPB-Bogor	JICA-IPB	-	Relation between bulk density and moisture content in comp. test of several wet paddy field soils.
2.	1989 JSIDRE annual seminar 27-28 July, 1989 Tokyo	JSIDRE	-	Physical properties of Indonesian paddy field soils.
3.	One day Seminar 19 February 1990, IPB-Bogor	JICA	-	Physical and mechanical proper- ties of several wet paddy field and upland soils
4.	Lab. Seminar 31 July 1989 Tokyo University	-	Staff and gra- duate student of Lab. of Soil physics and hydrology	The physical and mechanical characteristics of several Indonesia wet paddy field soils
5.	Lab. Seminar 29 July 1989 Ibaraki University	-	Staf of Lab. of irrigation and drainage	Some as point 3

### Presentation to academic magazines :

- a) Name of magazine : Journal of JSIDRE
- b) Presentator : Asep Sapei, M. Azron Dhalhar  
and S. Sudo
- c) Contents : Study on the compaction properties of  
several typical wet paddy field in  
Indonesia. (not published yet)



I

POST HARVEST TECHNOLOGY

I.1. a. RESEARCH TOPIC :

Thermophysical properties of tropical agricultural products.

b. OBJECTIVES :

In the design of equipment for agricultural product processing, such as drying, cooling and freezing basic thermophysical properties of the product should be known beforehand. These properties, covering the value of thermal conductivity, thermal diffusivity, specific heat, latent heat (heat of fusion), mass diffusivity and mass transfer coefficient are key parameters in determining optimal system as well as maintaining good quality of the process product. Unfortunately, many of the available data are for non tropical agricultural products. Since ten years ago work has been undertaken to design experimental method for determining these parameters. However, such simple methodology requires further improvement order to obtain a more accurate data in order to meet the engineering standard procedure for testing. Therefore, in this study we would like to improve our testing procedure with a more standard instrument such as thermal conductivity meter. Specific heat determination apparatus etc. Furthermore, the vast amount of tropical agricultural product require continuous accumulation data through testing. The need for computerized data acquisition system except for educational purpose is also meant to establish a standard and a more consistent measurement procedure. Some of the required instrument had been made available through the project, however, we still require a computer compatible with the already supplied "green kit" type .... In addition to this we would like to design and construct a multipurpose set thermophysical properties measurement unit in which plumbing work would be necessary.

c. RESEARCH DURATION : 3 years

d. RESEARCH COORDINATOR : Dr. Kamaruddin Abdullah.

e. JICA EXPERT : Dr. Y. Sagara

f. RESEARCH METHODS :

The measurement of thermophysical properties of foods and agricultural products accomplished by means of numerical, analytic approach using the instruments provided by the project.

g. RESEARCH RESULTS :

Thermophysical properties of some agricultural products such as tobacco, mango, pineapple, melon, watermelon and other tropical products had been collected.

h. ACHIEVEMENT :

1. Degree : Undergraduate
2. Presentation in the seminar :  
- Joint Seminar, 1990

i. PROBLEMS ENCOUNTERED :

The availability of some standard equipment, and still required to improve the research implementation.

j. FUTURE PLAN :

The thermophysical properties of some other agricultural products will be collected. Acquisition of the data collected then will be computerized for the academic purposes and as the basic data for research purpose.

k. RESEARCH COMMUNICATION :

- a. Discussion of research progress among the team member and JICA expert.
- b. Publication
- c. Seminar

I.2. a. RESEARCH TOPIC :

"Study on thermodynamic Properties of Water in Agricultural Product with Special References to Drying Process.

b. OBJECTIVES :

The main objective of this study is to conduct a thermodynamic analysis of the drying process and other advanced method of attacking the drying process.

c. RESEARCH DURATION : 3(Three) years from 1988-1990

d. RESEARCH COORDINATOR : Dr. Kamaruddin Abdullah

e. JICA EXPERTS : Dr. Y. Sagara/Y. koga

f. RESEARCH METHODS :

Background

Drying process is one of the oldest handling method of agricultural product in order to maintain longer storage time after harvesting. With better drying method will help the farmer to reduce post harvest losses and thereby, increase their income. As industrial process also penetrates the rural are, better and commercial type drying equipment to maintain consistent quality of the product. In the case of Indonesia, as the government had launched a massive program of non oil export to increase foreign exchange, further development of agrobased industries become more and more important. The penetration of industry to the rural expected to create more job to the rural people, including the farmers.

