No.

バングラデシュ農業大学院計画
巡回指導調査団報告書

昭和63年2月

国際協力事業団

農業開発協力部

農開技
JR
88－2

序　　文

バングラデシュ国政府は食糧増産，安定供給を目標として，農業技術全般の向上を目指し，農業研究機関をジョイデブール市に集中させ，これと同時に高等教育及び研究分野の拡充，向上を図ることとし，1984年4月に，大学院教育を行なう大学院大学として農業大学院計画（IPSA）に対する技術協力を我が国に対し，換請越した。

この要請に対し，国際協力事業団（ＪＩＣＡ）は文部省，九州大学，佐賀大学の協力を得，数度にわたる調査団，長期調査員の派遣を行ない，技術協力計画に関し「バ」国関係者と協議を重ね，1985年7月4日実施協議調査団宮島寛団長（当時九州大学農学部長）と「バ」国農業技術研究所（ＢＡＲＩ）所長との間で討議議事録（Ｒ／Ｄ）の署名をし，5ケ年間の技術協力を開始，また1986年10月8日計画打合せ調査団大村武団長（当時九州大学農学部長）とＢＡＲＩ所長との間で，暫定実施計画（ＴＳＩ）の署名を行なった。

以上の経緯を受け，これまでチームリーダー，業務調整をはじめとし，植物育種，植物病理，作物学，昆虫学の4分野の長期派遣専門家を中心として協力活動を実施してきた。

これをうけて，1988年1月2日から1月13日までの12日間の日程で，九州大学農学部長和田光史教授を団長とする巡回指導調査団を派遣した。同調査団は協力活動の進捗状況ならびに実績の確認をし，さらにプロジェクト実施にかかる問題点，今後の対応方針の検討，ならびに残された協力期間内における協力活動計画の策定等を目的とし，「バ」国関係者及び日本人専門家等と協議を行なった。

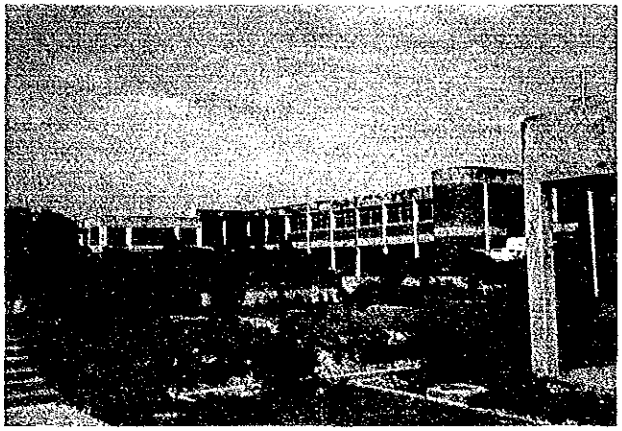
なお，本件協力の特徴として，一部分野（カリキュラム開発，農業普及等）の専門家がＵＳＡＩＤ（米国国際開発庁）から派遣され，日本のチームリーダーのもと，日，米，「バ」三国間の協力が行なわれていることがあげられるが今回の協議においても常時米側も参加したことは言うまでもない。今後とも，この新しい試みとなる本プロジェクトが三国の連帯と努力のもとに，なお一層，円滑かつ効果的に運営されることを期待するものである。

本報告書は，巡回指導調査団が，「バ」国及びＵＳＡＩＤ関係者との協議結果をまとめたものであり，今後の本件プロジェクトの実施にあたり，何等かの参考に資すれば幸いである。

最後に，本調査団派遣に際し，御協力いただいた「バ」側関係者はもとより，在バングラデシュ日本国大使館，外務省，文部省，九州及び佐賀大学の関係各位に対し，深甚なる謝意を表するものである。

昭和63年2月

国際協力事業団
農業開発協力部長
宮　本　和　美

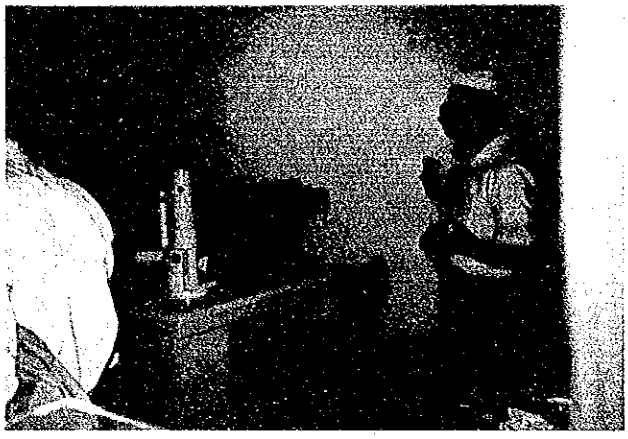


ＩＰＳＡ本館
（昭和57年無償協力による）

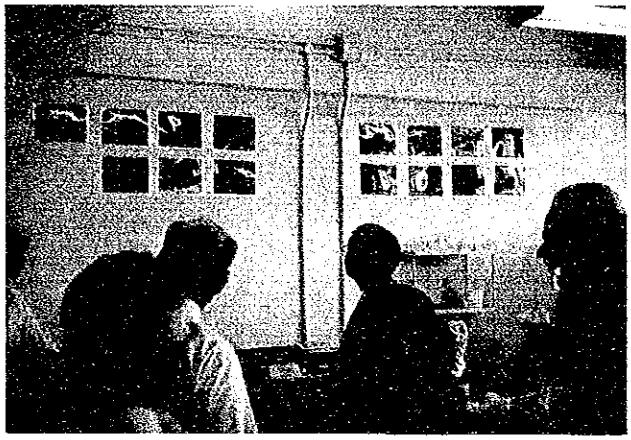
本館前圃場試験

圃場試験の説明を受ける

応急対策事業による
圃場内ガレージ

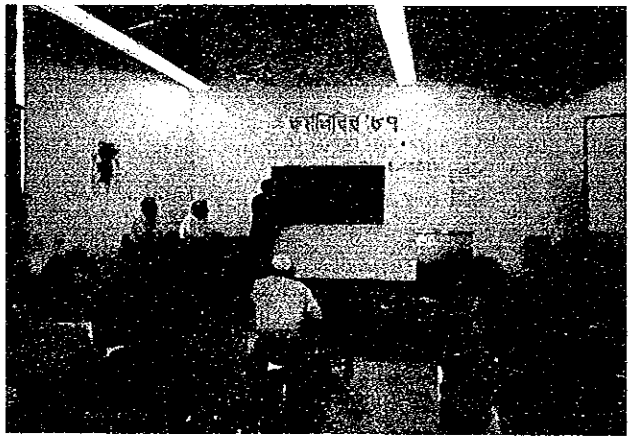


走査型電子顕微鏡



ＩＰＳＡ教官スタッフが撮影
したＥＭ写真

調整委員会
（ＢＡＲＣ会議室）



ＩＰＳＡ講堂にてセミナー実施

機関別等略語解リスト

本報告書内に使用している略語については「バ」国内にて，非常に頻繁に使用される言葉を記載したものであり，今後の参考となれば幸いである。

機　関　名；

MAF(MA)	Ministry of Agriculture (and Forests)（農業省）
MP	Ministry of Planning（計画省）
ME	Ministry of Education（教育省）
MED（E&R）	Ministry of Establishment (and Recruitment) Division（人事制定省）
BARC	Bangladesh Agricultural Research Council（「バ」農業技術研究審議会）
BARI	Bangladesh Agricultural Research Institute(「バ」農業技術研究所）
BRRI	Bangladesh Rice Research Institute（「バ」稲作技術研究所）
CERDI	Central Extension Resouces Development Institute(中央普及資源開発研究所）
BAU	Bangladesh Agricultural University（マイメンシン農科大学）
BAC(BAI)	Bangladesh Agricultural Institute（ダッカ農業カレッジ）
BCAS	Bangladesh College of Agricultural Sciences(農業科学カレッジ）……ＩＰＳＡ施設の前身
UGC	University Grants Commission（大学審議会－教育省）
USAID	United States Agency for International Develoment（米国国際開発庁）

その他参考機関名

BJRI	Bangladesh Jute Research Institute（「バ」黄麻技術研究所）
BTRI	Bangladesh Tea Research Institute（「バ」茶業研究所）
FRI	Forest Research Institute（「バ」林業研究所）
INA	Institute of Nuclear Agriculture（農業放射線研究所）
BADC	Bangladesh Agricultural Development Corporation（「バ」農業開発公社）
SCCA	Seed Certification Center of Agriculture（農業種子登録センター）

部局，委員会名等；

ERD	External Resources Division（対外援助局ー計画省）
PC	Planning Commission （計画委員会）
PEC	Project Evaluation Committee （プロジェクト評価委員会）
NTC	National Training Council （国家研修審議会）
NBR	National Board of Revenue （歳入局）－CDSTの申請,審査の担当局
ECNEC	Executive Committee of National Economic Council（経済懇談審議会）

シンジケート；（BAUの理事会）

Syndicate

職　　名；

DG	Director-General （BARI，BRRI，BJRI等所長の職名）
Sec.	Secretary （次官）
Add. Sec.	Additional Secretary （次官補）
Jot. Sec.	Joint Secretary （審議官）
Dep. Sec.	Deputy Secretary （参事官）
CSO	Chief Scientific Officer （部長研究員）
PSO	Principal Scientific Officer（主任研究員）
SSO	Senior Scientific Officer （上級研究員）
SO	Scientific Officer（研究員）
Prof.	Professor（教授）
Assoc. Prof.	Associate Professor （助教授）
Asstt. Prof.	Assistant Professor（助手）
Res. Assoc.	Research Associate（研究員）

手続関係書簡；

R／D	Record of Discussions（討議議事録）
TSI	Tentative Schedule of Implentation（暫定実施計画）
T／R	Terms of Reference（調査付託事項）
PPP	Preliminary Project Proforma（プロジェクト事前計画書）
PP	Project Proforma（プロジェクト計画書）
PP（TAPP）	Technical Assistance Project Proposal（技術協力計画要請書）
PP（GAPP）	Grant Assistance Project Proposal（無償資金協力計画要請書）
CDST	Custom Duties and Sales Tax（関税）

諸　単　位；

貨　　幣

1タカ（TK=Taka）=約5円（1US$=30.5TK）

1ラーク・タカ（Lakh Taka）=10万タカ

1クロール・タカ（Crore Taka）=100ラーク・タカ=1,000万タカ

度　量　衡

1フィート（ft）=0.305m，1ft2=0.093 m^2（1 m^2=10.75ft2）

1エーカー（acre）=4,047 m^2（1ha=2.47エーカー）

1ビガ（Bigha）=0.33エーカー

1セール（Seer）=933g

1モン（mound）=40セール=37.5 kg

バングラデシュ農業大学院計画巡回指導調査団報告書

目　　次

1. 巡回指導調査団の派遣について

1－1. 調査団派遣の経緯及び目的

バングラデシュ国は，農業技術全般の向上を図るため，農業高等教育の充実，改善を目的とし，バングラデシュ農業大学（ＢＣＡＳ）に対する協力要請を昭和 54 年 5 月申し越した。その後「バ」国側は計画途中に，移転計画を新設計画に変更し，これを受け日本国政府は無償資金協力により 58 年 3 月大学関連施設を建設したが，再度「バ」国側は，同大学を大学院教育（ＩＰＳＡ）のみとする計画に改め，本計画に対する技術協力を昭和 59 年 4 月に我が国に要請してきた。

この要請に基づき，昭和 59 年 10 月コンタクトミッション，同年 11 月事前調査，昭和 60 年 1 月同大学院付属農場にかかる実施設計調査を踏まえて，昭和 60 年 6 月実施協議調査団により協力内容，方法について協議した結果，研究活動の強化ならびに若手研究，技術者の訓練を実施することを目的に昭和 60 年 7 月 4 日Ｒ／Ｄに署名し，協力を開始した。

その後最終的に 5 名の専門家が昭和 61 年 8 月の時点で全員着任し，また基盤整備事業による圃場整備等についても昭和 61 年 7 月に完工し，本格的な協力が開始された。（別紙；本計画実施に至る経過（レビュー））

また，Ｒ／Ｄ署名後，1 年を経過した昭和 61 年 9 月本計画の具体的な実施計画をＲ／Ｄならびにそのマスタープランに基づき，さらには昭和 61 年 1 月派遣の短期専門家の「バ」国側との協議した協同研究課題設定等をもとに協力期間である 5 年間の協力計画について協議し，暫定実施計画（ＴＳＩ）の署名を行なった。

さらに，本計画については実施協議調査の際にも問題となっていたProject Proformaの承認が遅れていたが，昭和 62 年 8 月ＰＥＣ会議にて，基本的に承認され，これにより上記 P.P. の改訂をすすめているところである。

こうした状況下において，これまで協力予定のうち，植物育種，作物学，植物病理，昆虫学の 4 分野の実質的な協力活動が行なわれている。

ついては，現在の進捗状況，協力実績を把握したうえで，これまでの問題点を整理するとともに，今後の協力方針，計画について協議を行なう必要がある。以上のことから，本巡回指導調査団の派遣を行なった。

1－2. 調査団の構成

本件調査に参加した団員については以下のとおりである。

担当分野	氏名	派遣時現職
団長(総括)兼土壌学	和田光史	九州大学農学部長
園芸学	岩政正男	佐賀大学農学部長
植物病理	脇本哲	九州大学農学部教授
業務調整	浅野哲	国際協力事業団農業開発協力部農業技術協力課

1－3. 調査日程

調査日程の概要については，以下のとおりである。

月日(曜)	行程	協議内容概略(主な面談者)
1／2土	出発(東京－バンコク) 12：15 17：10；TG 641	移動
1／3日	移動(バンコク－ダッカ) 11：30 12：50；TG 321	移動
	ショナルガオンホテル 14：30	山田チームリーダー他，日本人専門家，Dr. Eisgruber(USAID) ㊙調査日程打合せ
	チームリーダー宅 17：00	山田リーダー，宮下調整員他 ㊙調査方針打合せ，プロジェクト活動状況等について事情聴取
1／4月	IPSA；プロジェクトサイト(ジョイデプール) 9：30	Mr. S.H. Khan(学長) ㊙表敬訪問，調査内容説明 学内実験室ならびに圃場視察及び実験内容等の聴取
1／5火	農業省；MA 9：00	Mr. A.M. Anisuzzaman(次官) ㊙表敬訪問，調査団目的説明及び調整委員会の設定について協議
	計画委員会；PC 11：00	Dr. S.H. Hasanuzzaman(メンバー)他 ㊙表敬訪問，調査目的説明
	USAIDダッカ事務所(米国国際開発庁) 12：30	Mrs. Priscilla Boughton(所長) Dr. Charles Hash(食糧農業部長)，他 調査目的及び現状について説明，今後の協力計画について意見交換

月日(曜)	行　　程	協議内容概略(主な面談者)
1／5 火	在「バ」日本大使館	田中大使
		㊙表敬訪問
	山田リーダー宅	日本人専門家チーム
	16：30	㊙現状，ならびに問題点等の意見交換
1／6 水	農業技術研究所(ＢＡＲＩ)	Dr. M.H. Mondal (所長)他
	9：00	㊙表敬訪問ならびに，現状，問題点について意見交換
	ＩＰＳＡ；教官控室	Dr. S.M. Amin (学長補佐)，Dr. A. Hamid (助教授)，Dr. M. Quadir，Dr. Tajul Islam，他
	10：30	㊙'87年研究実績及び'88年度計画について事情聴取
	山田リーダー宅	山田リーダー他日本人専門家との実施上の問題点，ならびに翌年度計画について意見交換
	15：00	
1／7 木	計画委員会(ＰＣ)	Dr. S.H. Hasanuzzaman (メンバー)，
	9：00	Dr. Altaf Ali (農業担当部長)，Dr. M. H. Mondal (ＢＡＲＩ所長)，Dr. Khan (ＩＰＳＡ学長)他
		㊙調整委員会事前議題調整，等
	農業技術研究審議会	Dr. M.M. Ralman (議長，前ＢＡＲＩ所長)
	(ＢＡＲＣ)	㊙表敬訪問，協議経過説明及びＩＰＳＡ，他の農業教育施設の将来計画について意見交換
	11：30	
1／8 金	在「バ」日本大使公邸	㊙大使主催新年会
(休日)	ショナルガオンホテル	㊙日本人専門家との打合せ
1／9 土	農業技術研究審議会	Mr. A.M. Anisuzzaman (次官)他
	9：00	㊙調整委員会開催
	山田リーダー宅	㊙日本人専門家との打合せ，リーダーの延長，後任問題について打合せ
1/10 日	ＩＰＳＡ講堂	㊙セミナー開催
	10：00	
	ＩＰＳＡ教官控室	Dr. S.M. Amin (学長補佐)，他教官
	13：00	㊙部別研究計画について最終意見交換，供与機材要望調査等

月日(曜)	行　　程	協議内容概略(主な面談者)
1/11 月	ＪＩＣＡ事務所 10：00 ショナルガオンホテル 12：30 19：00	松沢所長 ㊙帰国報告 ㊙団長レター作成 ㊙フェアウェルパーティー
1/12 火	移動(ダッカーバンコク) 14：00 17：10；TG 322	移動
1/13 水	帰国(バンコクー東京) ー福岡) 10：30 18：20；TG 740 他	帰国

1－4. 主要面談者

バングラデシュにおける主要面会者は以下のとおりである。

◎ Ministry of Agriculture (農業省)

Dr. A.M. Anisus Zahman — Secretary, Agriculture and Forest Div.,

Mr. Md. Azizul Hoque — Additional Secretary Agriculture and Forest Div.,

Mr. A. Waheed Khan — Agricultural Economist,

○ Bangladesh Agricultural Research Council (同省農業技術研究審議会)

Dr. M.M. Rahman — Chairman, BARC

○ Bangladesh Agricultural Research Institute (同省農業技術研究所)

Dr. M.H. Mondal — Director General, BARI

Dr. S.A. Khan — Director, IPSA

(IPSAにおけるその他ティーチングスタッフについては別表参照)

◎ Planning Commision, Ministry of Planning (計画委員会)

Dr. S.H. Hasanuzzaman — Member, (Agriculture),

Dr. A.H.M. Altaf Ali — Division Chief, (農業担当)

◎ USAID Mission to Bangladesh (米国国際開発庁ダッカ事務所)

Mrs. Priscilla Boughton — Mission Director

Mr. Howard R. Kramer	Deputy Mission Directer
Dr. Charles Hash	Director, Food and Agriculture,
Mr. Alan Hurdus,	Deputy Director, Food and Agriculture

◎ 在「バ」日本大使館

田 中 大 使

岡田二等書記官

◎ ＪＩＣＡバングラデシュ事務所

松 沢 憲 夫	事務所長
山 口 孝 一	事務所次長
江 川 敬 三	事務所員

2. 調査，協議内容（要約）

2－1. プロジェクト・プロフォルマ（Project Proforma）の承認について（経過）

本計画の経緯については，前章１－１にて述べたとおりであるが，この計画が「バ」国内において，農業カレッジ計画（ＢＣＡＳ）から現在の農業大学院計画（ＩＰＳＡ）への変更について農業省内で承認を得た（1983年10月）あと，国家計画策定にかかる最高決議機関であるところの戒厳令委員会にて計画変更の承認を得（1983年12月），その後対外援助局（ＥＲＤ；当時大蔵省下）を通じ，本計画にかかる技術協力の要請が出された（1984年4月）。

しかし，上記承認経過の中で「バ」国内の開発プロジェクトの１つとしての承認手続きとして，Project Proforma（プロジェクト計画書）に関して，計画委員会が開催するProject Evaluation Committee（ＰＥＣ）会議の承認が必要にもかかわらず，R／D署名当初この承認がなされていないまま，本計画が開始することとなった。

その後，P.P.の承認について，再々ＰＥＣ会議開催の方向で努力されたが，農業省，あるいは計画委員会等関係者の出席が，その場になって緊急要件により，流会となることが多かった。

こうした状況下において，1986年8月21日第１回ＰＥＣ会議が開催された。本件協議内容は次のとおりであった。

1. ＩＰＳＡは，現在農業省ＢＡＲＩの１部局として位置付けられているが，修士及び博士課程を実施する高水準の大学院大学となるべきである。（自立機関として）ついては，講師はリクルートされるべきではない。またリクルートにかかる基準，手続についてはＢＡＵ（マイメンシン農科大学）のそれに従うこととする。
2. 入学基準については，数年間以上（少なくとも２ケ月以上）の研究経験を有した学部卒業を含まなければならない。
3. ＩＰＳＡは本会議をもって６名の教授及び14名の助教授を採用してよい。
4. ＩＰＳＡは，それ自身の機能，活動方針を指導しうるような関係各省代表者ならびに農業科学分野の経験ある者等から構成されるBoard of Govenors及びAcademic Councilを有することができる。
5. 上記のとおり本学（ＩＰＳＡ）を高等教育機関となるべく，大学審議会委員長であるProf. Md. Abdul Bari氏の意見を仰ぐことを要請する。
6. 上記№5の意見を踏まえて再度ＰＥＣ会議を行うこととするが，本計画については基本的に受け入れることとする。

