	供与年度	機材名 (規格・能力)	供与数	処分数	現有数	利用状況	管理状況	処分理由等
12	62	大豆水分計 (ダイザー)	1	—	1	B	A	栽培 (26.4万円)
13	〃	メイズ水分計 (木屋 E-101)	1	—	1	B	A	〃 (17.6万円)
14	〃	脂肪抽出装置 (木屋 412)	1	—	1	C	A	〃 (24.9万円) 豆類の脂肪含量測定時のみ
15	〃	〃	1	—	1	C	A	〃 (24.9万円) 〃
16	〃	〃	1	—	1	C	A	〃 (24.9万円) 〃
17	〃	〃	1	—	1	C	A	〃 (24.9万円) 〃
18	〃	ガス充填機 (UFO-1000)	1	—	1	C	A	〃 (129 万円) 種子を入れた袋にガスを封入する時のみ使用
19	〃	MC-1デジタル照度計 (木屋 T-1M)	1	—	1	C	A	〃 (78 万円) 圃場試験における照度測定時のみ使用
20	〃	動力噴霧器 (YL 22 HD-1)	1	—	1	B	A	〃 (11.6万円)
21	〃	〃 (〃)	1	—	1	B	A	〃 (11.6万円) ムアラ農場
22	〃	上田電子天秤 (島津 EB 3200D)	1	—	1	B	A	〃 (34.9万円)
23	〃	卓上超音波洗浄器 (Julabo 5.9ℓ)	1	—	1	B	A	〃 (25.6万円)
24	〃	薬品器具戸棚 (ﾔﾏﾄ MC-124G MC-124 類似品)	1	—	1	A	A	〃 (15.8万円)
25	〃	〃 (ﾔﾏﾄ MC-125G MC-125 類似品)	1	—	1	A	A	〃 (22.9万円)
26	〃	〃 (ﾔﾏﾄ DC-106類似品)	1	—	1	A	A	〃 (11.4万円)
27	〃	〃 (ﾔﾏﾄ FLC-180W 類似品)	1	—	1	A	A	〃 (28.2万円)
28	〃	サイド実験台 (ﾔﾏﾄ FUT 3-240G 類似品)	1	—	1	A	A	〃 (14.7万円)
29	〃	耕転機 (ｸﾎﾞﾀ K-120 ｼﾞｰｾﾞﾙ)	1	—	1	B	A	〃 (61.4万円)

	供与年度	機材名（規格・能力）	供与数	処分数	現有数	利用状況	管理状況	処分理由等
30	62	耕転機（ｸﾎﾞﾀ K-120 ｼﾞｰｾﾞﾙ）	1	—	1	B	A	栽培（61.4万円） ムアラ農場
31	〃	〃	1	—	1	B	A	〃（61.4万円） チクメー農場
32	〃	〃	1	—	1	B	A	〃（61.4万円） ＢＯＲＩＦ本部
33	〃	カメラ（ﾐﾉﾙﾀ α-9000 f 1.4AF 50㎜ﾚﾝｽﾞ）	1	—	1	B	A	〃（10.5万円）
34	〃	電圧安定器（100V←→200V 6KVA）	1	—	1	A	A	〃（18.8万円）
35	〃	〃	1	—	1	A	A	〃（18.8万円）
36	〃	〃	1	—	1	A	A	〃（18.8万円）
37	〃	〃	1	—	1	A	A	〃（18.8万円）
38	〃	オートクレーブ（平山、HA-24D）	1	—	1	B	A	〃（45.8万円）
39	〃	ﾏﾙｻﾝ高速遠心器（ｱﾝｸﾞﾙﾛｰﾀ 9B-N6）	1	—	1	D	A	病理（48 万円） 本器を使用するウィルスの研究者２名が留学および転勤になった。
40	〃	ｴﾗｲｻﾞ用ﾏｲｸﾛﾘｰﾀﾞｰ（Uniskan-Ｉ）	1	—	1	D	A	〃（95 万円） 〃
41	〃	エライザ用洗浄器（８チャンネル用）	1	—	1	D	A	〃（95 万円） 〃
42	〃	全自動恒湿器（DNS-135 イスズ）	1	—	1	A	B	〃（38.8万円）
43	〃	採取用ミスト箱	1	—	1	A	B	〃（13.1万円） 特注
44	〃	インキュベーター収納枠	1	—	1	A	B	〃（26.6万円） 特注
45	〃	培養顕微鏡（CK2-TRC-1）	1	—	1	A	A	〃（36.3万円）
46	〃	顕微鏡（ﾆｺﾝ alphaphoto）	1	—	1	A	A	〃（34.8万円）
47	〃	低温貯蔵庫（三洋ｲﾝｷｭﾍﾞｰﾀｰ MIR 551 400ℓ）	1	—	1	A	A	〃（77.4万円）