Export commodities require consistent quality of the product and this can be achieved by understanding the drying characteristics of the commodities to be dried. In Indonesia, basic engineering research toward this end is very few and that had made the design of the drying system suitable for the tropical product has been hindered. Basic approach to study the drying process is also quite new for undergraduate and graduate education in Indonesia, therefore, a more comprehensive attempt to understand the drying mechanism will alleviate the quality of undergraduate and graduate education in this country.

the study of drying process in the past years had centered mainly on the study of the data accumulation on the drying characteristics of several products, measurement of basic properties such as the mass diffusivity, the drying constant, etc. In approaching the problem in the past most scientist had studied the process from macroscopic point of view, for example, in

the case of the drying constant, the work was limited to determine the best way to measure the value from geometrical point of view, such as the thin layer model, the sphere model, the cylindrical model etc. As the measurement technology and data processing is developing very rapidly a more basic approach such as the application of the irreversible thermodynamics, and cellular level understanding of the drying there is becoming necessary. These effort not only for scientific advancement but could lead to a better control of the process so that and more consistent quality could be achieved and more efficient process could be developed.

#### SOCIAL BACKGROUND

Indonesia produces quite varieties of tropical agricultural product which requires drying process from food crops, meat, fish, fruit and vegetables, cash crops such as coffee beans, cocoa, vanilly, tea, cloves, rubber etc. Better application of the drying process will increase the value of the product both in terms of quality and the diversification of products, thereby will increase the income of the farmer.

#### METHODOLOGY

In the past most of the drying process was studied by determining the convential parameters such as the Me, the drying constant according to the geometry of the drying product. Recently, many researchers are trying to do drying analysis from the thermodynamic point of view such as those recommended by hall, Whitaker etc. Using this approach it is hoped that entropy production during the process could be reduced so that excellent quality of the product could be maintained as well as the energy used during the process can be conserved. This topic of research is to be used as MS thesis work of Mr. Aga Garnadi, staff from the Faculty of Mathematics and Natural Sciences of IPB.

#### g. RESEARCH RESULTS :

Due to the illness of Mr. Aga Garnadi, the work has been postponed for a while. Several literatures had been accumulated particularly those available from the IDS'89. (Work of Whittaker).

#### h. ACHIEVEMENTS :

1. Degree : Undergraduate

i. PROBLEMS ENCOUNTERED :

The work has been temporary halted since Mr. Aga's illness. Since Dr. Sagara has left the country and has been visiting the project for a short time in Oct. 1990, practically we do not have the JICA expert at present who is capable to assist the counterpart is completing the research program.

j. FUTURE PLAN :

Since Mr. Frans Wenur had been accepted as S3 student at IPB graduate school since Sept. 1990 he can assist Mr. Aga's work to complete the work.



1.3. a. RESEARCH TOPICS :

Development of Post Harvest Technology of Tropical Fruits and vegetables for exportation (sanitation, pre-cooling and storage).

b. OBJECTIVES :

The objective of the studying to develop various packaging models for transportation of tropical fruits and vegetables. More specifically, the objectives are as follows

1. To measure the physical properties of tropical fruits and vegetables critical to mechanical impacts.
2. To select local material for the packaging models taking in to account both the engineering and the economic parameters.
3. To design and to build various packaging models for the fruits and vegetables.
4. To investigate the responds of the packaging model and the produce inside against the mechanical impact during transportation.

c. RESEARCH DURATION : 1988 - 1990 (3 years)

d. RESEARCH COORDINATOR : Dr.Ir. Hadi K. Purwadaria, MSc.

e. JICA EXPERT : Y. Koga

f. RESEARCH APPROACH METHODS :

1. Five primary fruits and three primary vegetables will be selected as the observed commodities in this study.
2. Survey will be conducted in the major producing areas of the related fruits and vegetables to collect data on 1) the method of handling during transportation, and 2) the available local packaging materials in the areas.
3. Physical properties of the selected fruits and vegetables will be measured in the laboratory.
4. Model on the vibration during transportation in a truck will be constructed at the agricultural engineering department.
5. Various packaging models will be developed and tested under the simulated vibrating truck. The packaging model with optimum performances will be chosen and introduced to the farmers.

g. RESEARCH RESULT :

h. ACHIEVEMENTS :

i. PROBLEM ENCOUNTERED :

1. Limited research budget from JICA, other resources supporting the research is research institution (Lembaga Penelitian), IPB and BPP-Teknologi, Jakarta.
2. Very late arrival of equipment. This project started in 1988, however until October 1990 no equipment has arrived yet.

j. FUTURE PLAN :

1. When the arrives, a vibrating table with measuring instruments will be set up and series of research in the areas of transportation impact on the packaging of various horticultural products will be conducted.
2. Mr. Soesilo, at present under training program in Japan, will help to set up the instruments and heavily involves in the studies. When possible, Mr. Soesilo (Faculty Staff at Dept. Agricultural Engineering) will undergo the graduate program.