またその後1987年7月30日に第２回ＰＥＣ会議が開催され，P.P.は条件付きで承認された。

付帯条件は下記のとおり

a　入学者に関しては，現時点における教官スタッフの能力（人数 20 名，教授はいない）からして，多くの入学許可をすべきでなく，In-Service 学生の入学のみとする。また教官スタッフの充実，施設の整備によって一般学生を認めてもよい。しかしながらここ 2～3 年間は，In-Service 学生に限定すること。

（これに関連して，農業省関係の公務員で，ＩＰＳＡの教育可能な分野における修士取得のための海外留学は差し止め，出来る限り，ＩＰＳＡで取得する様，制度改正をするべく，農業省に対し，指示したとのこと）

b　予算については，P.P. 上総額 26 クロール・タカであり，「バ」側負担は 12 クロール・タカとなっているが，ＣＤＳＴを除いて支出可能な額は 2～3 クロール・タカである。（このことは現在未整備である施設等の建設費用等は含まれておらず，海外の協力に期待することを意味していると思われる）

c　ＩＰＳＡの組織的位置付けについては，ＢＡＲＩの傘下にありかつ，Academic には，ＢＡＵのアフィリエーションを受けている。

しかしながら，現状とは違い高等教育機関として，自治機関となるべきと Prof M.A. Bari（UGC委員長）が勧告しており，今後協議することとし，さらに ECNEC における会議までに基本的に合意方針を出すこと。

ということを条件として，承認され，これにもとづいて P.P. を改訂することとなった。

これを受けて，今回の調査となったわけであるが，P.P. 改訂については，農業省内にて手続中であり，ＥＣＮＥＣ会議に未提出であった。よって改訂内容にかかる事項等も今回の調査目的にあわせ，1月9日開催の調整委員会（Cordination Committee）にて協議を行った。

付議事項は次のとおり

1. 自立について
2. 教官スタッフ（Ｃ／Ｐ）リクルートについて
3. 学生の入学基準について
4. 供与機材について
5. 施設建設要請について
6. 圃場整備について
7. '88 年度事業計画について

以上協議内容，結果については次節以降に述べることとする。

2－2. 調整委員会協議内容

2－2－1　ＩＰＳＡの自立について

ＩＰＳＡに対する技術協力計画立案の当初から，数次にわたる調査団によって，本計画目的の達成には，ＩＰＳＡの研究教育機関としての自立が基本的要件の一つであることが指摘

されてきた。バングラデシュ側の事情によってその承認が遅れていた本計画のProforma（PP）が昭和62年プロジェクト評価委員会（ＰＥＣ）会議で承認されたとき，この問題については，ＰＰ承認の条件として，ＩＰＳＡは行政上は農業省（ＭＡ），「バ」農業技術研究所（ＢＡＲＩ）に付属し，教育面では教育省（ＭＥ）の所管下にあるバングラデシュ農科大学（ＢＡＵ）のAffiliation を受けているが，将来自立した組織としての位置を得ることが望ましいとされている。しかし，その後もこの自立を具体的に促進する方策が審議されないままに経過して，昭和62年末には，次項に述べるように，ＢＡＲＩに付属しているためにＩＰＳＡ教官の採用が困難となる事態が生じた。

巡回指導調査団は1月5日（火）ＭＡにA.M. Anisuzzaman 次官を表敬訪問したときに，一つの問題点としてこれを採り上げ，これが基本的にはＩＰＳＡの自立と関連していることを指摘した。同次官はＩＰＳＡ教官の採用がＢＡＵの教官採用方式に従って直ちに行われるように，ＢＡＲＩに命令を発することを考えるとともに，この席上でその開催が合意された本計画に関する調整委員会で，ＩＰＳＡの自立についての問題点，方策などを討議することを約束した。

1月9日（土）「バ」農業技術研究審議会（ＢＡＲＣ）会議室で開催された調整委員会では，ＭＡのAnisuzzaman 次官司会で，ＩＰＳＡが提出したWotlsing PaperをＩＰＳＡのS.H. Khan 学長が説明して，ＩＰＳＡの自立が最初の議題として採り上げられた。討議の要約と結論を述べれば次の通りである。

1. ＩＰＳＡの自立が必要なことは，一般論としての合意が得られたが，これを達成するにはいくつかの段階を経る必要がある。
2. 第一段階としてはＩＰＳＡをＢＡＲＩから切り離し，ＭＡ所属とする。これにはＰＰの改訂が必要であり，また実施にはＭＡから行政命令を発する。
3. 「バ」国の農業教育の全般を考えた上で，ＩＰＳＡの自立を達成するために必要かつ考えなければならない事項を明確にするために，委員会を設置するかあるいはコンサルタントを雇用する。
4. 法会によるＩＰＳＡの自立が達成されるまで，ＩＰＳＡの運営を円滑に行なう目的で管理委員会を設けることを考える。

このようにＩＰＳＡの自立に関して，本計画に関係する「バ」国のＭＡ，計画委員会（（ＰＣ），ＢＡＲＣ，ＢＡＲＩ，ＩＰＳＡ及びＩＰＳＡプロジェクトチーム，ＵＳＡＩＤの代表者が出席した調整委員会で，前記のＰＥＣ会議の条件を具体化する決定及び提案がなされたことは，Ｒ／Ｄ並びに暫定実施計画（ＴＳＩ）署名後の本計画の実施によって，IPSAが「バ」国最高の農業教育研究機関の一つとして，着実に成長し，成果を挙げ始めていることが認識された結果であり，ＩＰＳＡ自立への第一歩として高く評価される。しかし，上記第2項のＰＰの改訂，ＭＡからの行政命令の発令，これがＢＡＲＩ研究者とＩＰＳＡ教官の

協力関係に及ぼす影響，第3項の委員会の設置あるいはコンサルタントの雇用，第4項の管理委員会の設置については，ひき続き注意する必要がある。

2－2－2. ＩＰＳＡ教官の採用

ＩＰＳＡ教官の採用は，前にも述べたように，ＩＰＳＡの自立と関係して現在問題になっている事柄の一つである。すでに，ＰＣはＩＰＳＡに8名の教採を置くことを認め，そのうち6名についてはすぐにでも採用できることになっている。また，全教官についてみれば37名の定員に対して，現在17名が欠員となっている。ＰＣは，これまで，これらの教官を大学教官の採用基準，方式に則って採用，補充することを，ＩＰＳＡ学長に指令してきたが，ＩＰＳＡが行政的にＢＡＲＩに所属しているために，ＢＡＲＩ研究者の反対によって，この方式でのＩＰＳＡ教官の採用は実施できない状況であった。しかし，前記の1月9日（土）調整委員会でのＩＰＳＡを行政上ＢＡＲＩから分離するという決定は，大学教官の採用基準，方式に則るＩＰＳＡ教官採用を可能にするものである。さらに，同委員会では，ＢＡＵの教官採用規則に従って，ＩＰＳＡ教官の採用が直ちに開始されることが確認された。

2－2－3. 学生の入学許可

ＩＰＳＡは「バ」国とその農業を振興するために，農学専門家として活躍できる人材を養成することを大きな目的の一つとして設立された大学院であり，入学を許可する学生の資質と数は，この目的達成のために，慎重な考慮を要する事項として，これまで度々論議された，昭和62年8月ＰＥＣ会議では，ＰＰ承認の条件の一つとして，入学を許可される者は，ＩＰＳＡ教官，施設が充分に整うまでは，In-Service，すなわち既に就業している者に限ることを指示した。一方，この指示によって，次年度以降の学生の入学が困難になることを想定したＩＰＳＡ教官は，昭和62年夏に160名の学生に入学を許可し，この中には授業に熱心でない学生も含まれて現在問題となっている。巡回指導調査団は，1月5日（火），PCにS.H. Hasanuzzamanメンバーを訪問したとき，また1月7日（木），ＢＡＲＣにM.M. Rahman議長を訪問したときに，この問題をとり上げ，意見を交換した。1月9日（土）の調整委員会に提出されたWorlsing Paperには，毎年の大学院入学者数を60名を限度とすること，1990年からは博士課程入学者10名をこのうちに含めることがＩＰＳＡから提案され，この提案が同委員会で採択されるとともに，入学者の選抜方式に関しては2－2－1で述べたＩＰＳＡの管理委員会に委ねられることとなった。なお調整委員会では，ＩＰＳＡでは学部学生の入学は許可しないこと，大学院学生の授業，学位論文作成の研究指導には，ＩＰＳＡ教官以外の研究者が当り得ることが確認された。

2－2－4. 施設建設計画について

現在ＩＰＳＡで使用している建物，施設は，日本国政府がバングラデシュ農業カレッジ（ＢＣＡＳ）に対する協力要請を受け，無償資金協力により大学関連施設として昭和 58 年 3 月に建設したもので，ＩＰＳＡが意図している大学院レベルでの教育，高度の研究活動を行なうには，情報管理センターの機能を併せもつ図書館，圃場事務・実験室，作物貯蔵庫，乾燥室，温室，網室などの建物，施設が必要であり，またＩＰＳＡがダッカからかなりの距離にあることから，ＩＰＳＡで教育，研究活動に従事する教官，その他の人々のための宿泊及び付帯施設の建設は，本計画が実施に移された時点から，「バ」国側のＩＰＳＡ関係者はもち論，協力しているＩＰＳＡプロジェクトチーム，米国国際開発庁（ＵＳＡＩＤ）からも，その必要性が認められ，早期の着工が要望されていた。しかし，ＩＰＳＡ計画のＰＰの「バ」政府による承認が遅れていたために，建物，施設に対する無償資金協力はこれまで要請されていなかった。

巡回指導調査団は 1 月 5 日（火）ＭＡにA.M. Anisuzzaman 次官を訪問したときに，この問題についても言及し，上記の要請が，昭和 63 年度に，日本政府によって採り上げられるためには，「バ」国側での要請に必要な公式手続が早急に完了する必要があることを述べた。同次官は，とくに宿泊施設の重要性に関して，これが建設されなければＩＰＳＡはＣＥＲＤＩと同じ困難に遭遇する可能性のあることを強調し，「バ」国側での要請の必要な公式手続きが完了すべきことを確認した。ＩＰＳＡに必要な建物，施設についての日本政府に対する無償協力要請は，1 月 9 日（土）の調整委員会でも採択され，ＭＡはとくにＰＣにこの要請を行なうために必要なＰＰＰを認可するように要請し，ＰＣはこれに同意した。また，巡回指導調査団には，本件について「バ」国側から強い要望があったことを日本政府に報告することが要請された。前述のように，ＩＰＳＡの建物，施設の拡充は，ＩＰＳＡの意図している教育，研究活動の発展には不可欠であり，「バ」国側から正式要請がなされたときには，その速かな受入れを要望する。

2－3. 1988 年度技術協力事業計画について

2－3－1. 専門家派遣計画

現在，山田芳雄リーダー，宮下信夫調整員の他，松永亮一（作物），津野和宣（病理），および，緒方一夫（昆虫）の各専門家が長期派遣されている。しかし，同リーダーは 1988 年 8 月に，また宮下調整員は同年 9 月に任期満了の予定である。本調査団は，同リーダーに対する内外からの信頼と今までの業績に対する高い評価に基づき，任期の延長を強く要請した結果，1 年間の延長（1989 年 8 月まで）がほぼ了承された。同リーダーは宮下調整員の任期延長を強く要望している模様であり，十分に考慮されることが望まれる。

緒方専門家は 1 年の任期を終え，1988 年 3 月に帰国の予定であるが，その後任として大

野和朗（昆虫）専門家が1989年3月迄の予定で派遣される。昆虫専門家は，Dr．Z．Alamをカウンターパートとし巾広い研究活動を行っている。

また，土壌学の専門家，園芸学の専門家については，それぞれ2～3名，2～3か月ずつの短期派遣によって継ぐ計画である。

その他，作物学，育種学，植物病理学各1名ずつ，電顕専門家1名の派遣が要望されている。

全体的に長期派遣の専門家が少いのが問題であるが，特に大きな支障はないものと考えられる。

2－3－2. 研修員の受入れ

Dr．A．Bhowmik（育種）およびDr．A.R．Chowdhury（園芸）が11か月間研修の予定で1988年1月から九大に来学している。前者は農学部育種学教室で，また後者は同園芸学教室でそれぞれの専門分野について習得する計画である。

またDr．A．Hamidを1988年度に，農学部栽培講座に11か月間研修生として受入れ，光合成その他の課題について研修の計画である。

Dr．S.H．Khanは近く予想される組織改変に伴う業務のため1988年度内の研修は困難の模様である。

Dr．M.H．Mondal（D.G．ＢＡＲＩ）は組織改良に伴い研修の必要性が無くなる可能性がある。

Dr．Ismail Hossein（病理）はＩＰＳＡに設置された2台の電顕の維持・管理のため，1988年度内の研修は困難と思われる。

Mr．M．Ali（育種）と，Mr．A．Mannan（病理）は文部省国費留学生に採用され，現在，研究生として農学部に在学している。1988年3月入試ののち，4月1日から大学院農学研究科農学専攻博士後期課程に入学し，3年間滞在の予定である。前者はナスの交雑育種を行う予定であり，後者はバングラデシュに分布する重要な植物ウイルスについて研究する予定である。

2－3－3. 機　材　供　与

派遣専門家の努力によって供与機材の引取りは比較的順調に行われるようになっている模様である。昭和61年度供与はすべてＩＰＳＡに到着しており，順調に作動している。ただ1件問題になっているのは温室の設計ミスである。温室の建築材料は輸送中に一部が破損したため縮小して建築されている。にもかかわらず空調のためのコンプレッサーが能力不足で，期待通りの温度が得られない。この状態では全く使用できないので，至急に改修することが必要である。

現在，1988年度供与分について，各Departmentから研究用必要機材をリストアップし，調整中である。

3. 実施運営上の問題点

3－1. プロジェクトの進捗状況

本調査団は1月4日，6日，10日にＩＰＳＡ学長，同補佐，教官と会合を持ち，また，実験室，図書室，圃場及び付帯施設などの視察を通じ，研究内容，進捗状況及び今後の研究計画について聴取，討議を行なった。また技協事業による供与機材，施設等の利用状況についても調査を行なった。前計画打合せ調査団として訪問以来の1年有余の間に「バ」国の厳しい状況下で，ＩＰＳＡ教官と，同専門家チームとの努力と協調によって，着実に研究実績が挙がっていることを認めた。つまり応急対策事業による講義室から実験室への改造の完了，昭和60，61年度供与機材の据付もほとんど終了し，その利用に必要な知識技術の移転も順調に行なわれ，これに呼応して，後述のとおり各専門分野における研究活動も活発に行なわれている。

次に各分野別に行なった研究実績及び今後の研究計画の課題について列記する。この際，6分野（Crop Botanyも含めると7分野）各々，聴取，意見交換を行なうため，団員は以下のとおり夫々の専門分野により分担し，とりまとめたものである。

和　田　団　長（総括兼土壌）－農学（Agronomy），土壌学（Soil Science）
岩　政　団　員（園　芸　学）－園芸（Horticulture），
　　植物育種（Genetics & Plant Breeding）
脇　本　団　員（植物病理）－植物病理（Plant Pathology）
　　昆虫学（Entomology）

〔農学（Agronomy）〕

'87，'88年度に実施あるいは計画されている主な研究題目を列記する。

1. トウモロコシ，カラシナの生育，収量に対する栽培密度の影響
2. アブラナの新品種の生育と収量
3. 小麦の生育，収量に対する品種と採種期日の影響
4. カラシナ，トウモロコシの収量に対するつぼみ除去の効果
5. マングビーンの花数，鞘数に対する窒素施用の効果
6. マングビーンの発芽，カラシナの根成長に対する土　水分の影響
7. ササゲの発芽に対する耕うんとマルチの効果

〔土　学（Soil Science）〕

1. 大豆の生育，収量に対するリン，あるいは窒素の施用と根粒菌接種の効果
2. エンドウに対する異なる培地に培養した根粒菌接種の効果
3. 乾季の稲あるいはその他の作物の生育，収量に及ぼす耕盤の影響とその破砕効果
4. ＩＰＳＡ圃場土壌の科学性，微生物相に対する有機物連用の効果
5. アブラナ，小麦，ジャガイモ，ダイコン，カブラ，ニンジンの生育，収量に対する土壌水

分の影響と管理

6. 小麦の生育，収量に対する土壌水分管理と窒素の施用効果

7. バングラデシュ土壌の粘土鉱物の同定

〔園芸学 (Horticulture)，植物育種 (Genetics & Plant Breeding)〕

この分野は同一課題について協同研究を行なっている場合が多く，主な研究課題は次のとおりである。

1. タマネギの雄性（花粉）不稔について

2. タマネギの授粉について

3. タマネギの母球選抜の収量に及ぼす影響

4. 小麦の雑種強勢

5. 小麦の出穂期と粒重の遺伝的分析

6. トマトの開花期の遺伝分析

7. トマトの雑種強勢

8. トマトのＦ２における選抜

9. カントリービーンの品種改良

10. ナスの品種改良

11. 集団選抜によるカリフラワーの改良

12. タマネギの種子貯蔵について

13. タマネギの球の大きさと種子生産について

14. トマトの収量に及ぼす落葉の影響

15. 挿し木に対する植物ホルモンの影響

16. レディスフィンガー (Lady's Finger) 3品種の収量について

〔植物病理 (Plant Pathology)〕

現在までの研究成果と現在計画あるいは進行している研究課題について列記する。

(1) 研 究 成 果 (1986 ～ 1987)

1. ヒアシンスビーン育成系統と品種Kartica との耐病性比較

2. ジャガイモ根こぶ線虫病防除のための綿実油粕による土壌改良の効果

3. ジャガイモ根こぶ線虫病防除のためのなたね油粕による土壌改良の効果

4. ジャガイモ根こぶ線虫病防除Furadam 3 G と尿素追肥の効果

5. 根こぶ線虫Meloidogyne spp. の宿主範囲

6. バングラデシュのキンマ（コショウ）葉に寄生する線虫

7. 寄生トマト菌に寄生する根こぶ線虫に対するアジ化ソーダの防除効果

(2) 研 究 中 課 題 (1987 ～ 1988)

1. ナタネ黒斑病の発生に及ぼす灌漑と施肥の影響

2. ナタネ根こぶ線虫発生に及ぼす灌漑の影響

3. ジャガイモの収量に与える根こぶ線虫の影響

4. 小麦の土壌伝染性及び種子伝染性病害に対する種子消毒剤の効果

5. 電子顕微鏡による形態観察と判別植物に対する接種による根こぶ線虫の同定

6. ワタ角斑病菌の同定

7. 小麦及びサトウキビに葉焼症状を起因する病原菌の同定

8. サトウキビ寄生性線虫の調査

(3) 将来の研究計画（1988～）

1. 重要作物に発生するウィルス病の同定（形態観察，宿主範囲及び抗血清の利用による）

2. ワタ角斑病菌のレース同定

3. トマト根こぶ線虫，サトウキビ葉焼病，ワタ角斑病，トマト・ナス青枯病，及び小麦斑点病の感染と流行課程に関する研究

4. 植物感染性線虫の微細構造に関する研究

5. 抗血清利用による植物ウィルスの同定

6. 1987～1988年計画の継続

〔昆虫学（Entomology）〕

(1) 研究成果及び研究中の課題

1. タマネギ，ナタネ，及びヒマワリの種子生産に及ぼすミツバチによる花粉媒介の役割

a ナタネ品種ＮＡＰ－２とＴＳ－72の種子生産に及ぼすミツバチによる花粉媒介の役割

b タマネギ品種におけるミツバチその他の生物による花粉媒介の機作と役割

c ヒマワリの種子生産における各種授粉法の比較

d アブラムシ防除のための薬剤散布がナタネ収量に関係するミツバチ花粉媒介行動に対する影響

2. ナタネアブラムシ防除用Dimethoidの散布間隔と防除効果

3. バングラデシュにおける昆虫標本の収集

a 一般昆虫の収集：昆虫の形態研究と分類研究のための教育材料として必要

b 特殊昆虫の収集：イネ，ジュート，野菜類など重要作物に分布する捕食性または寄生性昆虫及び花粉媒介性昆虫の収集

(2) 将来の研究計画

1. 宿主植物の抵抗性とその効果研究のための近代的昆虫飼育法

2. 主要害虫に対する宿主植物の抵抗性

3. 害虫の経済的加害水準と要防除限界

4. ミツバチとBlow Flyによる野菜及び油料作物の花粉媒介

5. 農業生態環境における昆虫社会構造の分析

6. 害虫の生活環と捕食性及び寄生性

7. 昆虫の収集，標本作成及び保存

8. 電子顕微鏡による昆虫の形態的観察

以上列記した研究のうち，一部1987年次に結果を得たものについては，バングラデシュにおける研究論文発表の機会を得，1987年6月に提出された発表要旨について，別添参考資料として，記載している。

なお，以上の研究のうち初歩的な課題が多いが，教官スタッフのみならず，現地研究者の知識水準は高く，特にＩＰＳＡの施設，機材等が整備されてきたこともあってか，研究に対する意欲を感じさせるものがあった。こうしたなかで，「バ」国内の農業生産の問題点を適格に捕らえ，重要課題については，学問的にも深く掘り下げるような研究の展開を見せてくれることを期待している。ついては，こうした基本的研究方法及び着眼点を十分考慮した研究を展開すべく，一部ＩＰＳＡ教官に示唆するとともに，日本人専門家チームにメモとして残した。また，日本におけるＣ／Ｐ研修を通じ，日本における研究の本質的考え方の相違点，また長所を学び取れる様，受入れの際，留意するとともに，Ｃ／Ｐ自身が吸収し，「バ」国に帰国後うまくそうした展開が出来るよう期待する。