PROGRESS DESCRIPTION (--> g) :

1. Three graduate students conducted research in these area, 1) Modified atmosphere storage of tomatoes, 2) Impact of simulated truck transportation on oranges, and 3) Rheological properties of jackfruits fruit juice. Two of them were from study program of post harvest technology, one was from agricultural engineering.
2. Currently, one undergraduate student (agricultural engineering) is carrying out experiments to establish the relationship of tomatoes color to the days of maturity of the fruits, and one graduate student Mr. Agus Margiwiyatno (post harvest technology) is observing the influence of maturity of oranges to the self life of the fruits during fresh handling.

REPORTS MADE :

1. Setiawan, Y., H.K. Purwadaria and T. Supriyanto, 1989. Behavior of variables in modified atmosphere system of fresh tomatoes. Second Joint Seminar JICA-IPB on Agricultural Engineering and Technology. Bogor, August 7-8, 1989.
2. Rusmono, M., H.K. Puwadaria and Y. Setiawan, 1990. Model simulate pendugaan masa simpan tomat dalam kemasan modified atmosphere (simulation model to predict self life of tomatoes inside modified atmosphere packaging). Seminar Hasil Penelitian, Lembaga Penelitian, IPB - Bogor.

3. Brontowaluyo, S. H.K. Purwadaria, MS. Tirtosukotjo, Y. Sagara and A.M. Syarief. 1990. Studies on mechanical impact on packet citrus during simulated truck transportation. Third Joint Seminar JICA-IPB on Agricultural Engineering and Technology. Bogor, October 8-9, 1990.
4. Rosidah, U., H.K. Purwadaria, K. Fujii, Y. Sagara and A.M. Syarief. 1990. Studies on rheological properties of jackfruit juice under heating temperature. Third Joint Seminar JICA-IPB on Agricultural Engineering and Technology. Bogor, October 8-9, 1990.

1.5. a. RESEARCH TOPICS :

Assessment and prediction of Post Harvest Loss of Grains

b. OBJECTIVES :

c. RESEARCH DURATION : mid 1990 - mid 1992 (two years)

d. RESEARCH COORDINATOR : Dr. Ir. Hadi K. Purwadaria, MSc.

e. JICA EXPERT : Dr. Y. Koga

f. RESEARCH APPROACH METHODS :

g. RESEARCH RESULT :

h. ACHIEVEMENTS :

i. PROBLEM ENCOUNTERED :

Very limited JICA budget for traveling to the project site. Counterpart budget from IPB as also limited. Combining JICA budget, IPB budget and the student scholarship is only sufficient for one season survey, not to talk about "year by year" survey and collecting "reliable" data as suggested by Dr. Nishimura and Dr. Koga in the discussion on October 10, 1990.

As comparison, the IDRC-Canada project in this area (Bulog-IPB-UGM) at the same project site (Kediri, East Java) for two years (1986-1987) had the budget of about Rp. 86 million (¥ 6.6 million). Copy of final report of this project is available for everybody interested (Dr. Koga has one). This project is about optimization of paddy and paddy maize handling at cooperatives.

j. FUTURE PLAN :

1. Base line data survey on paddy and maize will be conducted in the project site (Kediri, East Java) by the graduate student (Rr. Muhami - Post Harvest Technology) in this coming rainy season of January - February.

2. Data analysis will be completed in the IPB laboratories including the grain sample analysis (Refer to the summary of research proposal, Dr. Koga has the copy)

# J

## FOOD ENGINEERING

J.1. a. RESEARCH TOPICS :

Fundamental Study on Transport Phenomena and Quality Design in Bread Baking Process.

b. OBJECTIVES :

- To study the changes in moisture content and weight during baking.
- To study the effect of temperature on the texture of bread and the crust color as a function of baking time.
- To obtain physical properties and quality improvement of bread.

c. RESEARCH DURATION : Plan : 3 years  
Implemented : 2 years

d. RESEARCH COORDINATOR : Dr. Aman Wirakartakusumah

e. JICA EXPERT : Dr. Yasuyuki Sagara

f. RESEARCH METHODS :

- Straight dough Baking method was adopted from PT. Bogasari, Jakarta.
- The change in moisture content was measured directly in the oven using an analytical balance.
- Temperature of bread at various location was measured and recorded.
- Texture of bread will be measured using texturometer or instron testing machine.
- The change in crust color was measured by a whitenes meter as effected by sugar content as as temperature.
- Physical and thermal properties of bread will be calculated based on the measured data.

g. RESEARCH RESULTS :

- Study on kinetics of changes in crust color during baking was completed, and the results was presented in 3 rd JICA-IPB Joint Seminar in October 1990.
- Measurement of moisture content, weight and temperature of bread during baking were done.
- Physical and thermal properties of bread are still being calculated.
- Improvement of bread quality will be conducted next year in Japan by Ir. Subarna.