つぎに，供与機材の利用状況についてであるが，昭和60，61年度供与分は既に通関手続きを終了し，ＩＰＳＡ各研究室に配置され，利用されている。特に透過型及び走査型電子顕微鏡については，早期な引取り，設置，また慎重な運転を必要とし，当初から十分利用可能か懸念されていたが，十二分に慎重かつ適切な設置，操作指導にかかる専門家派遣に努めてきた。また，津野（植物病理）専門家の努力により，ＩＰＳＡ教官Ｃ／Ｐに一応の操作技術を修得させることが出来，当初の目的である病原微生物の形態観察及び同定に威力を発揮している。その他，研究機材についても，据付を終了し，各長期専門家による操作技術の教育の結果，十分に利用されている。今後，各機材の当初必要としていた学部のみならず，必要に応じ，全学的に操作技術を修得し，より一層の研究への利用が，必要であり，またＩＰＳＡ教官自身も，他学部の機材の利用希望もあり，出来る限り，うまく活用されるよう，今後留意していく必要がある。

しかしながら，グリーンハウスのみ，当初の設定仕様に足りず，温度制御が不充分なため，現在使用されていない。今回，長期専門家と今後の調整，修理等について協議した結果，昭和63年度内に調整専門家を予定することとした。

3－2. 実施上の問題点および今後とるべき対策

ＩＰＳＡがＢＡＲＩから独立し，農業省（ＭＡ）に直属することになったが，これが計画通り平穏に実現するとしても，その際にはプロジェクト実施上，種々の問題が起ることが予想さ

れる。現時点で，早急に実施されるべき課題としては下記の諸項目が挙げられる。

① ＩＰＳＡ運営委員会の設置

② ＩＰＳＡ内管理・事務組織の拡充

③ 教官およびその他要員の早期補充

④ 教官用宿舎の建設

⑤ 独立運営のために十分な予算の計上

⑥ そ　の　他

これらの諸課題は，まず設置される予定の運営委員会（ＭＣ：Management Committee）で十分に検討することが望まれる。ＭＣの構成についてはＩＰＳＡ代表の他，ＢＡＲＣ，Planning Committee，Dhaka Univ．ＢＡＵ，ＭＡ所属各研究機関（ＢＡＲＩ，ＢＲＲＩなど）の代表が加わることが望まれるが，ＩＰＳＡ代表は常にＩＰＳＡのAutonomousについて配慮する必要があろう。またこのＭＣには，本プロジェクト推進上，団長およびＵＳＡＩＤからの１名も委員として参加することが望まれる。

ＭＣは，ＩＰＳＡ運営に関する重要問題，即ち，組織，予算，建築，教官数，学生数，ＪＩＣＡとの関係などを審議し，少くとも年２回の開催によって，円滑な運営を計らなければならない。

ＩＰＳＡが今後ＭＡの１機関として独立し，円滑に運営されるためには，Directorのもとに，適切な規模の管理組織（Administration Office）を置く必要がある。この組織は，各Departmentからの要求の検討，経理などを通してPresidentを補佐し，ＩＰＳＡの運営が円滑に行われるよう最大の努力を払わなければならない。

現在，ＩＰＳＡの教官定員の内教授６名，助教授３名が欠員のままで放置されている。ＩＰＳＡは早急に，広い範囲から，自由の立場で，最も適当な人材を選び，補充しなければならない。また，優れた若い研究者を育成するためには，助手の職種が必要であり，少くとも，各Departmentに１名ずつの助手を置くべきである。先ず，教授の選考をＭＣの責任において客観的立場から公平に行ない，助教授，助手の選考はDirectorを長とし，教授をもって構成される選考委員会によって行われることが望まれる。

現在，ＩＰＳＡの教官はＢＡＲＩの官舎に居住している。ＩＰＳＡが独立すれば早速，多数の教官宿舎が必要になる。この教官用宿舎の建築要請に対応する案を考えておくことが望まれる。また図書館の建設も強く要望されている。

今後，ＢＡＲＩから独立するＩＰＳＡを円滑に運営するためには，十分な予算が計上されなければならない。これはバングラデシュ側の責任であるが，理想的な姿を期待することはできないであろう。大型供与機材の維持・運転費は何らかの形で援助することが望まれる。特に透過型および走査型電子顕微鏡を中心とする大型現代学機器の維持費を今後どのように計上するかは大きな課題となろう。これは本プロジェクトの延長問題とも関係する課題であり，今後慎重に検討を進める必要があろう。

4. 所　　感

「アジアにおける極貧の国」がバングラデシュに対する日本人からみた通念であるといってよい。そして，まさにその通りなのである。空港で，今も，金をねだるのは，アジアではこの国だけではあるまいか。

ダッカからＩＰＳＡまでの道で異様に思えたのは緑が少ないことである。乾期ではあったが，草が生えないほど水がないとは思えない。牛や羊が草を食んでいる草原にも申訳け程度の草しか生えていないのである。ＩＰＳＡの圃場にも除草剤をまいたように草がない。温度は十分にあるはずなのに草がないのは不思議であった。草も生えないほど土壌がやせているのであろうか。圃場や家の庭はもちろん，空地でも道端でも，草が生えて困る日本からみれば，草が生えない景色が異様に思えたのである。雨期に水がたまり過ぎるために草が生えなくなるのだろうか。草も生えないような自然環境下で，農業の興隆をはかるのは至難のわざのように思われる。

ＩＰＳＡは開設後わずか２年半であるが，各学科の研究者は教授層を除いてほぼ充実し，実験用の資材も整備された。圃場も，厳しい環境下にありながら，整備が進み，いくつかの作物が栽培されて地上を占有している。試験研究も開始されていて，注目をひく成果をあげている部門もみられている。農業の研究は長期間を必要とするし，比較的悠長な当国の研究者の取り組みに思いを致すと，本プロジェクトの効果的な進捗ぶりには，目をみはるものがある。これはチームリーダーをはじめ，各専門家やＪＩＣＡの関係職員やＵＳＡＩＤの職員の献身的な努力の賜物とみなされ，心からの敬意を表すものである。

雨期にどのような状態になるのか想像がつかないので適確なことは言えないが，この国の農業も水を制することから始まるのではあるまいか。ＩＰＳＡのDirector である Dr. Kahn がＩＰＳＡの敷地をとりまくクリークを作ることを提案していたが，ひとつの面白い着想であると思う。かつて木曽川の下流は堤で守られた輪中に人が住み農業が営まれていたが，これに似た発想と思えるからである。ヒマラヤやアッサムに降った雨水を受けとめなければならないこの国ではダムによる治水はえられない。木曽川の下流で発達した輪中の巨大化した方式が最も適した方法と思えるのである。

研究者との討論に際し，農夫さんの人数が話題になった。10 数名いるけれども，この人数ではとても足りないというのである。日本の大学の附属農場や試験場の農夫さんの数からみれば，ぜいたくに思える数である。それぞれの学科に学生がいるはずで，学生はどうしているのかと聞くと，学生は，研究実験に際し，圃場の外から，農夫さんに指図しているのだという。学生が実験に使う畑は自分で耕させ，種子は自分で播かせ草は自分でとらせればいいではないかというとそんなことをさせると，学生はストライキをするだろうという答であった。学生が自らの手で畑を耕し，種子をまき，草をとることが教育だというと，それはそうだけれども，この国では通用しないというのである。日本では考えられないことがまかり通っている国なのである。この研究者達も学生のときには自分で耕したり草をとったりしたことはなかったであろうし，今でもしてい

ないに違いない。研究者達に本当の教育の姿を知らせる努力が大切である。

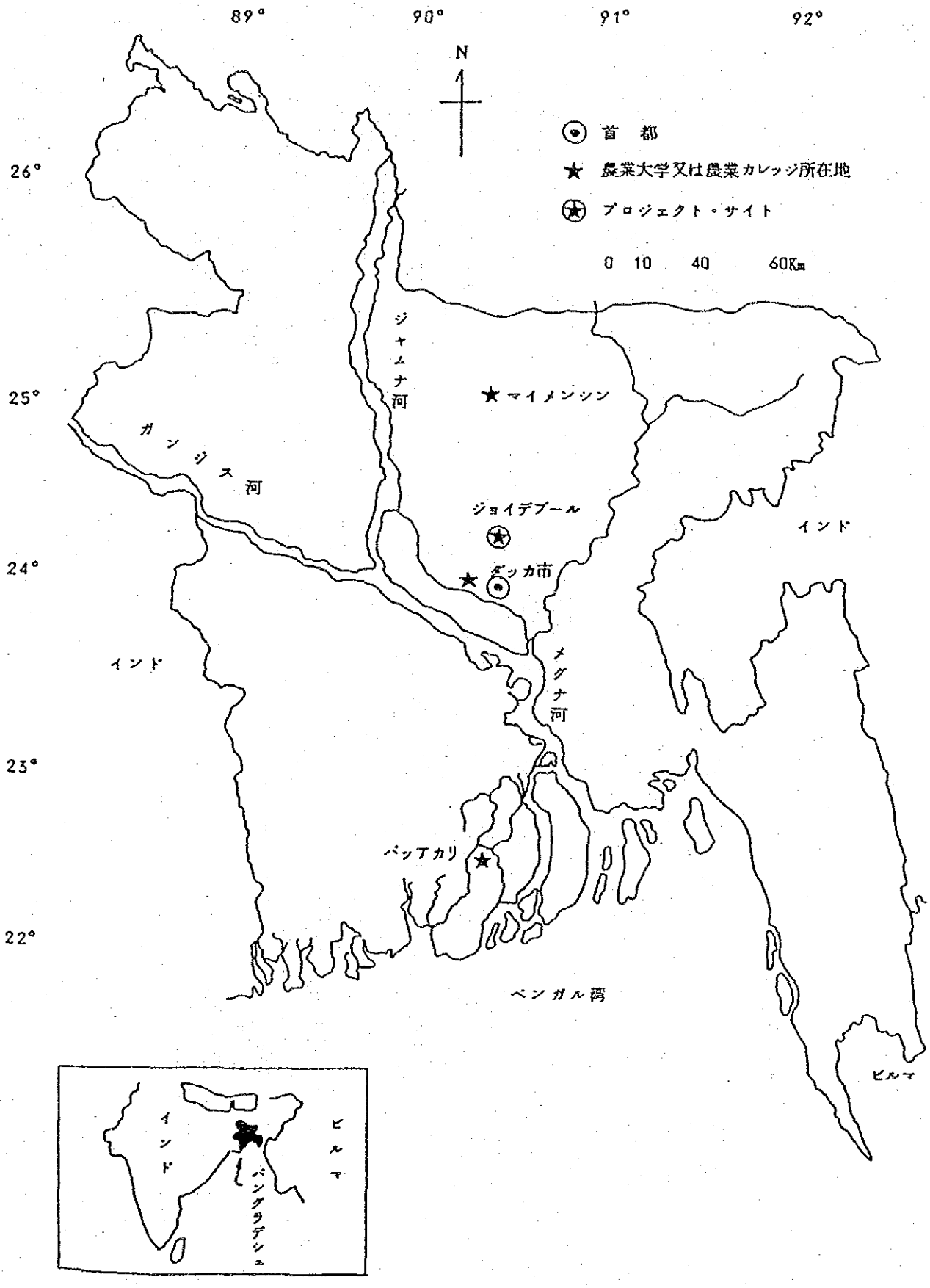
山田リーダーをはじめ３人の長期専門家や宮下業務調整らの努力は涙ぐましいものである。九州大学や佐賀大学の中堅の助教授たちの認識が不足しているように思える。これらの助教授クラスを３カ月前後の短期でよいから次々に派遣し，力を尽させることがＩＰＳＡの発展だけでなく，日本における大学での研究者，特に若い助教授たちにとってまた高等教育分野の発展に資するに違いない。

ついては，今後の長，短期専門家の派遣については，出来る限り多くの専門家としての派遣を検討していくこととしたい。

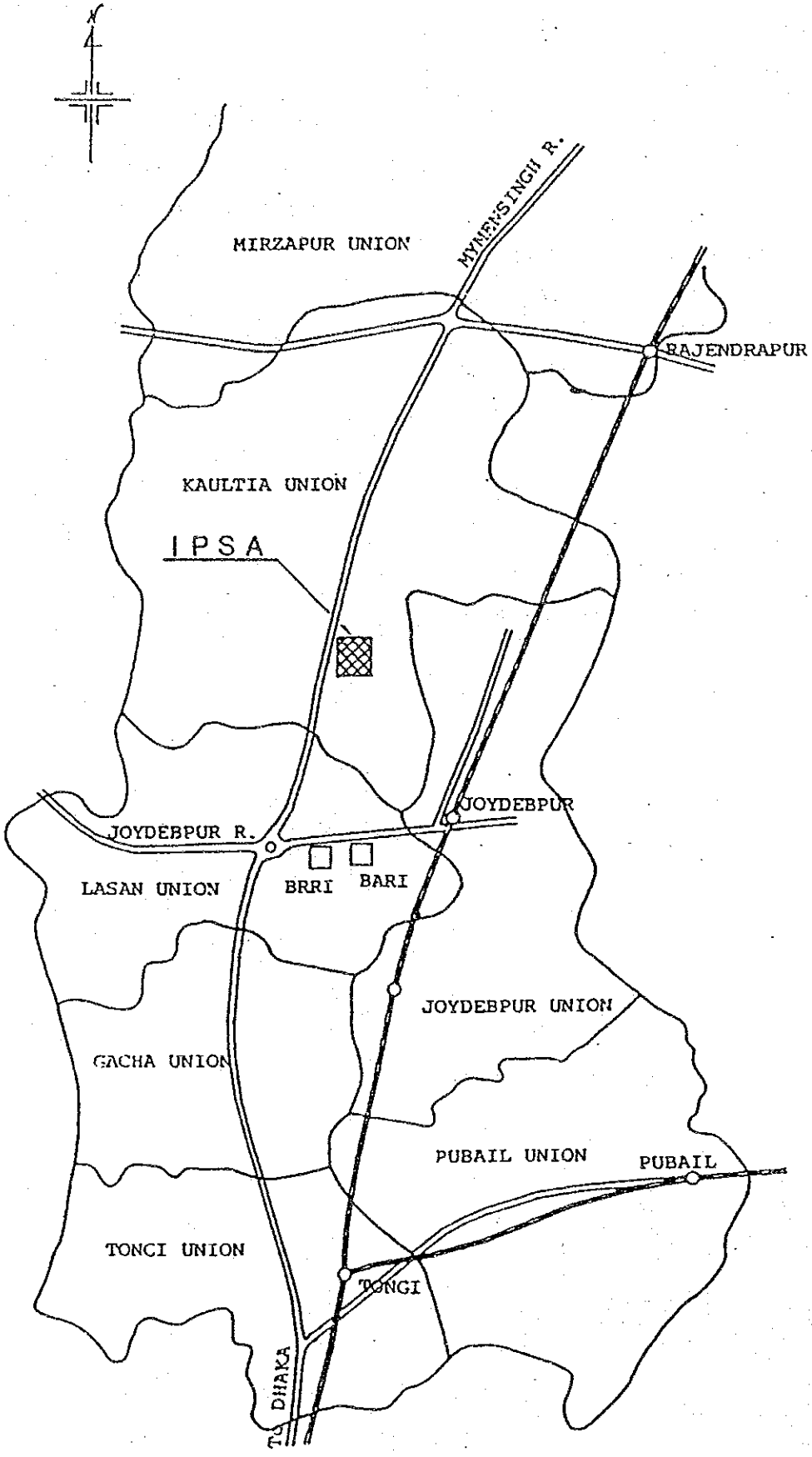
＜参考資料＞

1. プロジェクトサイト地図

地図 1.　バングラデシュ地図



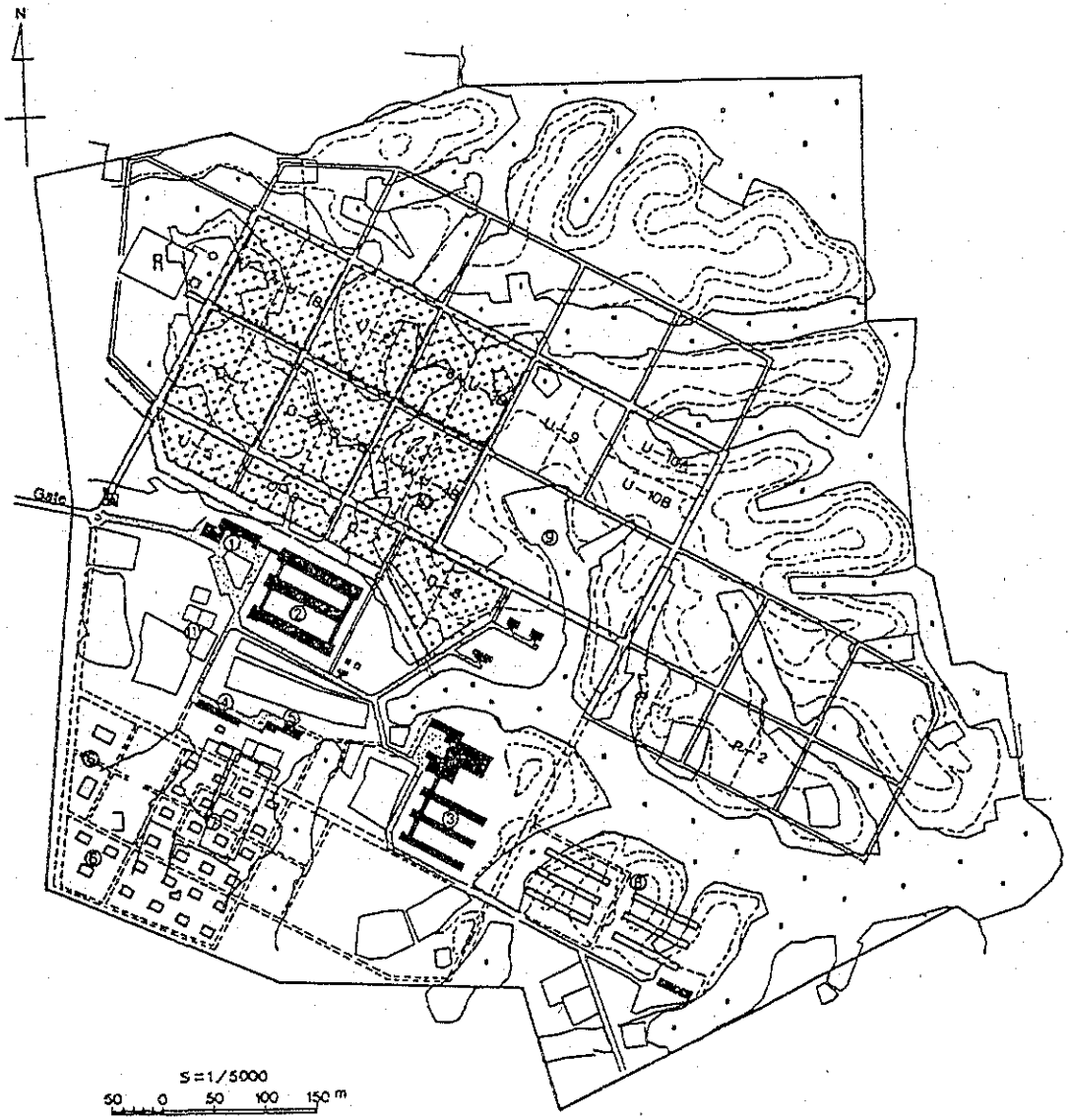
地図 2.　ＩＰＳＡ地図


MIRZAPUR UNION
MYMENSINGH R.
RAJENDRAPUR
KAULTIA UNION
IPSA
JOYDEBPUR
JOYDEBPUR R.
LASAN UNION
BRRI
BARI
JOYDEBPUR UNION
GACHA UNION
PUBAIL UNION
PUBAIL
TONCI UNION
TONGI
DHAKA

地図13. プロジェクトサイト及び試験圃場概要

INSTITUTE OF POST-GRADUATE STUDIES IN AGRICULTURE

GENERAL PLAN



LEGEND

Experimental Field
- U - Upland Field
- O - Orchard Field
- P - Paddy Field

Buildings
- Existing Bldg.
- Proposed Bldg.
- ① Functional Bldg.
- ② College Bldg.
- ③ Hostel Bldg.
- ④ Workshop
- ⑤ Comunity Facilities
- ⑥ Residential Bldg. (Officer)
- ⑦ Residential Bldg. (Staff)
- ⑧ Residential Bldg. (Labor)
- ⑨ Farm Machinery Center
- ⑩ Green House
- ⑪ Library

Irrigation and Drainage Facilities
- Deep Well Pump
- Irrigation Pump
- R Reservoir
- Irrigation Pipeline
- Farm Drain
- Box Culvert
- Pipe Culvert

Roads
- Main Road
- Secondary Road

Proposed Area to be constructed

＜参考資料＞

2. 本計画実施に至る経過

バングラデシュ農業大学院計画プロジェクト実施に至る経過（レビュー）

昭和５４年　５月　　バングラデシュ国政府は、ダッカにある農業カレッジのジョイデプール（ＢＡＲＩ；農業技術研究所等農業関連研究所が集中）移転拡充計画（ＢＣＡＳ）の建物建設を日本国政府に要請

９月　　無償資金協力コンタクトミッション派遣
（建設予定地の土地未取得のため、ペンディング）

昭和５５年　８月　　無償資金協力事前調査団の派遣
バングラデシュ側、移転計画を大学の新設に計画変更

昭和５６年　１月　　無償資金協力基本設計調査団の派遣

昭和５６年度　無償資金協力（２０億円）の実施

昭和５８年　３月　　無償資金協力による建物完成

４月　　プロジェクト技術協力事前調査団の派遣
（開学準備不備のため協力開始の延期決定）
＊農業カレッジ（ＢＣＡＳ）に対する技術協力に関する基本的問題点を調査
1)　団　　長　土谷　圭造　　九州大学　農学部教授
2)　農業教育　脇本　　哲　　九州大学　農学部教授
3)　協力企画　矢加部英敏　　九州大学庶務部国際主幹
4)　協力政策　吉村　保雄　　外務省経協局技協２課
5)　業務調整　宮下　信夫　　JICA農計部農技課課長代理
派遣期間；昭和58年 3月31日から昭和58年 4月14日まで

昭和５９年１０月　「バ」国側　大学院計画に変更（ＩＰＳＡ）

１２月　上記変更計画について戒厳令委員会承認

４月　「バ」国側より上記大学院計画に対する技術協力要請

昭和５９年　８月（～１１月）　長期調査員の派遣
＊大学院計画（ＩＰＳＡ）開学準備状況等調査及び計画変更による事前調査団受入準備

長期調査員　増見　国引　　ＪＩＣＡ特別嘱託
派遣期間；昭和59年 8月16日から昭和59年11月28日まで

９月　大学院　開学

１０月　技術協力コンタクト調査団の派遣
＊ＩＰＳＡ技術協力要請に関する「バ」国側政府準備状況調査及び事前調査団受入準備
1）団　　長　土谷　圭造　　九州大学　農学部教授
2）協力計画兼宮下　信夫　　JICA農計部農技課課長代理
　　業務調整
派遣期間；昭和59年10月 4日から昭和59年10月13日まで

１１月　事前調査団の派遣
＊ＩＰＳＡ技術協力の実施可能性調査及び具体的枠組について協議。ＵＳＡＩＤ（米国国際開発庁）との協同協力についてＵＳＡＩＤ要請を受ける。
1）団長総括　山田　芳雄　九州大学　農学部教授
2）大学院協力　大村　武　九州大学　農学部教授
3）農業協力　五斗　一郎　九州大学　農学部教授
4）協力政策　沼田　正俊　外務省経協局技協課
5）協力企画　鈴木　章文　文部省学術国際局国際企画課
6）業務調整　宮下　信夫　JICA農計部農技課課長代理
派遣期間；昭和59年11月17日から昭和59年11月28日まで

昭和６０年　１月　　国内支援委員会開催（準備会）

１月　　実施設計調査団の派遣
（～２月）　＊ＩＰＳＡ実験圃場実施設計調査

1)　団長総括　大村　武　　九州大学教授（附属農場長）
2)　圃場計画　長　智男　　九州大学　農学部教授
3)　業務調整　亀山　卓二　JICA農開部農技協課
4)　施設計画　林　健一　　太陽ｺﾝｻﾙﾀﾝﾂ(株)
5)　圃場計画　松永　俊行　太陽ｺﾝｻﾙﾀﾝﾂ(株)
6)　測量設計　森　季雄　　太陽ｺﾝｻﾙﾀﾝﾂ(株)

派遣期間；昭和60年 1月24日から昭和60年 2月 6日まで
（コンサルタントは昭和60年 2月27日まで）

長期調査員（技術協力計画）の派遣
＊事前調査団による「バ」国側への勧告の実施状況確認及び協力開始のための問題点の整理
1)長期調査員（土壌）和田　光史　九州大学　農学部教授
2)　"　（協力計画）宮下　信夫　JICA農計部農技課代理
派遣期間；昭和60年 1月24日から昭和60年 2月13日まで

４月　　実施協議調査団派遣準備のための長期調査員の派遣
（～５月）　＊Ｒ／Ｄの原案の提示及び電子顕微鏡を含む供与予定機材についての協議ならびに「バ」国内準備状況確認
1)植物病理　脇本　哲　　九州大学　農学部教授
2)協力企画　宮下　信夫　JICA農計部農技課課長代理
派遣期間；昭和60年 4月22日から昭和60年 5月25日まで

昭和６０年　６月　　国内支援委員会　発足

6月 （～7月）	実施協議調査団の派遣 ＊討議議事録R／Dについての協議、署名

1) 団長総括　宮島　　寛　　九州大学　農学部長
2) 研究協力　和田　光史　　九州大学　農学部教授
3) 研究管理　岸川　英利　　佐賀大学　農学部教授
4) 協力企画　坂田　達夫　　九州大学庶務部人事課長
5) 計画管理　宮下　信夫　　JICA農開部付
6) 業務調整　西川　芳昭　　JICA農開部農技協課

派遣期間：昭和60年 6月24日から昭和60年 7月 7日まで
（R／D署名；昭和60年 7月 4日）

9月　長期専門家（業務調整；宮下　信夫）の派遣

昭和61年 1月　長期専門家（植物育種；吉村　淳）の派遣
短期専門家（植物栄養；山田　芳雄）の派遣
（作物学；松永　亮一）
（植物病理；津野　和宣）
（施工管理；松永　俊行）

昭和61年 3月　第2回　国内支援委員会開催
＊今後の短期専門家の派遣計画ならびに機材の供与計画についての協議

昭和61年 5月　長期専門家（作物学；松永　亮一）　の派遣
（植物病理；津野　和宣）

昭和61年 7月　第3回　国内支援委員会開催
＊暫定実施計画（TSI）の策定にかかる協議

昭和61年 8月　長期専門家（チームリーダー；山田　芳雄）の派遣

昭和６１年　９月　　計画打合せ調査団の派遣

（～１０月）　　＊暫定実施計画の署名及びP.P.承認の督促

1)　団長総括　大村　武　　九州大学　農学部長

2)　研究協力　和田　光史　九州大学　農学部教授

3)　協力企画　木下　真　　文部省学術国際局研究助成課

4)　業務調整　浅野　哲　　JICA農開部農技協課

派遣期間；昭和61年 9月29日から昭和61年10月11日まで

昭和６２年　３月　　長期専門家（植物育種；吉村　淳）の帰国

長期専門家（昆虫学；緒方　一夫）の派遣

昭和６２年　８月　　第４回国内支援委員会

＊昭和６２年度専門家派遣、Ｃ／Ｐ研修受入計画等について協議、巡回指導調査団の派遣の調整

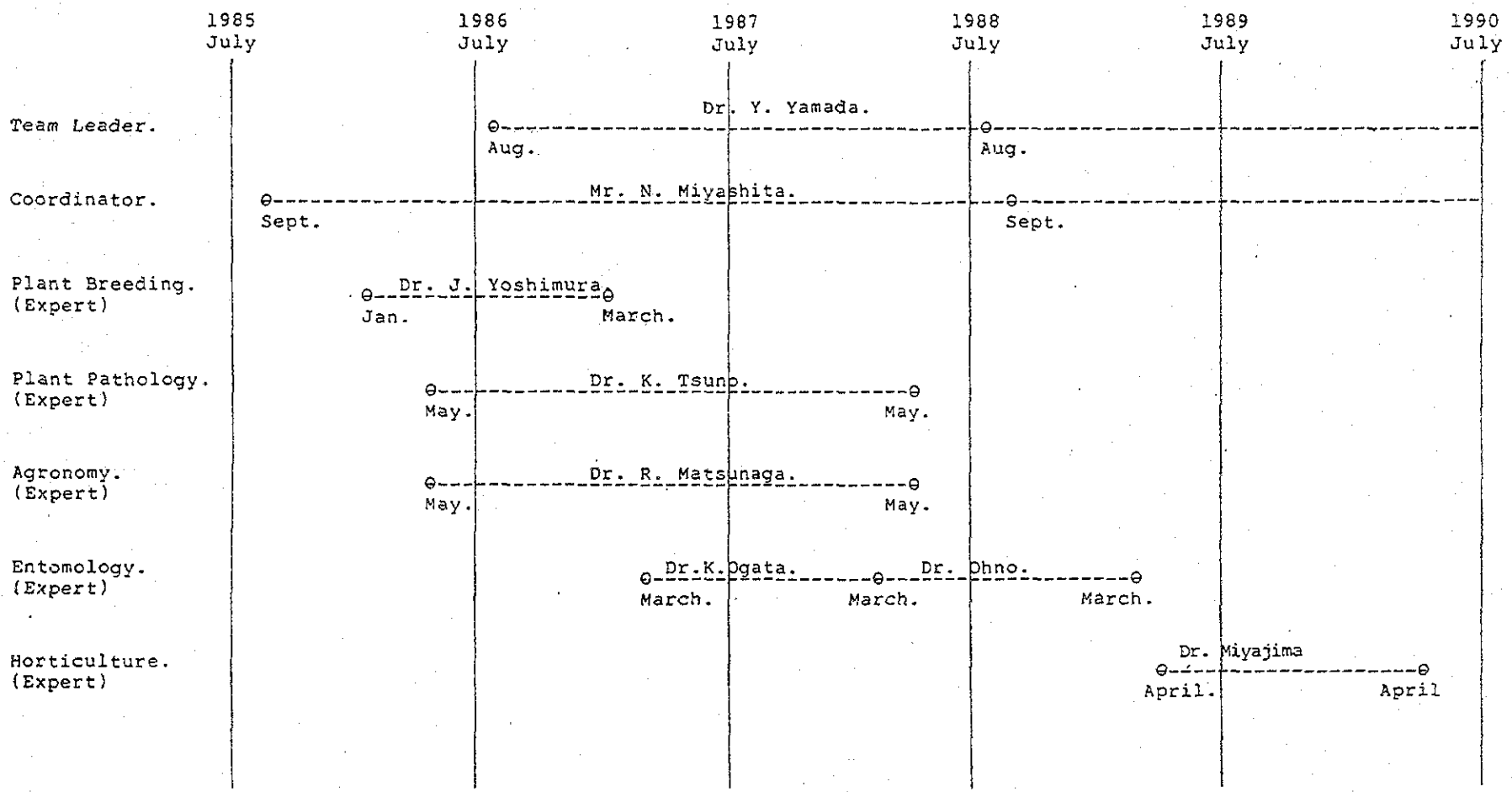
ＰＥＣ会議にて本計画基本的に承認を得る

昭和６３年　１月　　本巡回指導調査団の派遣

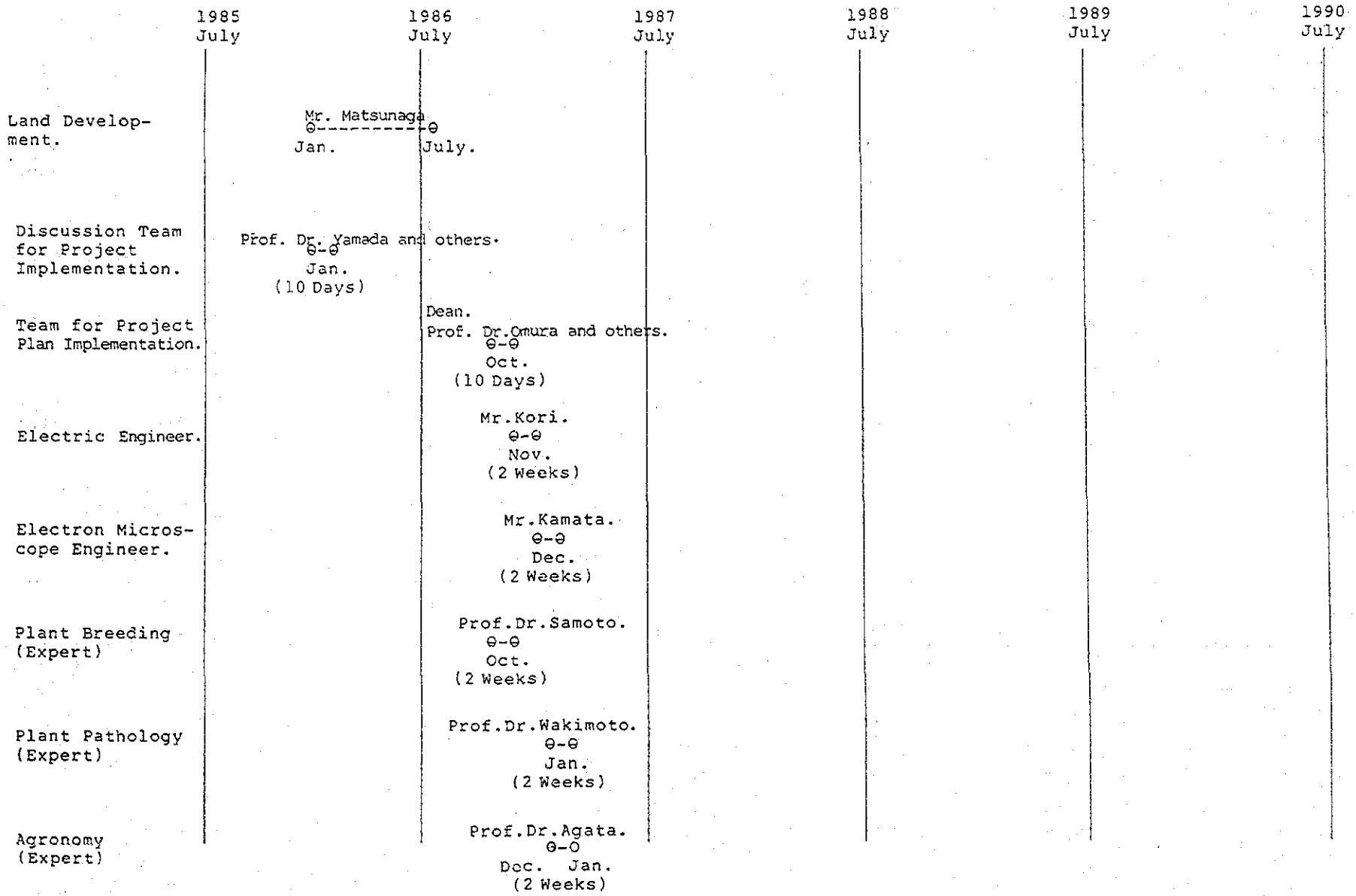
＜参考資料＞

3. 技術協力事業実績及び計画表

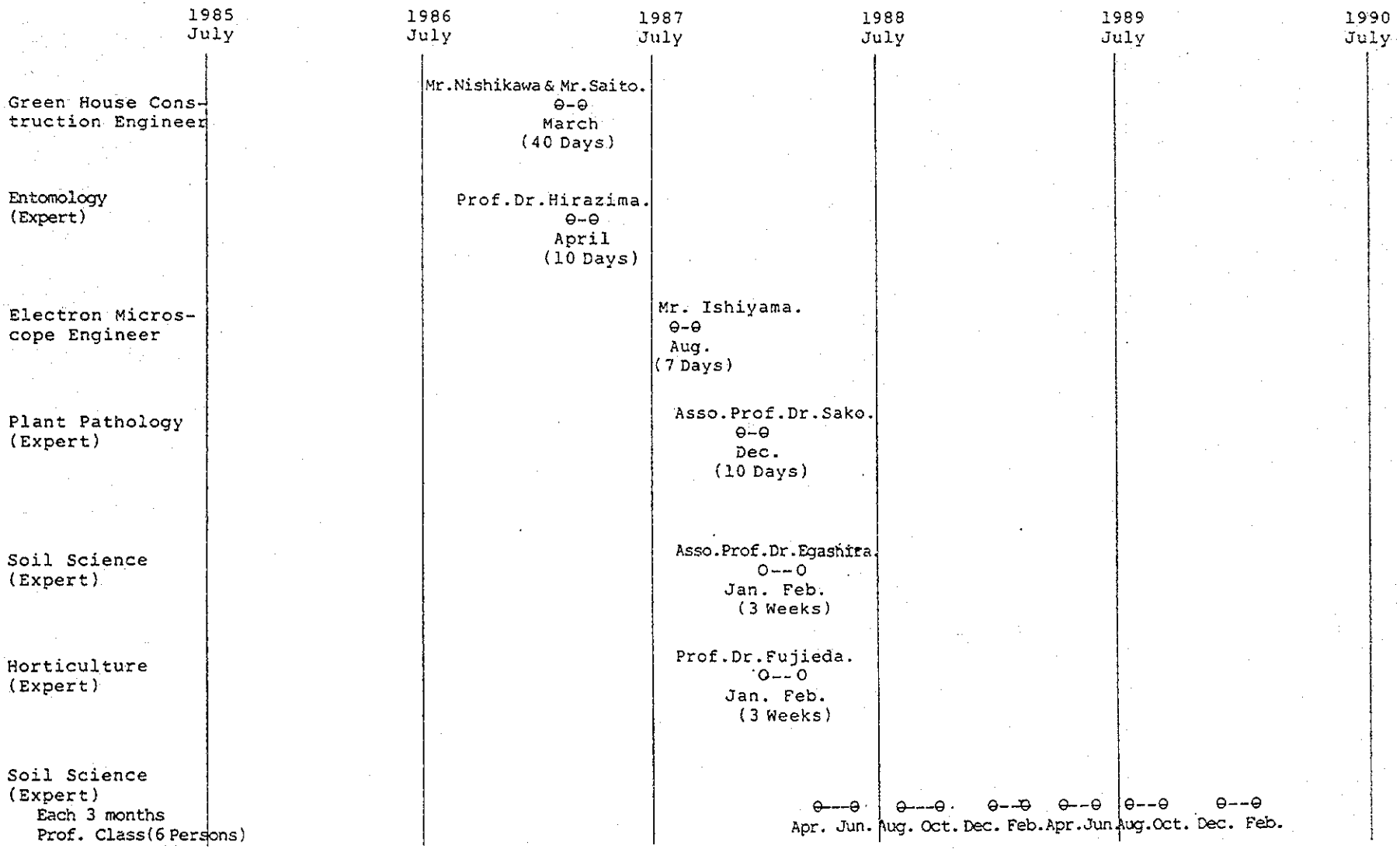
DISPATCH SCHEDULE OF JAPANESE EXPERT.
(Long Term)



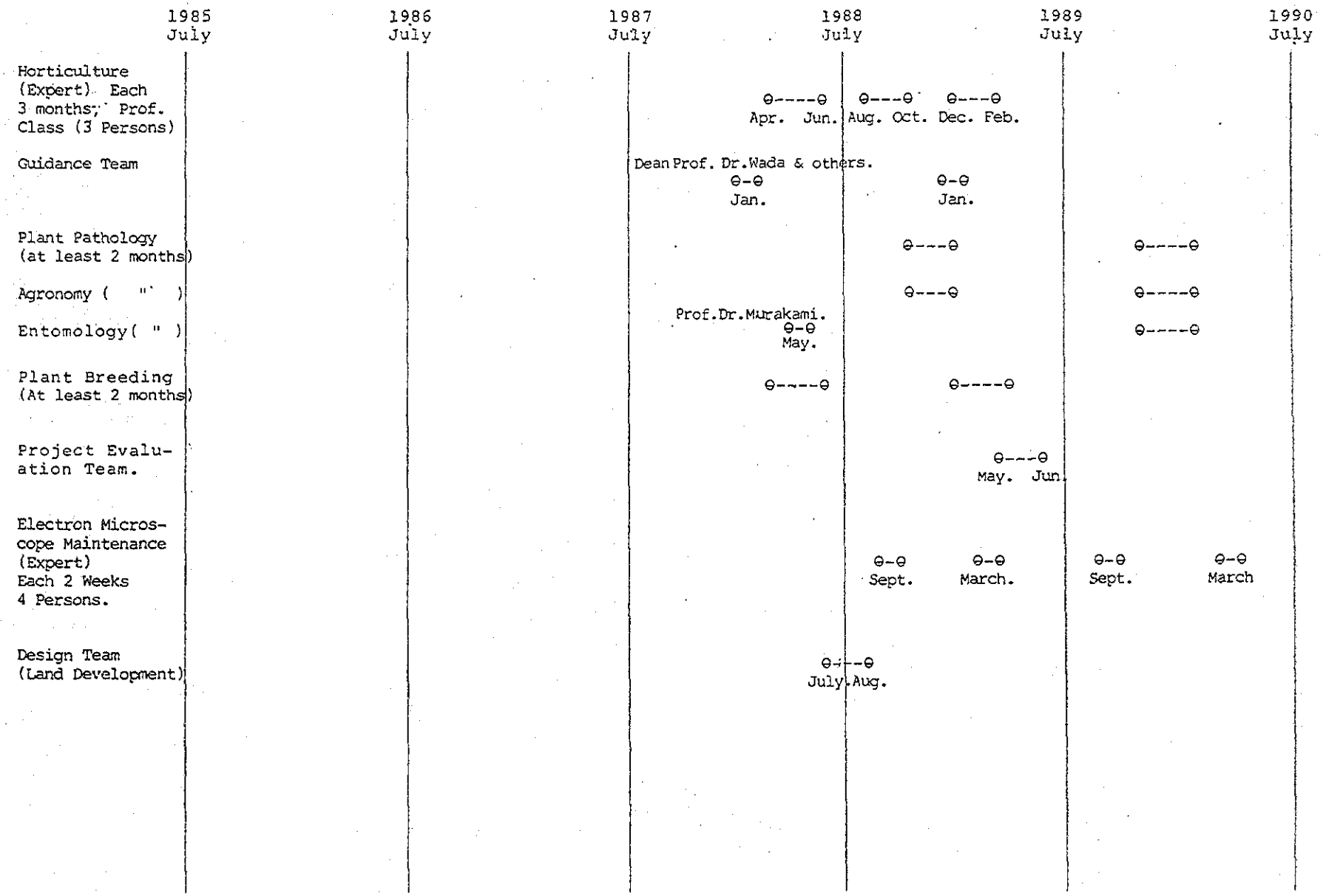
DISPATCH SCHEDULE OF JAPANESE TEAM OR EXPERT.
(Short Term)