h. ACHIEVEMENTS :

1. Degree : Undergraduate, Master
2. Presentation in the Seminar

i. PROBLEMS ENCOUNTERED :

- Due to late arrival of instruments, the start of experiment is delayed, therefore, the completion of the project is postponed up to 1991
- Budget is very limited

j. FUTURE PLAN :

- Writing up paper for the first part of the research, and Mr. Gatot will take his final examination in December 1990 for master degree.
- Dr. Sagara will be returned to Bogor and examine
- Mr. Subarna will leave for Japan next year to conduct the second part of the study improvement of quality design of bread. His training will be associated with this degree program in Indonesia (Sandwich).

J.2. a. RESEARCH TOPIC :

Freeze drying characteristic and transport properties of shrimp-meat.

b. OBJECTIVE :

In the last few years Indonesia had produced large amount of shrimps and shrimp products due its high price both domestically as as for export commodity. Many rice fields had been converted to shrimp rearing ponds due to this high demand for this product. Despite of its popular nature, shrimps in facts are susceptible to decay if stored under room or ambient temperature, therefore without proper refrigeration facilities, most of the product will be destroyed due to the vast quality deterioration and there by reduce its market value.

Freeze drying is one of the newest technology in the drying process of food commodity in which the product moisture is reduced to a very low value (2% wb) under low pressure. The process of freezing and sublimation dehydration help in reducing very little damage to the cell so that upon rewetting it is expected that the product could retain its vigor.

Since the rate of freeze-drying is controlled by heat and mass transfer across the dried layer of the material, the thermal conductivity and permeability of the dried layer and the effect of processing factors are fundamental information to determine the drying rate.

The main objectives of this research to measure the freeze drying characteristics of shrimp-meat under determine the thermal conductivity and permeability of the bulk layer connection with controllable factors such as the bulk density for raw sample, temperature and pressure of the dried layer.

c. RESEARCH DURATION : 3 years

d. RESEARCH COORDINATOR : Dr. Kamaruddin Abdullah

e. JICA EXPERT : Dr. Yasuyuki Sagara

f. RESEARCH METHOD :

To achieve the objectives of this research, an experimental freeze dryer was constructed. By applying the drying data obtained during freeze drying process to the model based on the heat and mass transfer, the thermal conductivity and permeability of shrimp meat determined



g. RESEARCH RESULT :

The values of thermal conductivity of the shrimp meat obtained during freeze drying process were range from 0.08-0.16 W/m.k, while the permeability were between 0.0027-0.004 m<sup>2</sup>/s

h. ACHIEVEMENT :

1. Presentation in the 2nd JICA-IPB Joint Seminar
2. Master degree
3. Presentation in the IDS '90 in Praha.

i. PROBLEM ENCOUNTERED :

Unavailable of the more accurate balance (LVDT) was effected to the weight data recording.

j. FUTURE PLAN :

To establish a mathematical model for simulating the heat and mass transfer mechanism within the intact shrimp, since such form is the most frequently found in trading activities, and then to experimentally verify transport properties.

k. RESEARCH COMMUNICATION :

1. Discussion of the research progress among research team
2. Seminar
3. Publication







SEMINAR PROGRAM

Monday, 8 October	Abdul Muis Nasution Hall
08:00 - 08:45	Registration
08:45 - 10:00	Opening Ceremonies <i>Welcome Address</i> Prof. Dr. Ir. Sitanala Arsyad Rector of IPB Mr. Yasuo Kitano JICA Indonesia Resident Representative <i>Opening Address</i> Mr. Goichiro Yukawa First Secretary of Agriculture Japanese Embassy <i>Opening Remarks</i> Ir. Wardoyo H.E. The Minister of Agriculture, Republic of Indonesia
10:00 - 10:30	Coffee/Tea Break
SESSIONS A. PRODUCTION (Venue : GMSK Auditorium)	
Session A.I.	Evaluation of Optimum Physical Condition on Farm for Crop Production
10:30 - 10:45	Chairperson : Dr. Isao Nishimura - JICA Rapporteur : Dr. Moeijamo Djojomatono - IPB Water movement in heterogeneous soils Tsuyoshi Miyazaki