DISPATCH SCHEDULE OR PROPOSED SCHEDULE OF JAPANESE TEAM OR EXPERT.
(Short Term)

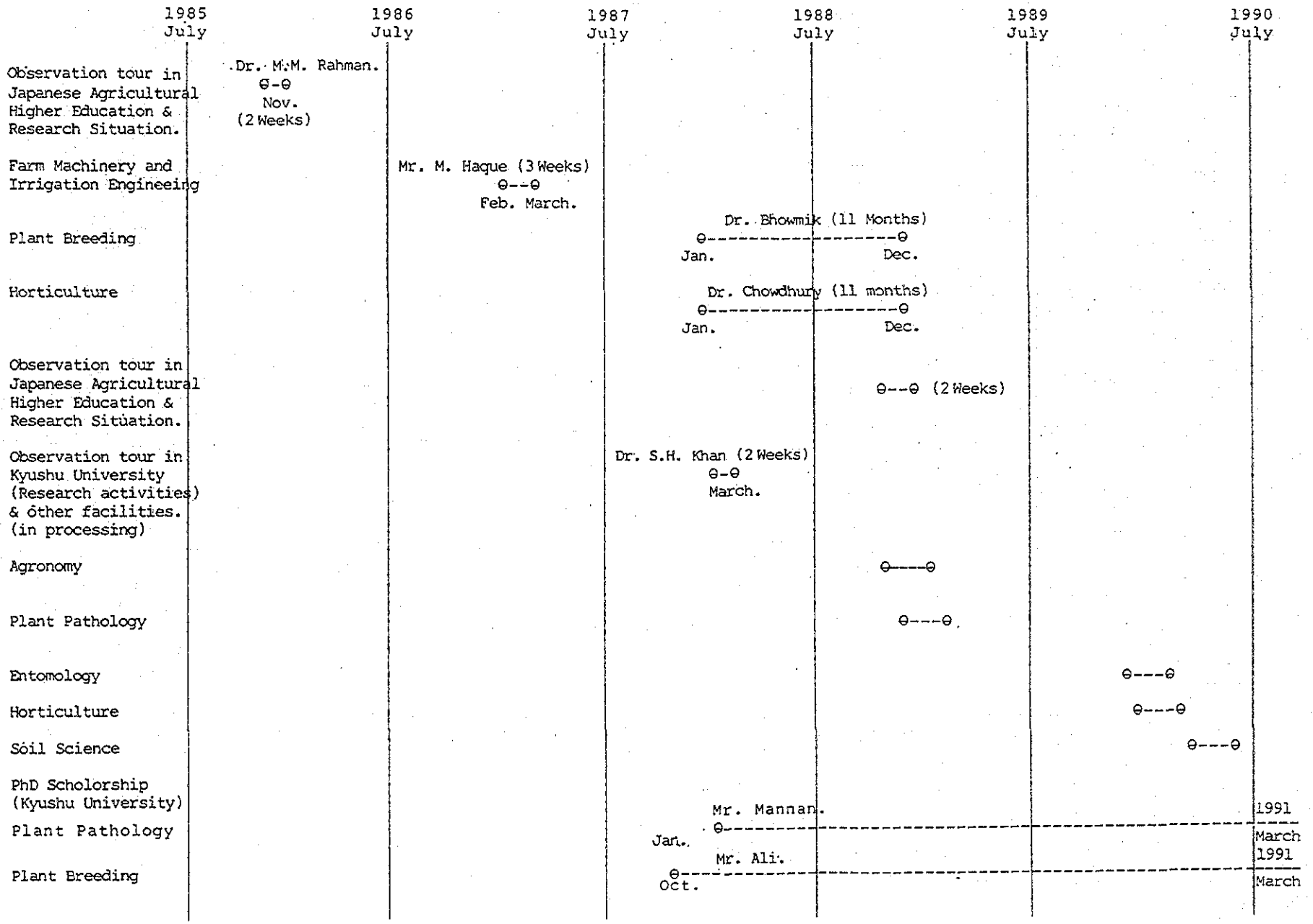


PROPOSED DISPATCH SCHEDULE OF JAPANESE TEAM OR EXPERT.
(Short Term)



COUNTERPART TRAINNING IN JAPAN.

Basically, JICA will Provide two to three persons trainning in Japan in every Project Year.



LIST OF CONSIGNMENT(S) IMPORTED UNDER JAPANESE TECHNICAL ASSISTANCE PROGRAMME AS GRANT FOR IPSA PROJECT DURING 1985-86, 1986-87 & 1987-88.

Sl. No.	Name of the Consignment(s).	Value (in ¥)	Value (in Tk)	B/L No. & AW Bill No.	ETA/Delivary Date.	Name of the Vessel	REMARKS. (Date of arrival at IPSA)
1	2 Cases Consignment of equipment (Tripod for NIKON NT-20 with BMF & Auto Level NIKON AE-5W & other)	¥ 244,917.-	Tk. 48,983.4	217.3177.4514 dt.24-12-85		By Air at Dhaka.	10 March, 1986
2	6 Sets Consignment of equipment (Pipe for Sprinkler, Materials for Well, Electric Power Cable)	17,333,606.-	34,66,721.2	Y-20-CG dt.09-1-86.		JOHNEVERETT	30 June, 1986
3	1 Unit Consignment of Toyota Land Cruiser Station Wagon, Model: BJ60RV-KC.	2,644,876.-	5,28,975.2	N-23-CG dt.30-3-86.		MURRAYEVERETT	29 Oct., 1986
4	1 Unit Consignment of Hino Dropside Dump 5.5 ton Model: GD171KA, 4x2.	2,790,000.-	5,58,000.-	Y-38-CG dt.31-3-86.		MURRAYEVERETT	1 Nov., 1986
5	4 Cases Consignmet of equipment (Distribution Board & Spares)/ Additional equipments.	3,695,066.-	7,39,013.2	217.3241.2682 dt.30-4-86		By Air at Dhaka.	4 Sept., 1986
6	13 Cases Consignment of equipment (Green House materials)	16,683,739.-	33,36,747.8	¥-54-CG dt.1-5-86.		HUGHEVERETT.	11 Dec., 19986
7	4 Cases Consignment of equipment & Materials.	753,091.-	1,50,618.2	217.3241.2741 dt.14-5-86		By Air at Dhaka.	28 Aug., 1986
8	2 Cases Consignment of equipment & materials for Laboratory.	396,538.-	79,307.6	217.3241.2796 dt.14-5-86		By Air at Dhaka.	7 August, 1986
9	40 Cases Consignment of equipment/ materials (Instruments & Semi-Haza)	45,451,017.-	90,90,203.4	Y-26-CG dt.03-6-86		JOHNEVERETT	1 Feb.,1987
10	1 Case Consignment of equipment (Electron Microscope)	16,223,000.-	32,44,600.-	Y-14-CG dt.03-6-86		JOHNEVERETT	29 Aug., 1986
11	11 Cases Consignment of equipment (Yanmar Tractor & Gas Cylinder with attachment)	11,150,409.-	22,30,081.8	Y-15-CG dt.03-6-86		JOHNEVERETT	30 June, 1986

LIST OF CONSIGNMENT(S) IMPORTED UNDER JAPANESE TECHNICAL ASSISTANCE PROGRAMME AS GRANT FOR IPSA PROJECT DURING 1985-86, 1986-87 & 1987-88.

(Date of arrival at IPSA)

Sl. No.	Name of the Consignment(s).	Value (in ¥)	Value (in Tk)	B/L No. & AW Bill No.	ETA/Delivary Date.	Name of the Vassel	REMARKS.
12	1 Case Consignment of equipment (Room Air Conditioner)	¥ 753,999.-	Tk. 1,50,799.8	KB GN-0010 dt.06-6-86.		BYAKUDAN MARU	
13	1 Case Consignment of equipment (CV Cable)	1,862,771.-	3,72,554.2	217.3312.1045 dt.11-6-86		By Air at Dhaka.	26 Oct., 1986
14	1 Case Consignment of equipment (Biological Microscope)	4,581,501.-	9,16,300.2	30-023 dt.04-7-86		PAMELA II	29 Aug., 1986
15	1 Case Consignment of equipment (Transformer, Small Diffusion Standard unit, Hand Piston Bullet)	200,939.-	40,187.8	217.3312.1340 dt.14-8-86		By Air at Dhaka.	30 Sep., 1986
16	1 Case & 295 Pcs., Consignment of equipment (Chemicals)	413,549.-	82,709.8	Y-7-CG dt.30-9-86		HUGHEVERETT	11 July, 1986
17	1 Case Consignment of equipment (Hospital Uniform, Color Film, Air Pump with Transformer AP-115RW, Microscope VE-32)	751,674.-	1,50,334.8	217.3412.3880 dt.23-12-86		By Air at Dhaka.	6 June, 1987
18	1 Unit & 1 Lot Consignment of equipment (Motor Vehicle "Toyota Corolla 1300 Station Wagon & ST., Spare Parts)	1,187,861.-	2,37,572.2	Y-10-CG dt.13-2-87		THOMASEVERETT	20 June. 1987
19	4 Cases Consignment of equipment (Honda Gasoline Engine Generator EM-550, Desicator, Vial, Insect Display Case, etc.)	623,254.-	1,24,650.8	217.3463.9393 dt.10-3-87		By Air at Dhaka.	20 June, 1987
20	2 Units & 2 Lots Consignment of Laboratory equipment & Motor Vehicle & attachment.	48,848,096.-	97,69,619.2	YC TG-23 dt.31-3-87		B. SWAPNA.	8 Sept., 1987

LIST OF CONSIGNMENT(S) IMPORTED UNDER JAPANESE TECHNICAL ASSISTANCE PROGRAMME AS GRANT FOR IPSA PROJECT DURING 1985-86, 1986-87 & 1987-88.

Sl. No.	Name of the Consignment(s).	Value (in ¥)	Value (in Tk)	B/L No. & AW Bill No.	ETA/Delivary Date.	Name of the Vassel	REMARKS.
21	1 Set Consignment of equipment (JSM-T220 Scanning Microscope Complete Set) for Laboratory.	¥ 14,955,978.-	Tk.29,91,195.6	Y-11-CG dt.11-4-87.		MURRAYEVERETT	(Date of arrival at IPSA) 27 June, 1987
22	Gasoline Engine for TUE-22PS Compressor, Tool Cabinet Set D-3000, Gas Exchange Apparatus & others.	933,100.-	Tk. 1,86,620.-	217.3584.3555			4 Oct., 87
23	Vacuum Emasculator and others.	652,745.-	Tk. 1,30,549.-	217.3559.1776			1 December, 87

LIST OF CONSIGNMENT(S) IMPORTED UNDER JAPANESE TECHNICAL ASSISTANCE PROGRAMME AS GRANT FOR IPSA PROJECT DURING 1985-86, 1986-87 & 1987-88.

Sl. No.	Name of the Consignment(s).	Value (in ¥) $	Value (in Tk)	B/L No. & AW Bill No.	ETA/Delivary Date.	Name of the Vassel	REMARKS.
	LOCAL PURCHASE (EQUIPMENT) :						
24	Gas Generator	$. 41,983.-			6 - 7 - 87'		
25	Toyota Station Wagon (Liftback)		TK. 750,000.-		28 - 7- 87'		
26	Mitsubishi Station Wagon 1300cc		725,000.-		28 - 7 - 87'		
27	Hino Bus (52 Sheats) —— Full payment		1,125,000.-		30 - 12 - 87'		
28	Telephone System (Out-5/ Inside-25) —— Contract date Advance payment only		350,000.-		27 - 7 - 87'		
	MINOR CONSTRUCTION :						
29	Drainage & Calvert work 1-8-1987 30-9-1987.		45,000.-				
30	Meteorological Center 1-9-1987 30-9-1987.		35,000.-				
31	Green House Basement Construction Payment date —— 9-8-1987.		250,000.-				
32	Glass & Net house construction Contract date—— 1-11-1987.						
33	Garrage & Drying bed Construction. Contract date—— 1-11-1987 Fence Work for Farm Facilities area (Non Contract base)						
34	Maintenance Work for Field Drain Ditch (Non Contract base)						
	CONSTRUCTION:				27-2-1986		
35	Land Development		3,728,000.-		06-7-1986		

＜参考資料＞

4. 調整委員会（COORDINATION COMMITTEE）

議事録

MINUTES OF THE MEETING OF COORDINATION COMMITTEE ON IPSA HELD ON JANUARY 9, 1988.

1. A meeting of the coordination Committee on IPSA was held on January 9, 1988 at 09:00 hours in the conference room of BARC under the chairmanship of Mr. A. M. Anisuzzaman, Secretary, Ministry of Agriculture. Detailed list of participants is enclosed at Annex-A.

2. At the Request of chairman, Dr. S. H. Khan, Director, IPSA initiated the discussion referring to various issues related to the development and progress of IPSA. Pertinent issues discussed were (i) Autonomy for IPSA, (ii) Recruitment of Faculty Members, (iii) Enrollment of students, (iv) Requirement of additional equipment and machinery, (v) Additional construction (vi) Land development and (vii) Next year's programmes and budgetary requirment. After threadbare discussions, the following decisions were taken agenda wise:—

(i) Autonomy for IPSA

1. Autonomy in general sense has been agreed upon and accepted, but this would be done in phases.

2. In the 1st phase IPSA would be delinked with BARI and brought under MOA through the revision of PP and an administrative order to be issued by MOA.

3. A committee would be set up and or a consultant hired in order to clearly spell out the details (academic, functional, administrative, etc. aspects) of autonomous status of IPSA in fuller sense of the term in the context of over all agricultural education policy of the country.

4. A management Committee would be set up for the purpose of effective functioning of IPSA till it attains full autonomy through an ordinance.

(ii) Recruitment of Faculty Members

1. The existing service rule as decided earlier by the Board of Governors and approved by the council and the system of BAU for the purpose of recruitment of teaching staff would be followed for immediate recruitment of faculty members.

2. Positionwise requirement of qualification/experience etc. would have to be spelled out in the revised PP.

(iii) Enrollment of Students

1. There would be no under-graduate enrollment.

2. A higher limit of 60 postgraduate (50 MSc + 10 PhD) students would be enrolled annually during this Plan period. Details of enrollment procedures and other related issues would be worked out by the Management Committee.

3. Guides/Supervisors for the postgraduate students would also be made from outside other than IPSA faculty members. All heads of research institutes would render full support for guiding IPSA students.

(iv) Equipment and Machinery.

1. A comprehensive list of equipment and machinery is to be prepared by Director, IPSA for its careful examination and agreement by JICA.

2. BARC and Planning Commission would examine the availability of the required equipment and machinery locally from different organisations (where these remain unutilized). Locally available ones would be transferred to IPSA through book adjustment and thereby saving CDST and time. The rest would be taken up with the GOJ to provide under Grant Assistance Programme.

(v) Construction

1. Additional structures (laboratory, library, residential quarters, etc.) would be proposed for financing under Japanese grant assistance.

2. MOA would make a special request to Planning Commission by January 15, 1988 in the form of a PPP to Process the grant assistance Proposal. Planning Commission has agreed to pursue the case strongly (although the GOB proposal for financing under Japanese grant assistance for 1988 has already been finalized). Dr. Wada, JTGT Leader would also make GOJ aware of this proposal in advance.

(vi) Land Development

1. Procurement of 30 acres of pocket land would be made for proper farm development of IPSA.

2. Planning Commission has agreed to waive the embargo on further land acquisition subject to inclusion of this component in the revised PP and submission of a complete land development plan acceptable to Planning Commission.

3. Provision of fund for additional land acquisition would be made in the next year's ADP.

(vii) Next year's Programmes and Budgetary Requirement.

This would be reviewed and acted upon by the Management Committee (to be set up shortly).

3. All the above decisions were shared and accepted by the Member (Agriculture), Planning Commission and the representatives of JICA, JTGT, USAID and others.

4. The meeting ended with a vote of thanks from the Chair.

Sd/-
(A. M. Anisuzzaman)
Secretary.

Government of the People's Republic of Bangladesh
Ministry of Agriculture
Agriculture Division
PMU (Research)

No. PMU (E & R)-IPSA-9/85/0025 Date: 20-2-88 Eng. / 7-11-94 Bang.

Copy forwarded for information and necessary action to:

1. Dr. S. H. Zaman
Member (Agriculture), Planning Commission
2. Dr. A. H. M. Altaf Ali
Division Chief (Agriculture), Planning Commission
3. Mr. Md. Azizul Hoque
Additional Secretary, Ministry of Agriculture
4. Dr. M. M. Rahman
Executive Vice-Chairman, BARC
5. Dr. M. H. Mondal
Director General, BARI
6. Mr. Md. Emdadul Hoque
Chief (Planning), Ministry of Agriculture
7. Dr. S. H. Khan
Director of IPSA
8. Mr. A. Waheed Khan
Agricultural Economist, Ministry of Agriculture

9. Mr. Charles Hash
Director, Food & Agriculture, USAID

10. Mr. Alan R. Hurdus
Deputy Director, Food & Agriculture, USAID

11. Dr. L. Eisgruber
Advisor, IPSA/USAID

12. Mr. K. Egawa
Deputy Resident Representative, JICA

13. Mr. G. Okada
Second Secretary, Embassy of Japan

14. Dr. K. Wada
JTGT Leader

15. Dr. M. Iwamasa
Member, JTGT/JICA

16. Dr. S. Wakimoto
Member, JTGT/JICA

17. Dr. S. Asano
Member, JTGT/JICA

18. Dr. Y. Yamada
Team Leader, IPSA Project

19. Mr. N. Miyashita
Coordinator, IPSA Project

20. Dr. K. Tsuno
Expert, IPSA/JICA

21. Dr. R. Matsunaga
Expert, IPSA/JICA

22. Dr. K. Ogata
Expert, IPSA/JICA

23. ----------

(A. Waheed Khan)
Agricultural Economist.

Annex-A.

List of Participants.

1. Dr. S. H. Zaman
   Member (Agriculture), Planning Cimmission
2. Dr. A. H. M. Altaf Ali
   Division Chief (Agriculture), Planning Commission
3. Mr. Md. Azizul Hoque
   Additional Secretary, Ministry of Agriculture
4. Dr. M. M. Rahman
   Executive Vice-Chairman, BARC
5. Dr. M. H. Mondal
   Director General, BARI
6. Mr. Md. Emdadul Hoque
   Chief (Planning), Ministry of Agriculture
7. Dr. S. H. Khan
   Director of IPSA.
8. Mr. A. Waheed Khan
   Agricultural Economist, Ministry of Agriculture
9. Mr. Charles Hash
   Director, Food & Agriculture, USAID
10. Mr. Alan R. Hurdus
    Deputy Director, Food & Agriculture, USAID
11. Dr. L. Eisgruber
    Advisor, IPSA/USAID
12. Mr. K. Egawa
    Deputy Resident Representative, JICA
13. Mr. G. Okada
    Second Secretary, Embassy of Japan
14. Dr. K. Wada
    JTGT Leader
15. Dr. M. Iwamasa
    Member, JTGT/JICA
16. Dr. S. Wakimoto
    Member, JTGT/JICA
17. Dr. S. Asano
    Member, JTGT/JICA
18. Dr. Y. Yamada
    Team Leader, IPSA Project
19. Mr. N. Miyashita
    Coordinator, IPSA Project
20. Dr. K. Tsuno
    Expert, IPSA/JICA
21. Dr. R. Matsunaga
    Expert, IPSA/JICA
22. Dr. K. Ogata
    Expert, IPSA/JICA

＜参考資料＞

5.　団 長 レ タ ー

January 11, 1988

Mr. A. N. Anisuzzaman
Secretary
Ministry of Agriculture

Dear Sir,

It's our pleasure to submit herewith the summary report on the Technical Guidance for the Institute of Postgraduate Studies in Agriculture Project in Bangladesh.

The Japanese Technical Guidance Team was organized by the Japan International Cooperation Agency, visited the People's Republic of Bangladesh from January 3, 1988 to January 12, 1988.

During its stay in Dhaka, Bangladesh, the team had a series of discussions with Bangladesh authorities concerned and Japanese expert team in respect of the desirable implementation of the Project.

We would like to take this opportunity to express my sincere appreciation for the warm cooperation and kindful arrangement extended to us.