10:45 - 11:00	Soil compaction as influenced by mechanical tillage in sugar cane plantation
11:00 - 11:15	E. N. Sembiring, Tineke Mandang and Abbas Effect of subsoil compaction at the coarse-textured volcanic ash soils of Japan Takanori Igarashi
11:15 - 11:30	Study on the soil strength of several wet-paddy and upland soils related to the agricultural machinery operations Asep Sapei, Moh. Azron Dhalihar, Tadahanu Nakamura and Etzal
11:30 - 12:00	Open Forum
12:00 - 13:00	Lunch
Session A.II.	Optimum Utilization of Agricultural Machinery on Farm for Crop Production
Sub-Session A.II-1	
13:00 - 13:15	Chairperson : Dr. Ir. Tineke Mandang - IPB Rapporteur : Ir. R. G. Sitompul - IPB Design of different speed twin rotax weeder Abdul Rozaq
13:15 - 13:30	Efficiency analysis of wheel power traction in upland clay soil by using moldboard plow Frans J. Daywin, Moeijamo Djojomatono, Kamatuddin Abdullah and Moh. Azron Dhalihar

13:30 - 13:45	Usage of double mold board plow with 8.5 HP hand tractor on various land conditions	Akmadi Abbas and Imam Djunaedi	Session A.III. Optimum Development Model of Watershed for Agricultural Use
13:45 - 14:00	Application of local manufactured disc plow on various land conditions	Imam Djunaedi, Akmadi Abbas and Dobby A. Darmajana	Chairperson : Dr Ir Suprodjo Pusposwardjo - UGM Rapporteur : Ir. Ascp Sapei MS - IPB
14:00 - 14:15	A study on a floating rotary tiller	R. Handaya, Abdul Rozzaq and Lukman	15:45 - 16:00 Study on land suitability analysis for water-land rice using satellite image and GIS Muh. Dimiyati, Satoshi Uchida and Ryota Nagasawa
14:15 - 14:45	Open Forum		16:00 - 16:15 Contribution of satellite data and GIS for irrigability appraisal Joko Setiyono, Gundho Wardoyo and Shimatro Kobayashi
	Sub-Session A.II-2		16:15 - 16:30 A computer model to predict the agricultural yield under the water shortage condition Waluyo Hatmoko, Suryadi, Marfini Darmawi, Amirwandi and Irfan Sodoono
14:45 - 15:00	Development of seed crops fertilizer drill operated by two wheel tractor	Astu Unadi, C.P. Gupta and Soedjatmiko	16:30 - 16:45 Analysis of sediment transport relation to the physical condition in Upper Watershed Cimamuk Sukandi Sukartaatmadja
15:00 - 15:15	Disposition to the use of conc index for predicting traction performance characteristics	M. Ade M. Kramadibrata	16:45 - 17:15 Open Forum
15:15 - 15:30	Coffee/Tea Break		
15:30 - 15:45	Open Forum		

SESSIONS B. POST PRODUCTION (Venue : A.M. Nasution Hall)	
Session BI. Post Harvest Technology	
12:00 - 13:00	Lunch
13:00 - 13:15	Drying characteristics of agricultural products Perwayani Lun A and Ajieng M. Syarif
13:15 - 13:30	A mathematical model for copra dryer Supratomo
13:30 - 14:00	Open Forum Sub-Session BI-3 Chairperson : Dr. Ir. Ajieng M. Syarif - IPB Rapporteur : Ir. Putiati Mahtar M. App.Sc. - IPB
14:00 - 14:15	A small scale cassava processing machines B. Praslowo, N. Richana, Y. Sinuseng, Riyadi and IGP Sarasultha
14:15 - 14:30	Optimization of cassava grater Dadi Rusendi and M. Muhaemin
14:30 - 14:45	Yam harvesting method in Japan Sam Herodian and Naolaka Hayashi
14:45 - 15:15	Open Forum
15:15 - 15:30	Coffee/Tea Break
10:30-10:45	Development of sorting and grading systems for fresh fruit and vegetables in Japan Hiroshi Morishima
10:45 - 11:00	Studies on mechanical impact on packed citrus during simulated truck transportation Sumirat Bronto Waluyo, Hadi K. Purwadania, Yasuyuki Sagara, Moh. Soedibjo Tirosokoito and Ajieng M. Syarif
11:00 - 11:15	Measurement of thermal conductivity of tropical fruits M. Yamin, Yasuyuki Sagara and Kamaruddin Abdullah
11:15 - 11:45	Open Forum Sub-Session BI-2 Chairperson : Prof. Dr. Hiroshi Morishima - Univ. Tokyo Rapporteur : Ir. A. Kohar Irwanto MSc - IPB
11:45 - 12:00	Tea drying with solar energy Kamaruddin Abdullah, Gani Bratawidjaja, M. Nizar, S. Kotani and Yasuyuki Sagara

Sub-Session BI-4

Chairperson : Dr. Kamaruddin Abdullah - IPB  
 Rapporteur : Dr. Ir. B. Suratno - UGM