Very Truly yours,

Eiji Wada

Dr. Eiji WADA
Team Leader, The Japanese
Technical Guidance Team

c.c: The Embassy of Japan in Bangladesh
JICA Bangladesh Office
Japanese Expert Team
USAID
Planning Commission
External Resources Division
Bangladesh Agricultural Research Council
Bangladesh Agricultural Research Institute
Institute of Postgraduates Studies in Agriculture

SUMMARY REPORT OF THE JAPANESE TECHNICAL GUIDANCE TEAM FOR THE INSTITUTE OF POSTGRADUATE STUDIES IN AGRICULTURE PROJECT IN THE PEOPLE'S REPUBIC OF BANGLADESH

SUMMARY REPORT OF THE JAPANESE TECHNICAL GUIDANCE TEAM FOR THE INSTITUTE OF POSTGRADUATE STUDIES IN AGRICULTURE PROJECT

I. Introduction

The Technical Cooperation for the Institute of Postgraduate Studies in Agriculture Project (hereinafter referred to as "the Project") started on July 4, 1985, based on the Record of Discussions and Tentative Schedule of Implementation signed on October 8, 1986.

The Japanese Consultation Survey Team for the Project 8hereinafter referred to as "the Team") headed by Dr. Koji WADA has been dispatched to Bangladesh to make smoothier progress of the Project activities, from January 3 to 12, 1988. (Ref. ANNEX).

The purpose of the Team activities are:

- to review the progress of the Project activities in line with Record of Discussion (R/D) Tentative Schedule of Implementation (TSI),
- to prepare annual implementation programmes for Japanese fiscal year 1988, and
- to have a consultation with Bangladesh officials andteaching staff concerned if countermeasures regarding R/D, TSI and other related arrangements are necessary.

Through the fruitful discussions with officials and teaching staff concerned on the Ministry of Agriculture as well as counterparts and Japanese expert team has come to realize that the Project is successful under strong expectation and energetic arrangements both of the Bangladesh and Japanese Government.

We are pleased to express our sincere gratitude and appreciation to all officials concerned who extended us a heart-felt and effective cooperation during our stay in Dhaka. We are especially grateful to Bangladesh Counterparts and JICA/USAID Expert Team headed by Dr. Yoshio YAMADA who have fully attended meetings with the Team.

II. Comments and Requirements

1. It's our great pleasure to be able to find out that IPSA research activities in laboratory and field level, have made remarkable progress in the last one and half year under devoted efforts and cooperation of Bangladesh Counterparts and JICA/USAID Expert Team.

2. We hope IPSA will improve its function as an independent institute and also make much more progress in its academic activities. We also hope that the Japanese Expert Team make further efforts to cooperate with Bangladesh side.

3. For that purpose, we request Bangladesh authorities concerned to take necessary measures for smooth, rapid and effective implementation of the decisions made in the Meeting of Coordination Committee on IPSA project held on January 9, 1988.

MEMBER'S LIST OF
THE JAPANESE TECHNICAL GUIDANCE TEAM
FOR THE INSTITUTE OF POSTGRADATE STUDIES IN AGRICULTURE PROJECT
IN BANGLADESH

Assignment	Name	Present Position
Leader/ Soil Science	Koji WADA	Dean, Faculty of Agriculture Kyushu University
Horticulture	Masao IWAMASA	Dean, Faculty of Agriculture Saga University
Plant Pathology	Satoshi WAKIMOTO	Professor, Faculty of Agriculture Kyushu University
Coordination	Satoshi ASANO	Project Officer, Technical Cooperation Div., Agriculture Development Cooperation Dept., Japan International Cooperation Agency

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

P.O.Box 216, Shinjuku-Mitsui Bldg.,
2-1 Nishi-shinjuku, Shinjuku-ku, Tokyo, JAPAN 163
tel. 03-346-5311

＜参考資料＞

6. IPSA教官等リスト (Bio-Data)

ＩＰＳＡ教官スタッフ　リスト

昭和６３年１月１０日現在

Nos.	Name 氏　名	Date of Birth 生年月日	Date of Joining. IPSA	Designation 職　名	Educational Qualification 学　歴
1.	Dr. Sarafat Hossain Khan	23, Dec., 1942	28, Sept., 1983	Director	B. Ag. (Dhaka)-1961 M.Sc. Ag. in Crop Botany (Cytogenetics) B.A.U.,-1964 Ph.D. in Genetics from U.S.A.-1974
2.	Dr. S. M. Ruhul Amin	24, March, 1940	28, Feb., 1987	Associate Director	B. Ag. (Dhaka)-1961 M.Sc. Ag.(D.U),-1963 in Soil Science Ph.D. in Plant Nutrition from Ankara Univ., Turkey -1973
Agronomy Department （農学科）					
3.	Dr. Abdul Hamid	30, June, 1950	6, Sept., 1983	Assoc, Prof.	B. Ag. (Hons.)B.A.U.-1970 M.Sc. Ag. in Agronomy, B.A.U.,-1972 Ph.D. in Agronomy from U.S.A.-1982
4.	Mr. Abul Hashem	5, Jan., 1956	17, Sept.,1985	Asstt. Prof.	B. Ag. (Hons.)B.A.U.-1978 M.Sc. Ag. in Agronomy, B.A.U.,-1980
5.	Mr. Md. Tajul Islam	1, July, 1955	15, Feb., 1987	Asstt. Prof.	B. Ag. (Hons.)B.A.U.-1978 M.Sc. Ag. in Agronomy, B.A.U.,-1980 M.Sc. in Agronomy from UPLB. Philippines, -1985

Nos.	N a m e 氏　名	Date of Birth 生年月日	Date of Joining. IPSA	Designation 職　名	Educational Qualification 学　歴
Genetics and Plant Breeding Department (植物育種遺伝学科)					
6.	Dr. Arunendra Bhowmik	2, March, 1952	4, April, 1984	Asstt. Prof.	B. Ag. (Hons.)B.A.U. -1972 M.Sc. Ag. B.A.U.,-1974 Ph.D. in Genetics and Plant Breeding, Bucharest,-1981
7.	Mr. Mohammad Ali	24, Feb., 1954	21, June,1983	Asstt. Prof.	B. Ag. (Hons.)B.A.U.-1974 M.Sc. Ag. in Genetics and Plant Breeding, B.A.U.,-1975 M.Sc. in Conservation & Utilization pf Plant Genetics Resources, U.K., 1981-1982
8.	Mr. Md. Shajahan Ali	25, Nov., 1958	2, Jan., 1984	Lecturer	B. Ag. (Hons.)B.A.U.-1979 M.Sc. Ag. in Genetics and Plant Breeding, B.A.U.,-1980
Plant Pathology Department (植物病理学科)					
9.	Dr. Md. Ismail Hossain Mian	22, April, 1951	18, June, 1985	Assoc. Prof.	B. Ag. (Hons.)B.A.U. -1971 M.Sc. Ag. in Plant Pathology B.A.U., -1972 Ph.D. in Nematology, U.S.A.,-1982
10.	Mr. Abdul Mannan Akanda	31, Dec., 1953	23, June,1986	Asstt. Prof.	B. Ag. (Hons.)B.A.U.-1974 M.Sc. Ag. in and Plant Pathology B.A.U.,-1975

Nos.	N a m e 氏　名	Date of Birth 生年月日	Date of Joining. IPSA	Designation 職　名	Educational Qualification 学　歴
Soil Science Department (土壌学科)					
11.	Mr. S.M. Peyara	30, March, 1937	21, June, 1983	Assoc, Prof.	B. Ag. in Soil Science, Botany-1959 M.Sc. Ag. in Soil Science,-1962 M.Sc. in Pedrogy & Survey from U.K. -1983
12.	Dr. Jamil Haider	1, Nov., 1953	7, June, 1984	Asstt. Prof.	B. Ag.-G.D.R.-1977 M.Sc. Ag.-G.D.R.-1979 Ph.D. in Microbiology, F.R.G.,1983
13.	Mr. A.j.M. Serajul Karim	15, Jan., 1954	15, Feb., 1987	Asstt. Prof.	B. Ag. B.A.U.-1977 M.Sc. Ag. in Soil Sci.,B.A.U.,-1979 M.Sc. in Soil Physics, Colorado State Univ., U.S.A. -1986
Horticulture Department (園芸学科)					
14.	Dr. Ayubur Rahman Chowdhury	15, March, 1950	1, June, 1985	Assoc. Prof.	B. Ag. (Hons.)B.A.U. in Horticulture -1971 M.Sc. Ag. in horticulture B.A.U.,-1972. Ph.D. in U.K.,-1980
15.	Dr. Mohamma A. Quadir	1, Aug., 1952	16, Nov., 1983	Asstt. Prof.	B. Ag. (Hons.)B.A.U. in Horticulture -1972 M.Sc. Ag. in Horticulture,B.A. U.,-1977. Ph.D. in Horticulture,U.S.A.,-1983

Nos.	Name 氏　名	Date of Birth 生年月日	Date of Joining. IPSA	Designation 職　名	Educational Qualification 学　歴
Entomology Department （昆虫学科）					
16.	Dr. Zinnatul Alam Chowdhury	29, June, 1950	5, June, 1984	Asstt. Prof.	B. Ag. (Hons.)B.A.U. -1972 M.Sc. Ag. in Entomology-1974 Ph.D. in Entomology U.S.A.,-1983
Statistics and Biometry Department（農業統計学科）					
17.	Mr. Khandaker Saif Uddin	31, Dec., 1953	7, May, 1985	Asstt. Prof.	B. Ag. (Hons.)in Statistics Chittagong Univ., -1975 M.Sc. in Statistics, Chitta., Univ., 1976
Agriculture Extension Department （農業普及学科）					
18.	Dr. A.K.M. Abdul Hannan Bhuiyan	16, Aug., 1944	14, Feb., 1987	Assoc. Prof.	B. Ag. (Hons.)B.A.U.-1967 M.Sc. Ag. in Entomology, B.A.U. 1969 M.Sc. in Extension & Education, UPLB Philippines, 1984. Ph.D.(Candidate) in Ext. & Edu.,UPLB Phil.,-1987
19.	Mr. Delwar Hossain	18, Jan., 1955	22, March 1984	Lecturer	B. Ag. (Hons.)in Economics, B.A.U. -1976 M.Sc. Ag. Ext. & Edc. B.A.U., -1977.

Nos.	N a m e 氏　名	Date of Birth 生年月日	Date of Joining. IPSA	Designation 職　名	Educational Qualification 学　歴
Crop Botany Department (作物学科)					
20.	Dr. Md. Abdul Khakeque Mia	1, June, 1951	16, Feb., 1987	Assoc, Prof.	B. Ag. in Crop Botany, B.A.U.-1972 M.Sc. Ag. in Genetics & Plant Breeding, B.A.U.-1974 PH.D. in Genetics, IARI,New Delhi -1985
21.	Dr. Md. Tofazzal Hossain	1, Jan., 1954	15, Feb., 1987	Asstt. Prof.	M.Sc. in Plant Breeding from USSR -1981 Ph.D. in Bio.Science & Genetics and Breeding, USSR-1985
Farm Section (附属農場)					
22.	Mr. Md. Abdul Jabbar Miah	21, Oct., 1946	15, Oct., 1985	SSO (Farm)	B. Ag. (Hons.) in Agronomy B.A.U. -1970 M.Sc. Ag. in Agronomy B.A.U. -1971 Diploma in Wheat Breeding, CIMMYT, Mexico,-1977
Administration, Accounts and Others Section (総務　経理部門)					
23.	Mr. Md. Gholam Hossain	5, Jan., 1948	1, March, 1986	Assistant Director (Accounts)	B. Com., 1967 M. Com., 1970
24.	Mr. Manjurul Haque	27, Jan., 1957	12 Jan., 1981	Assistant Engineer	Diploma Engineer(Civil) 1976

Nos.	N a m e 氏　名	Date of Birth 生年月日	Date of Joining. IPSA	Designation 職　名	Educational Qualification 学　歴
25.	Mr. Md. Abdul Karim	30, June, 1948	29, Dec., 1984	Head Assistant	B.A. -Dhaka University, 1972
26.	Mr. Awarul Kabir Choedhury	10, May, 1955	12, Jan., 1985	Security Supervisor	B.A. -Chittagong Univ., 1976
27.	Mr. Syed Zahurul Amin	10, Jan., 1959	9, March, 1987	Librarian	B.Sc. -1980 M.A. in Library Science Dhaka University -1982

＜参考資料＞

7. '87年研究実績Abstract一覧

ABSTRACTS

of papers presented in the Research Review Meeting
June 28-29, 1987

Institute of Postgraduate Studies in Agriculture
Salna, Gazipur

PLANT COMPETITION EFFECTS IN MAIZE AT A WIDE RANGE OF POPULATION DENSITIES

A. Hamid and A. Hashem

Evaluation of the nature and extent of plant competition and the effects thereof on the yield and yield attributes of maize was evaluated for two cropping seasons. Population densities ranging from 3 to 300 plants/m2 in 1985 and 4 to 400 plants/m2 in 1986 were accommodated in a systematic design. Plant growth parameters were studied throughout the growing season at a regular interval. Per plant grain yield was the prime determinant of yield per unit area at population densities higher than 10 plants/m2. As population density decreased, yield/plant increased progressively. Maximum yield (7.06 t/ha) obtained at 35 X 35cm spacing was the function of both per plant yield and population density. Sparse population less than 8 plants/m2 improved yield attributes and grain yield per plant but they could not keep the yield/unit area high. Per plant grain yield tended to level off at the densities less than 6 plants/m2 indicating that competition for the growth factors in maize is the minimum or absent when planted at 40 X 40cm or more spacing.

PLANT COMPETITION IN MUSTARD AT A WIDE RANGE OF POPULATION DENSITIES

A. Hamid and A. Hashem

Competition effects on grain yield and yield attributes of mustard (cv. TS-72) were evaluated at a wide range of plant densities accommodating 5 to 370 plants/m2 using a systematic design. Population influenced plant height but it was inconsistent. Plant height reduced drastically at closer spacing when population exceeded 122 plants/m2. Per plant number of branches decreased gradually with the increase in population density. Seed yield increased at sparse population reaching the highest (7.5 g/plant) at a population density of 7 plants/m2. However, the highest yield per unit area was recorded for the density of 88 plants/m2 (1.6 g per plant). Number of seeds per pod or number of pods per plant increased as space per plant increased but the grain size remained unaffected due to variation in population densities.

STUDY ON THE GROWTH AND YIELD OF SEVEN RAPESEED LINES

A. Hashem and A. Hamid

An observational trial with seven newly developed lines (NAP1 to NAP7) of Brassica napus during 1985-86 rabi season exhibited that NAP2, 5 and 6 produced nearly 1000 kg/ha and, rest all lines 500 to 600 kg seeds/ha. The line NAP3 matured 126 DAE, NAP4 130 and rest all 112 DAE. NAP 1, 2, 6 and 7 initiated flower between 23 and 33 DAE and others between 33 and 43 DAE. NAP2 had the longest floral duration of 70 days and NAP3 had the shortest of 30 days. Flower formation in all other lines except NAP4 was terminated after 73 DAE (40 days floral duration). Flower bud dvelopment continued till 93 DAE in NAp1, 2, 3 and 4 but was terminated after 53 DAE in NAP5 and 63 DAE in 7. Maximum LAI and dry leaf weight were observed 53 DAE in all the lines. NAP4 produced more seedless pods and unfilled seeds.

DEVELOPMENT AND DRYING PATTERN OF SPIKELETS OF FIVE VARIETIES OF LATE PLANTED WHEAT

A. Hashem, A. Hamid and R. Matsunaga

A field experiment carried out at IPSA Farm during 1986-87 winter season with four seeding times viz., Nov 30, Dec 15, Dec 30 and Jan 1, and five varieties of wheat viz., Ananda, Kanchan, Barkat, Akbar and Aghrani revealed that grain yield and yield attributes decreased with delayed seeding. The grain yield did not differ due to varieties. Interaction of seeding time and variety resulted in gradual decrease of grain yield and yield attributes of varieties with delayed seeding. The variety Aghrani gave higher yield when seeded on Nov 30. As the seeding time was delayed, the extent of grain yield reduction was 10% in Dec 15, 35% in Dec 30 and 48% in Jan 15 seeding compared to Nov 30. None of the varieties were found suitable for seeding after Dec 15. Maximum leaf area of Nov 30 and Dec 15 was observed at 53 DAE and, Dec 30 and Jan 15 at 43 DAE. The plants in Nov 30 retained about 38% green leaf area till 83 DAE while it was vanished in Dec 30 and Jan 15 seeding before 73 DAE. Spikelets of Dec 30 and Jan 15 seeding dried faster than Nov 30 and Dec 15. The former two retained only 13% moisture at maturity (80 DAE) while latter two about 30% moisture till 86 DAE. Dry matter accumulation followed a reverse pattern to drying pattern. Because of faster reduction in leaf area and spikelet moisture, Dec 30 and Jan 15 seeding matured about one week earlier than Nov 30.

DEFOLIATION EFFECTS ON YIELD FORMATION OF *Brassica campestris*

A. Hamid

Mustard (*Brassica campestris*) plants (cv. SS-75) completely defoliated after first flowering were compared with those retaining leaves intact. The study was conducted in the winter season of 1984-86. Variation in number of branches per plant, pod weight, pod-seed ratio and seed size due to treatments were not statistically significant. Grain yield remained unaffected due to defoliation indicating that leaves have little or no direct influence on the yield formation of mustard.

EFFECT OF DEFOLIATION ON THE YIELD PERFORMANCE OF MAIZE

A. Hashem and A. Hamid

A field experiment was conducted at IPSA Farm in the Kharif season of 1986 to study the influence of defliation on the dry matter production, grain yield and yield attributes of maize (cv. Barnali). Uniform plants having identical growth stage and six variable defoliation treatments imposed. Defoliated plants reduced total dry matter contents in general. Lowest dry matter content was recorded for the totally defoliated plants. Grain weight per ear and grain size obtained from undefoliated treatments were significantly higher than those of defoliated plants except the treatment where the leaf blades beneath the ear were removed. Defoliation beneath the ear was as good as no defoliation. But defoliation above the ear was as harmful as removing all the leaf bladee except those of the leaves adjacent to the ears. Complete defoliation reduced grain yield to the extent of 60%.

NITROGEN AND CARBAFURAN EFFECTS ON THE GROWTH AND YIELD PERFORMANCE OF MUNGBEAN

A. HAMID

Studies were carried out both in the semi-controlled environment and in the field to evaluate the influence of nitrogen and carbafuran on the growth, dry matter partitioning and yield of mungbean. Both nitrogen and carbafuran increased leaf area, leaf N cntent, NAR, dry matter, most of the yield attributes and grain yield. Dry matter accumulation during the reproductive phase was significantly influnced by nitrogen and

carbafuran, and method of N application. Plants treated with nitrgen fertilizer and carbafuran pruduced higher amount of dry matter after flowering; but gave low harvest index values compared to control. The results suggest that mungbean yield can be substantially increased through efficient dry matter partitioning employing agronomic manipulations.

EFFECT OF N FERTILIZATION ON THE FLOWER ABSCISSION AND YIELD FORMATION OF MUNGBEAN

N. Islam, A. Hamid and A. Hashem

Mungbean yield is greatly constrained by limitation of nutrients particularly nitrogen during the reproductive stage. An investigation to this effect was carried out in the Kharif season of 1986 with variable dozes and methods of N fertilization. Number of flowers set per plant did not differ markedly due to treatment differences. Basal application of N followed by foliar spray of urea once or twice in reproductive phase reduced flower abscission significantly. Pod abortion remained unaffected by the rate and method of nitrogen application. Grain yield of mungbean was highest when the crop was treated with 40 kg N/ha as basal dose and 40 kg N/ha as urea sprayed twice during flowering time. Yield was inversely related to the numbers of flowers aborted. Increase in neither basal dose nor the foliar application of N alone increased grain yield of mungbean.

EFFECT OF MOISTURE REGIMES ON THE EMERGENCE OF MUNGBEAN SEEDS ON THREE SOIL TYPES

T. Islam, A. Hashem, A. Hamid and R. Matsunaga

A laboratory experiment carried out at IPSA in 1987 with three soil types viz., Jamuna Floodplain (Palima, Tangail), Deep Red-brown Terrace soil (IPSA Farm) and Nearly levelled Terrace soil (Amnura, Rajshahi) and four simulated moisture regimes viz., Field Capacity (FC), 75% FC, 50% FC and 25% FC to test the emrgence rate of mungbean seeds indicated that Tangail soil had 92% emergence followed by Rajshahi (68%) and IPSA Farm (62%). Highest emergence rate was recorded in the moisture regime of FC (96%) closely followed by 75% FC (94%) and 50% F (79%). Lowest emergence rate (27%) was recorded in 25% FC. Interaction of soil type and soil moisture regimes showed that emergence rate increased with increase in soil moisture content upto FC in all soil types. The emergence rate of Tangail soil at 25% FC was 82% compared to no emergence in two other soils. The emergence rate at 50% FC of Tangail soil was as good as FC and better than 75%

FC of any soil. It was clear that at least 75% FC is necessary in Rajshahi and IPSA Farm soil for 90% or more establishment while 50% FC moisture in Tangail soil appears adequate.

ROOT GROWTH OF MUSTARD IN A COMPACT CLAY SOIL UNDER VARIABLE WATER REGIMES

A. Hamid, A. Hashem and R. Matsunaga

Ramification of root systems of three varieties of mustard (viz., SS-75, TS-72 and Tori 7) in a heavy clay soil was studied at four variable soil water regimes during 1986-87 growing season. The soil was compact having bulk density values ranging from 1.31 to 1.82 g/cm3. Root growth in terms of depth of penetration and number of roots was greater when plants grown without irrigation for varieties SS-75 and TS-72. In most cases roots did not penetrate beyond 50cm. Irrigation tended to reduce the root growth in general. Distribution of roots was also affected by irrigation regimes. When irrigation was applied once or twice, most of the roots developed within 0-20cm of the top soil. In case of variety Tori7 more root growth was found when the crop was irrigated three times; but regardless of water regimes, this variety developed root system poorly compared to other two varieties.

Root system development seemed to have no or least influence on the grain yield of mustard. Highest yield (586 kg/ha) was recorded for the crop when it was irrigated thrice. Non-irrigated crop produced the lowest yield (183 kg/ha). Varieties did not differ significantly in yield but the interaction between the varieties and water was significant.

STAND ESTABLISHMENT OF SUMMER MUNGBEAN IN BANGLADESH

A. Hamid, Manik L. Banik and A. Hashem

Drought or exceeasive rainfall following planting of mungbean seeds causes poor and uneven germination, increased seedling mortality, and poor growth. Rate of germination (46%) of mungbean seeds as obtained under field condition differed markedly with that recorded in a laboratory test (88%). The rate of emergence, however, varied depending on the moisture content and bulk density of soil. Highest rate (62%) of seedling emergence in the field was observed in the soil having bulk density of 1.22 g/cm3 at a moderate moisture content (0.38cm3/cm3). Rate of seedling emergence declined appreciably at

soil moisture content beyond 0.45 cm3/cm3 or below 0.26 cm3/cm3. Soil submergence resulted in either failure or reduced germination. Tillage accentuated submergence injury. Plants grown without tillage recovered from submergence or soil saturation six days earlier.

In a sandy soil water table below 50cm resulted in poor growth, and increased plant mortality and reduced pod setting while in clay soil, growth and seedling vigor improved with increased depth of water table upto 100cm. Per plant root volume (10.70 cm3) and grain yield (5.38 g) were almost double at a water table depth of 100cm compared to plant grown in clay soil having a higher water table (20cm).

MULCH AND TILLAGE EFFECT ON ROOT GROWTH AND WATER UPTAKE BY COWPEA

A. Hamid

Root growth, water uptake and yield performance of cowpea were investigated under variable tillage systems with or without mulch cover on a rapidly drying heavy textured soil. Grain yield of cowpea was related to root growth and water uptake patterns.

Rooting density was more with tillage than without it. Conventional and reduced tillage produced identical root length densities. Cowpea without mulch produced deeper root system while roots tended to concentrate in the upper layers under mulch cover. Soil moisture depletion from the deeper layers was enhanced by greater ramification as produced under conventional and reduced tillage system. There was little difference in the total water depletion from the profile due to tillage and mulch. However, mulching in general resulted in better growth and increased grain yield. Reduced and conventional tillage systems also improved yield performance. Cowpea yield and associated attributes were influenced by the root system development but remained unaffected by the amount of moisture depletion from the profile.

EFFECT OF WATER TABLE ON THE ROOT GROWTH AND YIELD PERFORMANCE OF MUNGBEAN

Manik L. Banik, A. Hamid and A. Hashem

Mungbean being an upland crop its growth and yield performance particularly when sown on high and medium high land

is greatly influnced by hydrological conditions. Mungbean plants (cv. Mubarik) were grown in plastic tube (22cm dia) of variable heights with simulated water table underneath and compared. Root growth and yield attributes were depressed as the water table was closer to the roots. All the plant factors excepting number of branches per plant and pod length were found to be affected at varying degrees by the depth of water table. Higheat seed yield (5.4 g/plant) was obtained for the plants having water table depth of 100cm. Yield reduction due to closer depth was 39% for 20cm and 13% for 50cm.

ENTONOLOGY

POLLINATING BEHAVIOUR OF HONEYBEE (*Apis indica* F) AND ITS INFLUENCE ON SEED PRODUCTION OF CAULIFLOWER

M.Z. Alam, M.A. Quadir and M. Ali

In cauliflower, during full blooming stage and at pick activity period, the bees from open hives spent more time per flower (9.03 sec) compared to bees in caged condition (6.69 sec). Times spent per plant by a bee was 160.80 sec and 149.00 sec in cages and in open condition, respectively. However, the number of flowers visited per minute was higher in cages compared to bees in open condition. A higher percent of filled seed was produced in flowers pollinated by bees in open conditions (69.7) compared to flowers pollinated by bees in cages condition (54.2). Flowers in the control treatment produced the lowest seeds (24.6%). Open pollinated plants produced longer siliqua compared to cages pollinated and control plants. No variation was observed for 1000-seed weight. The number of seeds per siliqua tended to be higher in open pollinated flowers followed by flowers pollinated in caged condition. Very few seeds per siliqua were found in the control. The increased seed yield found in open pollinated condition reflects the better pollinating activities of honeybees where they remain free rather than confinement.

EFFECT OF BEE POLLINATION ON SEED PRODUCTION OF CARROT (*Daucus carota* L)

M.Z. Alam, M.A. Quadir and M.S. Ali

The maximum number of honeybee visited carrot flower at morning hours of the day. Similar trend was also found with the other insect visiting carrot flower. Pollinating effects of other insects were very insignificant as compared to honeybee. Increase in seed yield in freely pollinated umbels by honeybees over control was 14.99 times and 10.26 times more in respect of number and weight of the seeds. For obtaining good seed yield o carrot, it is better to encourage bee visitation through transportation of hives near the vicinity of the field.

ROLE OF HONEYBEE IN FRUIT AND SEED SETTING OF BOTTLEGOURD, *Lagenaria siceraria* (Mol.) Standl.

M.Z. Alam and M.A. Quadir

The percentage of success in marketable fruit setting of bottlegourd were 15.00 and 8.33 for flowers pollinated by honeybee and flowers pollinated by hand, respectively. The percent of fruit setting in isolated flowers were 5.00, 3.33 and 3.33 for mosquito net, paper bag and polythene bag, respectively. Flower pollinated by honeybee resulted the highest percentage (60.35) of filled seeds compared to hand pollinated flowers (49.55) and isolated flowewrs (15.62 to 57.80).

BEHAVIOUR OF POLLINATORS AND THEIR PERFORMANCE ON ONION SEED PRODUCTION.

S.S. Alamgir and M.Z. Alam

To estimate of visitation of onion flower by honeybees (*Apis indica* and blow flies (*Calliphora* sp.), replicated caged plots (6.0m x 4.5m) were used. Observations were recorded thrice daily (8.00-11.00 a.m., 11.00-2.00 p.m. and 2.00-5.00 p.m.) from February 6 to March 7, 1985. Air temperature during this period was ranging from 21-29 C. On the basis of 17 days observation, a honeybee visited 407 onion flowers during its visiting hours in a day and spent 5.5 sec per flower. A blow fly on the other hand visited 300 flowers and stayed 7.6 sec per flower.

Significantly higher percent of filled ovaries were harvested in blow fly pollinated plots (61.00%) compared to open pollinated (49.5%), honeybee pollinated 49.0%) and untreated control plots (42.20%). The seed weight per umbel were 3.20g. 2.20g, 1.59g and 1.10g in blowfly pollinated, honeybee pollinated, open pollinated and untreated control flowers, respectively.

EFFECT OF POLLINATION ON SEED FORMATION IN SUNFLOWER

M.Z. Alam

A set of 8 sunflower discs in two rows were isolated in a mosquito netted cage (7.5 ft x 6.5 ft x 5.5 ft) before the flowers open. Six such cages, with 8 unopen discs were built in a randomized complete block design. Three of them were provided with beehives as soon as the flowers started opening and continued till flowering has been completed. The rest three cages were left without any pollinators (control). Another 3 sets of 8 such discs were tagged and kept for open pollination by bees and few other pollinating insects. The test was conducted at IPSA in 1985.

During their visit honeybees spent 4-10 secs per flower depending on the time of the day temperature and the availability of nectar and/or pollen. Nectar collecting bees spent more time than pollen collecting bees. Open pollinated discs gave significantly higher yield followed by honeybee pollinated and controlled discs. Lack of pollination increased the formation of empty seeds in sunflower. Both open and bee pollinated discs yielded a higher percentages of seeds with kernel in the outer zones of the discs followed by middle and central zones. Yield of sunflower was positively related to bee pollination and the biological peculiarities of the flower.

MASS REARING OF BLOWFLY, *Calliphora* sp. (Diptera : Calliphoridae) ON COW LUNG

S.S. Alamgir and M.Z.Alam

A mass rearing technique of blowfly was tried on a cow lungs at IPSA. A locally purchased cow lung was kept on a earthen pot containing sand at the bottom and placed in a 1.0m x 1.0m net house. Five cow lungs were placed in diffferent times in the months of November 1984 through February 1985. Data on temperature, duration on egg laying, incubation period, larval and pupal stage along with adult longivity were recorded. Average egg laying period, incubation period, duration of larvae, pupae and adult stages were 1.4, 1.5, 6.5, 7.0 and 4.0 days respectively wit an avarage temperature of 29 C and R.H. of 84%. On an average 5000 pupae per lung were harvested.

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EFFECT OF ONION SEEDS PRODUCED BY DIFFERENT POLLINATING AGENTS ON ONION PRODUCTION IN SUBSEQUENT GENERATION

M.Z. Alam

A experiment was undertaken to evaluate the effect of seeds obtained from natural pollination, bee pollination, blowfly pollination and controlled (mosquito netting) pollination on onion production in subsequent generation. This was determined on the basis of 4 parameters viz. percent germination, average bulb size, average bulb weight and yield. Seedlings of the 4 treatments were planted at IPSA experimental field in 1985. All but controlled pollination treatments were statistically similar in respect of all the parameters tested. The seeds from control were inferior in all parameters.

SCREENING OF MANGO AGAINST MANGO FRUIT WEEVIL, *Sternochetus frigidus* F.(Curculionidae: Coleoptera) IN GAZIPUR

M.Z. Alam and M.A. Quadir

A study was conducted to screen ripe mangoes against mango fruit weevil from 12 localities surrounding Gazipur. Mango samples were collected from the local market (Joydebpur Bazar, Porabari Bazar, Mirzapur Bazar) during mid mango season (June 1984). Mango samples were purchased randomly and the name of the locality was recorded. Data on average pulp thickness, fruit weight and percent infestation were recorded at IPSA laboratory. The samples collected from localities north to Gazipur had more than 30% infestation. Samples from other localities east, west or south to Gazipur had less mango fruit weevil infestation. There was no relationship between pulp thickness or fruit weight and infestation.

AN INVESTIGATION ON THE AVAILABILITY OF MALE STERILE ONION IN BANGLADESH

M.Ali, M.A. Quadir and S.H. Khan

An exploratory trip was undertaken in the onion seed producing areas of Rajshahi during 1983-84 growing season to identify and collect male-sterile onions. Suspected male-sterile plants, identified through poor to nil pollen availability on the umbel at full bloom stage were collected. Pollen from such plants were microscopically tested for confirmation of sterility. Out of the plants collected from a population covering more than two hecteres of land, one plant was found completely sterile whereas the other two were intermediate in terms of pollen viability and availability. The immature anthers of male-sterile plant were translucent-green in contrast to the more yellowish in normal ones. Perianth segments of male-sterile flowers were less open than that of male-fertile ones. If this sterility is due to interaction of cytoplasmic and chromosomal recessive factors as in Italian Red 13-53 and can be maintained, a hybrid breeding programme can be taken to improve the poor bulb yield of onion in Bangladesh.

CYTOLOGICAL INVESTIGATION ON THE NATURE OF MALE STERILITY IN ONION (*Allium cepa* L.)

S.H. Khan, M. Ali and M.A. Quadir

A cytological study on pollen development in the normal and male-sterile flower bulbs of onion was conducted to ascertain the possible mechanism involved for sterility. Meiosis in buds of varying sizes in both normal and male-steriles were normal upto the tetrad stage. Post-meiotic development in the normal was rapidly completed and the microspores developed rapidly to show their exine/intines while still enclosed within the PMC wall which also ruptured qickly. Development proceeded further to complete the pollen mitosis and showing the germinating pore, exine and intine distinctly. Generative and vegetative nuclei attain their structural distinctiveness at flower opening. In the male-steriles, however, further development of microspores was arrested immediately after tetrad formation with the bud tissue still growing resulting in larger bud sizes. A general disorganization of nuclear material started. One or two microspore(s) at this stage showed nucleus/nuclei as a condensed body. With the development of flower bud, a general vacuolation started within the nuclear material and nuclear membranes of the

microspores disappeared while the PMC wall still persisted. Nuclear material was lost rapidly diminishing in size ultimately to disappear completely. The cytoplasm of the microspores was the microspores still encaged in the PMC wall. The degeneration was completed with 100% pollen sterility.

STUDY ON THE MODE OF POLLINATION AND ROLE OF POLLINATING AGENTS IN LOCAL ONIONS

B.R. Banik, S.H. Khan and M. Ali

To find out one of the possible genetic causes of poor bulb yield of local onions, one experiment was carried out to assaes the mode of pollination and role of pollinating agents in the pollination of Bhati and Taherpuri varieties in 1985-86 growing season. The variety, Taherpuri was found better than Bhati for seed production. Among eight different treatments, open-pollination was found better than any other treatment. In absence of self pollen, upto 87% cross fertilization can be achieved with honeybee under caged condition. Wind contributed 10 and 60 percent towards cross-pollination for the variety Taherpuri and Bhati, respectively. This indicated that the pollen of te later variety as nonsticky type. Self-pollination by wind and gravitational force in Taherpuri and Bhati was 30 and 18%, respectively. Honeybee was found very effective for pollination of Taherpuri variety while wind alone contributed most towards pollination in Bhati. These two factors contributed substantially in the total pollination. Quite a high percentage of self-pollination may take place in absence of pollinating insects in the seed field and result in poor seed set as well. Caging influenced pollen viability and seed set.

EFFECT OF POSITIVE AND NEGATIVE SELECTION OF MOTHER BULB ON THE SEED AND BULB YIELD OF ONION

M. Ali, M.A. Quadir, A.R. Choudhury and M.Z. Alam

To know one of the possible causes of poor bulb yield of onion, four different experiments on the effect of bulb size on seed and bulb yield were conducted during 1984-85 to 1986-87 growing season. Seed bulbs of different sizes were grown both in open and control condition using honeybee for free pollination or pollination within the population, respectively. Number of umbels/plant, number of filled and unfilled ovary/umbel, number

of seeds/umbel and weight of seeds/plant were significantly influenced due to bulb size either in open or control or in both growing conditions. Seed production/plant was higher when the plants were pollinated under caged condition using honeybee than that harvested from open pollinated flowers. When the bulbs were grown from the seed produced in open or controlled pollinating condition, no significant yield advantage was observed due to mother bulb size. However, an inconsistant bulb yield increase by 10-30% from seeds of large bulb over that from small bulb was recorded within this one generation of selection.

ASSESSMENT OF YIELD LOSS OF EARLY ONION DUE TO LACK OF UNIFORMITY IN SIZE AND MATURITY

M. Ali and K. Saifuddin

An investigation was made to assess the yield loss of early Taherpuri onion normally produced by using small bulbs during 1986-87 growing season. Due to lack of selection for uniformity of bulb size a considerable percentage of small bulbs ranging from 3.85 to 11.3 g each was recorded. Due to poor size of these bulbs estimated yield loss was 60-70% depending on harvest time, when expected uniform large bulb was considered within the range of 11.4 to 23.3 g each. When the bulbs were stored from the market for a month 6-13% more moisture loss was observed in immature bulbs than that of mature ones and it would have been even more if onions could be collected from the growing field just after harvest.

HETEROSIS IN WHEAT

A. Bhowmik and M.S. Ali

A full diallel cross combination was obtained using eight parents, namely Ananda, Balaka, Ciano 79, Dirk, Kanchon, Kheri, Sonalika and Sonora 64 in 1984-85. The F_1's were studied for five characters. Both positive and negative heterosis were observed over better parent for all the characters studied. Out of 56 combinatins almost all the crosses showed positive heterosis for grain yield/plant. The maximum heterosis was observed in the cross Dirk x Kheri (182.91%). For heading date most of the crosses showed negative heterosis indicating the dominance of earliness. Ciano 79 x Ananda showed maximum heterosis for 100-kernel weight (55.75%). For plant height most of the crosses showed negative heterosis. The significant positive heterosis was

observed only in ten crosses. For tiller number/plant most of the crosses showed positive heterosis. The maximum heterosis was observed in Kheri x Ananda (141.70%).

GENETIC ANALYSIS OF HEADING DATE AND KERNEL WIGHT IN WHEAT

N.S. Ali and A. Bhowmik

A full diallel cross was made to study the genetic components of variation in wheat for heading date and kernel weight. The highly significant value of D, H1 and H2 suggested the importance of both additive and dominance effects in the inheritance of heading date. For days to flower, D, H1 and H2 were not significant but the values of 't' was close to 1.96, indicating the importance of both additive and dominance variation. The significant and positive value of F indicated an excess of dominant alleles present in the parents than the recessive alleles. The heritability in broad sense was 90% and 96.21% for heading date and kernel weight, respectively. The Vr, Wr graph showed wide genetic diversity among the parents.

GENETIC ANALYSIS OF FLOWERING-TIME IN TOMATO

A. Bhowmik, M.S. Ali and S.H. Khan

The genetic analysis of flowering-time was studied in a 6-parent diallel cross of tomato. The variance component analysis showed the importance of both additive and dominance genetic variance in the inheritance of this character. The asymmetrical distribution of the positive and negative alleles at all loci was found. The character was observed to be controlled by one to two genes or groups of genes exhibiting dominance. The heritability in broad sense was 76.98%. The graphical analysis indicated the wide genetic diversity among the parents. The regression coefficient indicated the non-allelic interaction among the genes.

HYBRID VIGOUR IN TOMATO

A. Bhowmik, M.S. Ali and S.H. Khan

A full diallel cross combination was made using six parents, namely Japanese, K 7, FR 2, CT 1, Cl 143-0-10-3 and World Champion in 1984-85. The F1's were studied for eight haracters in 1985-86. Both positive and negative heterosis were found over better parent for all the characters. Almost all the crosses showed positive heterosis over better parent for fruit yield per plant. A good number of crosses showed positive heterosis for total number of fruits per plant and individual fruit weight. For plant height only few crosses showed positive heterosis over better parent. For days to flower, out of 30 crosses, 20 showed negative heterosis over better parent. This study indicated the possibility of exploiting hybrid vigour in tomato.

COMBINING ABILITY ESTIMATES IN TOMATO (*Lycopersicon esculentum*)

A. Bhowmik, M.S. Ali and S.H. Khan

A six parent full diallel cross was obtained to study the combining ability for eight characters. The combining ability analysis was carried out according to method 1 and model 1 of Griffing (1956). The difference due to genotypes, gca and sca was highly significant for all the eight characters. Reciprocal differences were observed for five characters only. The predominant role of additive genetic variance was observed for all the traits. Parent Cl 143-0-10-3 showed greater magnitude of gca effects for yield per plant, fruit number per plant, number of branches per plant and days to flower.

PLANT SELECTION FROM F_2 GENERATION OF TOMATO

M.S. Ali and A. Bhowmik

Thirteen F2 plants were selected on the basis of fruit yield per plant and yield contributing characters from a F2 population comprising of 18 cross combinations of tomato in 1986-87. All the selected plants exhibited higher fruit yield per plant than all the parents used in the crosses. Fruit yield per plant, number of

fruits per plant, average fruit weight and fruit bearing branches per plant ranged from 3.17-5.56 kg, 27-70 numbers, 60.33-150.27 g and 6-14 number, respectively. Japanese x CT 1/3-18 exhibited the highest fruit yield per plant (5.56 Kg) and the highest average fruit weight (150.27 g). World Champion x FR 2/1-1 produced the maximum number of fruits per plant. Japanese x World Champion/1-3, CT 1x FR 2/1-1 and CT 1 x Japanese/1-1 showed earliness in flowering as well as maturity.

GENETIC ANALYSIS IN COUNTRYBEAN

M.S. Ali and A. Bhowmik

Heterosis, combining ability and inheritance study were performed on three characters, namely days to flower, number of pods per plant and yield per plant in a 4-parent half-diallel cross of countrybean. The variance due to gca and sca were significant for all the characters studied, indicating the presence of both additive and non-additive gene effects. The parent RARS 2 was the best general combiner for number of pods per plant and yield per plant. RARS 2 x Mirsarai 9 showed significant positive sca effects for both number of pods per plant and yield per plant. The cross RARS 2 x Mirsarai 9 also exhibited high heterosis over both mid- and better parents for number of pods per plant and yield per plant. Significant negative heterosis was also found in this cross for days to flower.

The components of variation estimates showed the importance of additive variation for inheritance of days to flower, but for inheritance of number of pods per plant and yield per plant the presence of non-additive (dominance) variation was found. The asymmetrical distribution of the positive and negative alleles at all loci was found in all the characters studied. The highest narrow-sense heritability value (45.68%) was found in yield per plant. The graphical analysis indicated wide genetic diversity among the parents in all the characters.