15:30 - 15:45	Prototype development of soybean pod-sheller
	Ridwan Thahir, S. Lubis, J. Setiawati and Sutrisno
15:45 - 16:00	Effect of vibrating plate arrangement on the performance of a simple cylindrical corn sheller
	I. K. Tastra
16:00 - 16:15	Development of the pepper-peeler equipment
	Tamrin, Aljeng M. Syarif and Pasril Wahid
16:15 - 16:30	The effects of storage temperature of green vanilla beans on the yield and quality of cured beans
	I Made S. Utama, Hadi K. Purwadana, Melly S. Sinaga and Pasril Wahid
16:30 - 16:45	Simulation model for predicting rice storage losses at farm level due to insect infestations
	Gardjito
16:45 - 17:15	Open Forum

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Tuesday  
 9 October 1990

SESSIONS A. PRODUCTION  
 (VENUE : CMSK Auditorium)

Session A IV. System Analysis and Management for Agricultural Production

Sub-Session AIV-1

Chairperson : Dr. Ir. Eriyano - IPB  
 Rapporteur : Dr. Ir. Bambang Pramudya - IPB

08:00 - 08:15	Evaluation of agricultural labor and energy supply in low land rice tillage
	E. Eko Ananto, Moejiarno Djjomartono, Kamaruddin Abdullah, Eriyano and Soedjarmo
08:15 - 08:30	Model analysis for deciding the numbers and locations of tractor base camp in a sugarcane plantation
	Tri Purwadi
08:30 - 08:45	Development of expert system program to diagnosis on bulldozer engine troubles
	Iman Prasriya, I Wayan Astika, Moejiarno Djjomartono, and Emmy Darmawati
08:45 - 09:00	A knowledge base system for insecticide application to rice crop
	Hadi Suryanto
09:00 - 09:30	Open Forum
09:30 - 09:45	Coffee/Tea Break

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10:00 - 10:15	Sub-Session AIV-2 Chairperson : Dr. Yasumasa Koga - JICA Rapporteur : Ir. Garjito, MSc - IPB	11:00 - 11:15	The effects of subsurface drainage on rice based cropping pattern Paul Santosa
09:45 - 10:00	Employment and income structure of rainfed farming in West Java Shigeki Yokoyama	11:15 - 11:45	Open Forum
10:00 - 10:15	Simulation on the impact of agricultural mechanization to labor situation - a case study in Grobogan, Central Java Eva Z. Yusuf and Viva Satriana	11:45 - 12:00	Sub-Session A V-2 Chairperson : Dr. Ir. Soedodo Harjoamidjojo-IPB Rapporteur : Ir. Sukandi Sukartaalmadja, MS-IPB The computer program for calculating the designed water level and canal cross section in tertiary unit design Dodi Kusnadi Kalsim and M. Rirot Cahyoesntosa
10:15 - 10:30	Open Forum	12:00 - 12:45	Assessing groundwater contribution as an effort to increase irrigation efficiency in the tertiary block level Sukirno and Sigit Supadmo Arief
Session A V. Efficient Use of Irrigation in Indonesia		12:15 - 12:30	Developing rice yield model in the ill drained tertiary block irrigated area Sigit Supadmo Arief
10:30 - 10:45	Sub-Session A V-1 Chairperson : Ir. H. Aris Priyanto, MAE - IPB Rapporteur : Ir. Tri Purwadi, M.Eng. - UGM The modernization of paddy field irrigation systems based on Japanese experience Hiroyasu Shimura	12:30 - 13:30	Lunch
10:45 - 11:00	Salinity of surface groundwater in the coastal area of irrigated ricefield Suprodjo Pusposutardjo	13:30 - 14:00	Open Forum

Sub-Session A V-3

Chairperson : Prof. Dr. Hiroyasu Shimura - Univ. Tokyo  
 Rapporteur : Dr. Kazunori Kato - JICA

14:00 - 14:15	Prediction of crop transpiration coefficient of garlic using CRPSM Model
	Pulu Sudjira, Tri Sudyastuti, and Heru Tawan lo
14:15 - 14:30	Irrigation water requirement and application method for corn
	Soododo Harjoamidjojo, M. Yanuar J.P. and Achmadi Partowijoto
14:30 - 14:45	Study on water productivity in the crop production of soybean ( <i>Glycine Max M.</i> )
	Achmadi Partowijoto and M. Yanuar J.P.
14:45 - 15:15	Open Forum
15:15 - 16:00	Coffee/Tea Break
16:00 - 17:00	Closing Ceremony (Venue A. M. Nasution Hall)
	Session Conclusions
	Closing Remarks Prof. Dr. Ir. Edi Guhardja - Director of Graduate School IPB

Tuesday  
 9 October, 1990

SESSIONS B. POST PRODUCTION  
 (Venue : A. M. Nasution Hall)

Session B II	Food Engineering
	Sub-Session B II - 1
	Chairperson : Dr Ir M. Aman Wirikartakusumah - IPB Rapporteur : Ir. Ag. Suryandono M.App.Sc - UGM
08:00 - 08:15	Prediction of model structural parameters for the dried layer of coffee solution undergoing sublimation dehydration
	Yasuyuki Sagara
08:15 - 08:30	Effect of drying on volatile biologically - active constituents of caucas ( <i>A. victorialis L.</i> )
	C. Ifanny Wijaya, Hiroyuki Nishimura and Junya Mizutani
08:30 - 08:45	Measurement of thermal diffusivity of fish using geometrical analysis method
	Oediyanto Guyandji, Kamaruddin Abdullah, and Edy Hartulistyoso
08:45 - 09:15	Open Forum

Sub-Session B II - 2		11:00 - 11:15	
Chairperson : Dr. Ir. Rizal Syarif - IPB Rapporteur : Ir. Y. Aris Purwanto - IPB	Influences of the geometric type of fuel wood on the stove efficiency		Bodiman Nuryudin, Endah Agustina and Kamaruddin Abdullah
09:15 - 09:30	Heat and mass transfer characteristics of white bread crust during baking	11:15 - 11:30	Stiffness and strength of <i>Ilexa brasiliensis</i> sp. and <i>Albizia falcata</i> Dack wood as materi als for drive-in rack pallets
	Gatot Priyanto and M. Aman Wirakartakusumah		Sri Mujiastuti, Marolop Sinaga and Rachmat Agus
09:30 - 09:45	Coffee/Tea Break		Open Forum
09:45 - 10:00	Volumetric expansion of Indonesia chips (krupuk) during oil deep frying as affected by fractions of bound water	11:30 - 12:00	Lunch
	Soewarno T. Sockarto and Dewi Muliawan		
10:00 - 10:15	Studies on rheological properties of jackfruit juice under heating temperature	Session B IV	Bioprocesses in Agro-Industries
	Umi Rosidah, Hadi K. Purwadaria, Kasumi Fujii, Yasuyuki Sagara and Aijeng M. Syarif		Chairperson : Dr. Ir. Srikanthi Fardiaz - IPB Rapporteur : Ir. M. Faqih Udin, MSc.
10:15 - 10:45	Open Forum	13:30 - 13:45	Analysis of celluloses of <i>Trichoderma viride</i> and <i>Aspergillus niger</i> grown on rice straw
Session B III	Energy for Agriculture and Material for Farm Structure		Maggy T. Suhartono and Eirmansyah
	Chairperson : Dr. Ir. Ridwan Thahir - Ministry of Agriculture Rapporteur : Ir. John Kumendong MS - IPB	13:45 - 14:00	Enhanced biological phosphorus and nitrogen removal from agroindustrial wastewater
10:45 - 11:00	Optimization of a solar drying system		Anas M. Fauzi
	Kamaruddin Abdullah and Yasuhisa Seo	14:00 - 14:15	Effect of delignification pretreatment on enzymatic saccharification of cellulose in lignocellulosic agricultural waste
		14:15 - 14:45	Djumali Mangunwidjaja
			Open Forum

14:45 - 15:30

Coffee/Tea Break

15:30 - 16:30

Closing Ceremony

Session Conclusions

Closing Remarks

Prof. Dr. Ir. Edi Guhardja - Director of Graduate Program  
IPB





TENTATIVE SCHEDULE OF IMPLEMENTATION  
FOR  
THE ACADEMIC DEVELOPMENT OF THE GRADUATE PROGRAM  
AT THE FACULTY OF AGRICULTURAL ENGINEERING AND TECHNOLOGY  
INSTITUT PERTANIAN BOGOR

The Japanese Consultation Survey Team headed by Dr. Hiroshi Morishima and the Indonesian Authorities concerned have jointly formulated the Tentative Schedule of Implementation for the Academic Development of the Graduate Program at the Faculty of Agricultural Engineering and Technology, Institut Pertanian Bogor (hereinafter referred to as "the Project") as annexed hereto.

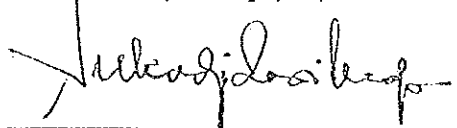
This has been formulated on the basis of the Record of Discussions and the Tentative Schedule of Implementation on the Japanese Technical Cooperation for the Project signed between the Japanese Implementation Survey Team and the Authorities concerned of the Government of the Republic of Indonesia at Jakarta, on December 24, 1987 and on the conditions that necessary budget will be allocated for the Implementation of the Project by both sides, and that the above-mentioned Schedule is subject to change within the framework of the Record of Discussions when necessity arises in the course of implementation of the Project.