DIALLEL ANALYSIS IN EGG PLANT

A. Bhowmikand M.S. ALI

A four parent half diallel cross was made to study the combining ability in egg plant. The mean squares due to both gca and sca were highly significant suggesting the additive and non-

additive gene effects for all the traits. The parent P4 was a good general combiner for individual fruit weight and yield per plant. The analysis of genetic components of variation suggested that the dominance was important for fruit number and fruit weight. The asymmetrical distribution of positive and negative alleles at all loci was found for fruit number and fruit weight. The graphical analysis indicated the wide genetic diversity among the parents.

HORTTICULTURE

EFFECT OF SOWING DATE ON FLOWERING TIME OF COUNTRYBEAN

A.R. Chowdhury and M. Ali

Seeds of three countrybean strains JER, JEW and Sylhet were sown on the 1st day of each month from May '86 to April '87. JER and JEW took almost same time from sowing to 1st flowering. These two strains took about 56, 55, 49, 55, 59, 71, 70, 54 and 38 day to flower when sown on the 1st of each month. The strain Sylhet, however, flowered in mid September when seeds were sown either in May, June or July requiring respectively 135, 110 and 75 days from sowing to flowering. This strain took 80, 70, 60, 45, 54, 45 and 35 days when seeds were sown in August, September, October, November, December, January, February and March, respectively.

FLORAL BIOLOGY OF COUNTRYBEAN AND ASPECTS OF ITS POLLINATION

A.R. Chowdhury, M.Ali, M.A. Quadir and A. Hussain

Floral biology of countrybean and aspects of its pollination were studied at IPSA in 1986-87. The strains used were Sylheti, Kartika and JER. In almost every cases Sylheti and Kartika produced similar results while the floral characters of JER widely differed from those of the former two in respect of number of flower buds per inflorescence and number of nodes per inflorescence. The results revealed that successful pollination can be done at any time of the day; bagging after emasculation gave a higher percentage of fruit set than without bagging. Among other things optimum developmental stages for pollen, stigma and flower bud for successful pollination were worked out.

DEVELOPMENT OF EARLY/YEAR ROUND VARIETIES OF COUNTRYBEAN

A.R. Chowdhury and M. Ali

A breeding programme was initiated in 1984 making direct and reciprocal crosses between JER and Kartika, and JER and 0015 to combine 'year-round fruiting habit' of JER - a very inferior strain, to the good strains.F1 plants were grown in 1985 in which some of the crosses produced fruits with intermediate size and high fibre content (as with JER). Eightyfive F2 plants from each of the crosses were grown in 1986. Based on earliness, fibre

content and fruit size, 10 most suitable plants from F2 of JER x 0015 were selected while other crosses were rejected since thay failed to produce suitable combination. Most of the 10 selected plants produced flowers in the first week of August and their fruits reached harvestable maturity later in August. F3 seeds from the selected plants were grown in the same year to advance one generation. F3 and F4 plants will be grown in 1987-88.

IMPROVEMENT OF LOCAL CAULIFLOWER STRAINS THROUGH MASS SELECTION

A.R. Chowdhury

Seeds of local cauliflower strains that are capable of producing seeds in Bangladesh condition were collected and grown in different dates at Hathazari, Chittagong in 1981-82 and at Joydebpur in 1982-83 for evaluation. In both the experiments phenotypic uniformity in most of the strains was almost absent. It was revealed that the varietal names like Kartika, Agrahayni, Poushali etc. are vague and misleading since all the strains reached harvestable maturity at similar time when planted at a same date. Based on yield and uniformity in maturity, plant type, and curd form, 20 plants of the accession CF0001 were selected in 1982-83. After 4 cycles of mass selection uniformity for the desired characters was almost reached in 1985-86. Mass selection is also being carried out in other three accessions CF0002, CF0004 and CF0007 from 1983-84 at IPSA.

STUDIES ON THE SEED VIABILITY OF LOCAL ONIONS AS INFLUENCED BY DIFFERENT STORAGE CONTAINERS

M.A. Quadir, M. Ali and M.K.U. Mollah

Seeds of both Bhati and Taherpuri variety were kept at eight different containers namely, single layeed polythene, double layered polythene, refrigerator (in single layered polythene), brown coloured bottle, colourless bottle, tin container, earthen pot (ordinary), glazed earthen container and plastic bottle. Germination tests were recorded bimonthly starting from mid-January and this was done in soil and in petridish. It was observed that the germination percentage of both the variety decreased as the time advances. The final germination percentage at the time of sowing revealed that the seed stored in brown coloured bottle, colourless bottle, and in refrigerator (in single layered polythene) retained good viability (germination

rate more than 75%). For variety Bhati in addition to the three containers, the seed stored in plastic bottle also showed good viability.

EFFECT OF BULB SIZE ON SEED PRODUCTION OF TWO ONION CULTIVARS

M.K.U. Mollah, M.A. Quadir and M. Ali

With a view to determine the suitable bulb size for seed production of two onion cultivars namely Taherpuri and Bhati, an experiment was conducted at IPSA, Salna, Gazipur during 1984-85. The variation due to bulb size resulted significant influence on number of umbels per plant and seed yield per plant and per unit area. Significant variation was also observed between varieties for seed yield. Large, medium and small sized bulbs produced 450.00, 400.00 and 316.67 Kg of seeds per hectare. Taherpuri produced 485.18 Kg of seeds per hectare compared to 292.60 Kg of seeds produced by Bhati. Large and medium sized bulbs of Taherpuri yieled more seeds than small bulbs whereas for Bhati, only large sized bulbs resulted good yield.

EFFECT OF DIFFERENT DEGREES OF DEFOLIATION ON THE YIELD OF A DETERMINATE VARIETY OF TONATO - RUMA VF

M.A. Quadir and M.Z. Alam

Twentyfive percent and 50% leaf removal were done at the vegetative and floweing stage of a determinate variety of tomato namely Ruma VF. Data on fruit harvest indicated that removal of 25% of the leaf during flowering stage resulted increased fruit yield compared to control and other treatments. Removal of 50% leaf during vegetative stage also resulted higher yield whereas removal of 25% leaf during vegetative stage showed similar yield compared to control plants. However, fruits harvested from plants of different defoliation treatments did not show any significant difference in terms of percent soluble solids and pH.

ROOTING INITIATION OF DIFFERENT CUTTINGS BY DIFFERENT GROWTH REGULATORS

M.A. Quadir and M.S. Ali

IBA, IAA, Atonic and Miraculan at different concentration were used for root initiation in different soft and hard wood cuttings. IBA seems to be most effective at 50 ppm concentration for soft wood cuttings. Teasle gourd cuttings when soaked for 24 hours produced profuse rooting at this concentration. However, none of the treatments induced any rooting for hard wood cuttings like Thuja.

YIELDING ABILITY OF THREE LADY'S FINGER CULTIVARS

M.A. Quadir, M. Ali and M.S. Ali

In order to determine the yield potential of two exotic varieties of lady's finger namely Pusa Sawani and Pentagreen, compared to a local one, a trial was conducted at the IPSA farm during the summer season of 1984. The variety Pusa Sawani was found to excel in all yield contributing characters compared to Pentragreen and the local one. The average number of fruits and yield per plant and in turn the total number of fruits and yield per hectare of the variety Pusa Sawani seems to be encouragingly higher than the other two varieties. Pentagreen, the other exotic variety performed poorly in all characters compared to the local one. However, the average fruit weight seems to be similar for all three vareties.

COMPARISON OF AN ADVANCED LINE OF HYACINTH BEAN WITH A STANDARD VARIETY, KARTIKA, REGARDING INCIDENCE OF DISEASES

I. H. MIAN

Anthracnose (Colletotrichum lindamuthianum), cercospora leaf spot (Cercospora sp) and bean yellow mosaic virus are the common diseases of hyacinth bean in Bangladesh. Among them anthracnose is considered to be the major disease. It can attack any part of the plant but infection on fruits is most notable. Data on the incidence of the three diseases were recorded from an experiment established at BARI Testing Station, Paharioli, Chittagong. The objective of the experiment was to evaluate an advanced line of hyacinth bean. The check variety was Kartika.

The field was free from bean yellow mosaic virus and incidence of cercospora leaf spot was not coniderable.

The severity of anthracnose on fruits was considerable and percentage of fruits under different severity groups were determined just after harvest. The severity was estimated on a 0 - 5 scale, where 0 represented fruits free from anthracnose, 1 = less than 1% fruit surface affected, 2 = 1 - 5% fruit surface affected, 3 = 5 - 10% fruit surface affected, 4 = 10 - 20% fruit surface affected, and 5 = more than 20% fruit surface is affected by the disease. Both the materials of hyacinth bean were affected by anthracnose. More than 65% fruits of kartika were healthy whereas 48.12% fruits of the advanced line were free from the disease. The fruits under severity groups 1 and 2 were 13.96% and 8.20% in case of advanced line and 5.6% and 11.2% in case of kartika, respectively.

COTTON OILCAKE AMENDMENT TO SOIL FOR ONTROL OF ROOT-KNOT NEMATODES ON POTATO.

R. ALI and I. H. MIAN

The effects of cotton oilcake amendment to soil on plant growth, tuber yield and incidence of root-knot (Meloidogyne incognita, M. javanica) in potato studied under a pothouse experiment. The oilcake was used at the rate of 0%, 0.125%, 0.250% and 0.500% viz. 0, 2.5, 5.0 and 10.0 ton/ha with and without N-P2O5-K2O at the rate of 80-60-120 kg/ha respectively. Soil infested with a mixed population of the root-knot nematode species was collected, screened (1 cm) and apportioned into 7 kg quantity. Requisite amount of the amendment were thoroughly mixed with the soil and poured into earthen pots. After 15 days each

pot was planted with two tubers of potato, variety cardinal. Ten pots were used for each treatment. Five pots under each treatment received N-P2O5-K2O at the rate of 80-60-120 kg/ha. The plants were allowed to grow for 60 days. At the end of the growing period, data on plant growth, incidence of the disease, population of nematodes in soil and tuber yield were collected.

The incidence of root-knot and population of nematodes in soil decreased but shoot and root growth of potato plants and tuber yield increased gradually in response to increasing rate of cotton oilcake. The effects of the amendment on those parameters were significant at its two higher rates. Use of oilcake with synthetic fertilizers was more effective to control the disease and to enhance plant growth or yield. In this case, 85.89% yield increase and 50% reduction in root-knot incidence were recorded at 2.50 ton/ha. Maximum tuber yield was obtained with the highest rate (5.0 ton/ha) of the amendment when synthetic fertilizers were not added, whereas highest increase in tuber yield was observed when cotton oilcake was applied @ 1.25 ton/ha along with synthetic fertilizers. From this investigation it might be concluded that cotton oilcake may be applied with N-P2O5 K2O for control of root-knot nematodes in potato.

MUSTATRD OILCAKE AMENDMENT TO SOIL FOR CONTROL OF ROOT-KNOT NEMATODES IN POTATO

M. R. ALI and I. H. MIAN

Efficacy of mustard oilcake amendment to soil, with or without application of NPK, for control of root-knot disease (Meloidogyne incognita + M. javanica) in potato (Solanum tuberosum) were tested in a potculture experiment. The amendment was used at the rate of 0, 0.125, 0.250, and 0.500% (w/w) viz. 0, 2.5, 5.0, and 10.0 ton/ha. Nematode infested soil was collected, screened and apportioned into 7 kg amount. Requisite quantities of amendment was mixed with the soil to have 0, .125, 0.25, and 0.5% oilcake. After mixing with oilcake the soil was poured into earthen pots and incubated for decomposition of the amendment. After 15 days of incubatiuon two seed tubers of potato were planted in each pot under each treatment. Ten pots were used for each treatment and 5 of them received N-P2O5-K2O @ 80-60-120 Kg/ha respectively. The plant were allowed to grow for 60 days in an open space. At the end of growing period the experiment was harvested and number of galls/g of roots, population of root-knot nematodes in 100 cc soil, fresh shoot weight of potato plants and tuber yields were recorded.

Fresh shoot weight of potato plant and tuber yields increased but number of galls and population of nematodes decreased linearly in response to the increasing dosage of mustard oilcake. But the correlation coefficient between each of the parameters and dosage was insignificant. Reduction in gall number and nematode populations, and increase in plant growth and tuber yield were significant at the highest dosage of amendment. The amendment showed better performance when NPK were added. The rate of reduction in nematode population or in gall number and that of increase in plant growth were higher when NPK were applied in addition to oilcake. At 0.5% level of amendment increase of plant growth and yield were 33.82% and 77.22% respectively, and reduction of gall number and nemic population were 66.26% and 24.91% respectively, when NPK were not used. But shoot weight and yield increased by 63.31% and 40.96% respectively,and gall number and nematode population decreased by 85.82% and 79.23% respectively at the same rate of oilcake when NPK were added. Such trends in those parameters were also observed at lower dosages of the amendment but at reduced rates. The rate of increase in yield was higher in case of amendment without NPK. Application of oilcake at 0.5% and only N-P2O5-K2O gave about same tuber yield (12.76 ton/ha and 12.07 ton/ha respectively).

EFFECT OF FURADAN 3G AND ADDITIOAL UREA TO CONTROL ROOT-KNOT NEMATODE IN POTATO.

R.ALI and I. H. MIAN

To study the efficacy of furadan 3G and additional urea to control root-knot nematodes (M. incognita, M. javanica) in potato (S. tuberosum) an experiment was conducted using the pesticide at the rate of 0, 1.0, 1.5, 2.0 and 2.5 kg ai/ha and additional urea at the rate of 1000 kg/ha. Soil infested with a mixed population of the nematode species was collected and screened (1 cm) and apportioned into 7 kg amount. Requisite quantities of furadan 3G and urea were mixed with the soil to have the above rate of the pesticide or urea . A general dose of N-P2O5-K2O @ 80-60-120 kg/ha were applied. After mixing soil was poured into earthen pots. Two seed tubers of potato were planted in each pot under each treatment and the pots were kept in an open space. The plants were allowed to grow for 60 days. At the end of the growing period data on gall number/g root, nematode population/100 cc soil, fresh shoot weight and yield were taken.

Application of furadan 3G at 1.5 kg a.i./ha and or higher rates resulted significant increase of shoot growth and yield. Significant reduction (49.9%) in nematode population was obtained with the lowest dose but gall number was reduced (66.53%)

significantly by only at its highest rate (2.5 a.i.kg/ha). The effects of all doses on shoot growth, yield and gall number and that of 1.0 to 2.0 kg a.i. /ha on nematode population were statisticaly same. Maximum reduction in gall number and nematode population and increase in shoot weight (188.13%) as well as yield (56.36%) were obtained with highest rate. The shoot growth and yield were linearly and positively but gall number and nematode population were linearly and negetively correlated with the rates of furadan. However, correlation coefficient between rate of the pesticide and each of the parameters was not significant.

Use of additional urea caused significant reduction in gall number (88.67%) and nematode population (78.59%) but plant growth was not satisfactory due to phytotoxicity.

HOST RANGE OF ROOT-KNOT NEMATODE (MELOIDOGYNESPP.)

I. H. MIAN

Host range of root-knot nematodes (Meloidogyne incognita, M. javanica) were studied in a pot experiment amongst some flowers commonly grown in Bangladesh. Seeds of those plant species were sown in earthen pots and 15 days old seedlings were inoculated with 1g galled roots of tomato infected by a mixed population of the two root-knot nematode species. Before inoculation severely galled roots were collected and cut into small pieces (0.5 -1.0 cm). Inoculation was done by introducing the inocula into the soil near the base of the seedlings. After 60 days the root systems were evaluated for degree of galling and the plant species were graded as highlly susceptible, moderately susceptible, susceptible, resistant and immume on the basis of degree of galling in their root systems.

Among the plant species tested balsam (white), balsam (violet), hollyhoch, lupin, moonflower and sunflower were highly susceptible, calendula was susceptible, cosmos (white), cosmos (violet) were moderately susceptible, camellia (white), camellia (red) and candituft were resistant, and chrysanthemum, dahlia, dianthus, zinnia, maloti, marigold (double), marigold (single), and phlox were not infected by the nematodes.

NEMATODES ASSOCIATED WITH BETELLEAF IN BANGLADESH

I.N. Mian and M.I. Zahid

A comprehensive field investigation conducted throughout Bangladesh in 1985 showed that the plant parasitic nematodes associated with betelleaf (Piper betle) were Aphelenchoides fragariae, Aphelenchus sp., Belonolaimus longicaudatus, Criconema sp., Criconemoides sp., Ditylenchus dipsaci, Helicotylenchus dihystera, Hemicriconemoides sp., Hoplolaimus indicus, Meloidogyne incognita, M. javanica, Paratylenchus sp., Pratylenchus coffeae, Rotylenchus sp., Scutellonema bradys, Trichodorus sp., Tylenchorhynchus sp., and Tylenchus sp.. No field of the surveyed areas was free from plant parasitic nematodes but all the genera were not present in every field. The predominant plant parasitic nematodes were species of Ditylenchus, Meloidogyne and Pratylenchus.

EFFECTIVENESS OF SODIUM AZIDE TO CONTROL ROOT KNOT (Meloidogyne sp.) ON POTATO SEEDLINGS FROM TRUE SEEDS

M.S. Hossain and M.I. Mian

The effectiveness of sodium azide (NaN3) for control of root knot disease on potato seedlings raised from true potato seeds (TPS). The chemical was used at the rate of 0, 50, 100 and 150 kg a.i./ha. Soil infested with a mixed population of Meloidogyne incognita and M.javanica were collected, screened and apportion into 4 kg amount. Requisite quantities of sodium azide were mixed with soil thoroughly to have the above rates. Treated soil was poured into plastic pots and kept in an open space after covering with polythene sheet. After 10 days TPS was sown in each pot. The seedlings were allowed to grow 45 days. At the end of the growing period seedlings were uprooted carefully and data on gall number, gall index and shoot weight were collected.

The incidence of root knot significantly reduced when sodium azide was applied. Gall number per plant and gall index values were linearly and inversly correlated with rates of chemicals. Both the parameters were decreased significantly with the increase of rates. At 150 kg a.i./ha 100% control of disease was obtained. The effect of sodium azide on shoot growth was insignificant but the relationship between shoot weight and rates were positive and linear.

RESPONSE OF PHOSPHORUS AND *Rhizobium* INOCULATION ON GROWTH AND YIELD OF SOYBEAN (*Glycine max*)

J. Haider and P. Bhattacharjee

The effects of three phosphorus doses (0, 30 and 60 kg P per hectare) were compared relative to growth and yield of soybean (var. P.V. 1) at Modhupur soil of IPSA under non-inoculated and inoculated (with *Rhizobium japonicum* strain BAU 104) conditions. Nitrogen and potassium were added to the soils at the rate of 30 kg/ha. *Rhizobium* inoculation had a significant positive effect on the growth and yield of soybean plants. Yield increment by inoculating *Rhizobium* under the three phosphorus treatments were 366%, 219% and 85%, respectively. Addition of phosphorus led to a certain extent to the increased yield of soybean. The increment in yield by applying phosphorus (P_1 and P_2) were 29% and 24%, respectively over the controlled one.

EFFECTIVENESS OF RHIZOBIAL INOCULATION AND NITROGEN APPLICATION ON GROWTH AND YIELD OF SOYBEAN (*Glycine max*)

J. Haider, S.N. Rashid and K. Saifuddin

An experiment was conducted at IPSA farm in the rabi season 1986-87 to compare the growth and yield performances of soybean (var. P.V. 1) under the presence and absence of the nitrogen fertilizer with and without *Rhizobium* inoculum (*Rhizobium japonicum* strain BAU 104). Basal nitrogen was applied at the rate of 50 kg N/ha and 10% N/ha was used as foliar spray at the flowering stage of soybean plants. *Rhizobium* inoculation and foliar spray of nitrogen had a positive response on yield of soybean. Without basal nitrogen *Rhizobium* inoculation increased soybean yield by 119% and 32% under non-foliar and foliar N application, respectively. Foliar spray of N increased the yield by 80% and 6% under non-inoculation and inoculation of *Rhizobium*, respectively. With basal and foliar nitrogen *Rhizobium* inoculation led to an increased yield by 38%. Nitrogen addition had a positive influence on yield of soybean (28% increment over the controlled one).

EFFECIENCY OF *Rhizobium* IN DIFFERENT INOCULATION MEDIA ON GROWTH AND YIELD OF PEA (*Pisum sativum*)

J. Haider and M.A. Quadir

A preliminary study was conducted at IPSA farm to evaluate the effeciency of *Rhizobium* inoculum in two media (liquid media contained strain 1045 and peat media contained strain TAL 1401 and TAL 1402) alongwith control on the plant growth and yield of a local variety of pea. Basal nitrogen (N), phosphorus (P) and potassium (K) were applied at the rate of 30, 40 and 40 kg/ha, respectively. The data indicates that rhizobial inoculation resulted higher dry matter against the control alongwith increased seed yield. Yield increment by 34% and 53% was observed by inoculating *Rhizobium* in peat and liquid media, respectively. Rhizobial inoculation had also a positive effect on plant growth and an increase by 7% and 30% in plant dry weight was also obtained by peat and liquid media, respectively over the controlled one. Among the inoculation media, the overall performance of liquid media was better than the peat media.