Jakarta, July 20, 1988



Dr. Hiroshi Morishima  
Leader  
Consultation Survey Team  
Japan International Cooperation  
Agency

Jakarta, July 30, 1988.



Dr. Sukadji Ranuwihardjo  
Director General  
Directorate General of Higher Ed.  
Ministry of Education and Culture  
The Republic of Indonesia

— RESEARCH TOPICS AND SCHEDULE (TENTATIVE) —

Research Topics	Year				
	1988	1989	1990	1991	1992
A. Optimum Utilization of Agricultural Machinery on farm for Crop Production.					
1. The influence of mechanical tillage on soil physical and dynamic properties for increasing crop production.			(5 years)		
2. A study on the relationship between soil moisture and tractor capacity in dryland farming.		(3 years)			
B. System Analysis and Management for Agricultural Products.					
1. Development of management and information system for agricultural production.			(4 years)		
2. Management of sugarcane mechanization.		(2 years)			
C. Labour Science and Farm Work Science.					
1. Measurement of human energy efficiency during the operation of agricultural machine and tools.		(3 years)			
2. Dynamic anthropometry research for designing purpose of simple tools.			(3 years)		
D. Energy and Rural Electrification.					
1. Development of integrated energy utilization system for thermal unit operation in agriculture.			(5 years)		

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Research Topics	Year				
	1988	1989	1990	1991	1992
2. Biomass/energy modeling and technology development.		(2 years)			
3. Input-Output energy analysis for rice production systems in Indonesia.		(3 years)			
E. Farm Structure and Strength of Material.					
1. Environment control for growing fruits and vegetables in green house.		(4 years)			
2. The use of agricultural by-product for agricultural building materials.		(2 years)			
F. Optimum Development Model of Watershed for agricultural use.					
1. Study on watershed model appropriate for agricultural use in Indonesia.		(3 years)			
2. Development of remote sensing technology for rural planning and land/resources surveying.		(5 years)			
G. Efficient Use of Irrigation in Indonesia.					
1. Modeling food crop response to irrigation and simulation for increasing production.		(3 years)			
2. Microcomputer controlled open channel flow monitoring system.		(3 years)			
3. Hydrological evaluation of water resources and its utilization to irrigation.		(4 years)			

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Research Topics	Year				
	1988	1989	1990	1991	1992
II. Evaluation of Optimum Physical Condition on Farms for Crop Production.					
1. The effect of compaction in paddy field on the optimum condition for secondary crop condition.			(5 years)		
I. Post Harvest Technology.					
1. Therophysical properties of tropical agricultural products.			(5 years)		
2. Studies on the thermodynamic properties of water in agricultural product with special reference to drying process.		(3 years)			
3. Development of post harvest technology of tropical fruits and vegetables for exportation (sanitation, pre-cooling and storage).			(5 years)		
4. Development of optimum handling, processing and storage system for secondary crops in Indonesia.			(4 years)		
5. Assessment and prediction of post harvest loss of grains.				(2 years)	
J. Food Engineering					
1. Fundamental study on transport phenomena and quality design in bread baking process.			(5 years)		
2. Freeze drying characteristics and transport properties of shrimp paste.		(2 years)			

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Item	Year				
	1988	1989	1990	1991	1992
ACADEMIC EXCHANGE WORKS					
1. Seminar/Workshop and Symposia					
JAPANESE CONTRIBUTIONS					
1. Assignment of Experts					
(1). Long-term assignment					
1). Team Leader					
2). Coordinator					
3). Experts in :					
a). Agricultural Engineering					
b). Post Harvest Technology					
c). Food Science					
(2). Short-term assignment					
Experts in :					
1). Agricultural Engineering					
2). Post Harvest Technology					
3). Food Science					
Note : One expert may cover more than one field					
2. Acceptance of Indonesian personal in Japan					
Trainees in :					
(1). Agricultural Engineering					
(2). Post Harvest Technology					
(3). Food Science					
3. Provision of equipments for :					
(1). Agricultural Engineering					
(2). Post Harvest Technology					
(3). Food Science					

-- Three or four personnel a year --

----- Dispatched as required -----

-- Three or four personnel a year --

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Item	Year				
	1980	1989	1990	1991	1992
INDONESIAN RESPONSIBILITIES					
1. Assignment of Counterpart and Administrative Personnel					
(1). Head of the Project			Rector, of IPB		
(2). Counterparts in Agricultural Engineering to the Japanese Experts					
(3). Counterparts in Post Harvest Technology to the Japanese Experts					
(4). Counterparts in Food Science to the Japanese Experts					
LAND, BUILDING AND OTHER INCIDENTAL FACILITIES					
- Existing FATETA building and facilities -					
ALLOCATION OF RUNNING COST OF THE PROJECT					

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