	供与年度	機材名（規格・能力）	供与数	処分数	現有数	利用状況	管理状況	処分理由等
48	62	電圧安定器（100V←→200V 6KVA）	1	—	1	A	B	病理（18.8万円）
49	〃	〃	1	—	1	D	B	〃（18.8万円）マルサン高速遠心器用に供しているため
50	〃	可搬式気象観測装置（太陽計器）	1	—	1	A	A	生理（390 万円）
51	〃	〃	1	—	1	A	A	〃（390 万円）
52	〃	非接触型温度モニター（英弘精機 1R D510）	1	—	1	A	A	〃（67 万円）
53	〃	〃	1	—	1	A	A	〃（67 万円）
54	〃	〃	1	—	1	A	A	〃（67 万円）
55	〃	〃	1	—	1	A	A	〃（67 万円）
56	〃	pHメーター（東亜電波 HM-20S）	1	—	1	A	A	〃（18.7万円）
57	〃	穀粒検査丸目ふるい（木屋 107C）	1	—	1	B	A	〃（11.9万円）
58	〃	高注粉砕機（cyclotec-1093 日本ゼネラル）	1	—	1	B	A	〃（52 万円）
59	〃	濁度計（日製産業 UT-11）	1	—	1	A	A	〃（70 万円）
60	〃	電子天秤（EB-3200D 島津）	1	—	1	A	A	〃（34.9万円）
61	〃	ﾀﾞﾌﾞﾙﾋﾞｰﾑ分光光度計（日立 150-20 型）	1	—	1	B	A	〃（151.5万円）
62	〃	電圧安定器（100V←→200V 6KVA）	1	—	1	A	A	〃（18.8万円）
63	〃	〃	1	—	1	A	A	〃（18.8万円）
64	〃	〃	1	—	1	E	A	〃（18.8万円）所定の電圧にならないため業者に修理依頼中
65	〃	顕微鏡	1	—	1	A	B	昆虫（20.96万円）

	供与年度	機材名（規格・能力）	供与数	処分数	現有数	利用状況	管理状況	処分理由等
66	62	冷蔵庫（デショナル 210ℓ）	1	—	1	A	A	昆虫（13.9万円）
67	〃	〃	1	—	1	A	A	〃（13.9万円）
68	〃	〃	1	—	1	D	A	〃（13.9万円）カウンターパートが大学で研修中のため
69	〃	コンピューター（NEC，APC-IV）	1	—	1	A	A	〃（80.6万円）
70	〃	実体顕微鏡（ニコン SH2-10TP ×20）	1	—	1	A	A	〃（69.4万円）
71	〃	カメラ（ニコン F3 HE ズームニコン 35-135mm）	1	—	1	B	A	〃（20.1万円）
72	〃	電圧安定器（100V←→200V 6KVA）	1	—	1	A	A	〃（18.8万円）
73	〃	〃	1	—	1	A	A	〃（18.8万円）

3－8　カウンターパート配置状況表

63年3月31日　　報告者　五十嵐　孝　典

プロジェクト名	インドネシア農業研究強化計画	協力期間	昭和61年4月1日～昭和66年3月31日
協力機関	中央食用作物研究所（CRIFC）・ボゴール食用作物研究所（BORIF）		
住所	Jl. Merdeka 99, Bogor, Indonesia		
郵便宛先	同上		

番号	カウンターパート氏名	職名	配属年月日	専門分野	学歴	指導専門家	研修受入分野（期間）	備考
1	Dr. Ibrahim Manwan	中央食用作物研究所 所長	62年8月	昆虫生態	ルイジアナ大 フィリピン大	五十嵐		
2	Mr. Soegiyanto, Bsc	〃 総務部長	56年3月	昆虫	農業研究 アカデミー	西山	視察（58.6.1～6.18）	
3	Dr. Hans Anwarhan	〃 企画部長	62年12月		フィリピン ロスバニオス大	西山		
4	Mr. Machyudin Syam	〃 研究広報部長	56年3月		ガジャマダ大・コーネル大	西山		
5	Dr Syarifuddirs Karama	ボゴール食用作物研究所 所長	63年4月		フィリピン ロスバニオス大	五十嵐		
6	Mr. Hatla Doeni	〃 総務部長	60年3月		事務管理 アカデミー	西山		
7	Mr. Tambunan	〃 会計課長	61年4月		ボゴール農大	西山		
8	Mr. Muchridansyah. S.	〃 総括農場長	61年4月		バンドン教育大	西山		
9	Mr. Suprapto Sumadi	〃 研究情報部長	61年4月		ガジャマダ大	西山		

番号	カウンターパート氏名	職　名	配属年月日	専門分野	学　歴	指導専門家	研修受入分野（期間）	備　考
10	Mr. Soetjipto Partohardjono	ボゴール食用作物研究所 栽培部長	37年8月	栽培	ボゴール農大	鎗　水	学位取得（62.9～62.12） 北大	
11	Mr. Djuber Pasaribu	栽培部 豆作主任	51年1月	栽培	フィリピン ロスバニオス大	鎗　水	大豆栽培（62.9～63.2） 農研センター・農大	
12	Mr. Rasyid Marzuki	栽培部 研究員	46年4月	栽培	ルソン中央大学	鎗　水		
13	Mr. Ignatius Valerius Soetarto	栽培部 研究員	43年3月	栽培	バンドン 教育大学	鎗　水	大豆栽培（55.5～55.10） 九州農試	
14	Mrs. Endang Suhortatik	栽培部 研究員	50年3月	栽培	ボゴール農大	鎗　水		
15	Mrs. Sri Hutami	栽培部 研究員	53年3月	栽培	ガジャマダ大学	鎗　水	大豆栽培（62.2～62.9） 農研センター	
16	Dr. Mukalar Amir	ボゴール食用作物研究所 植物病理　部長	45年5月	病理	ガジャマダ大学	高　屋	イネ病害(いもち病)(50.3～50.9) 豆類病害 (54.6～54.9) 学位取得 (58.3～59.3)	
17	Mr. Muhamad Muchsin	植物病理部 研究員	48年11月	病理	ナショナル大学	高　屋	ダイズ・ウィルス病 (62.2～62.9)　農理研	
18	Mr. Muhamad Djaeni	植物病理部 研究員	44年12月	病理	ナショナル大学	高　屋		
19	Dr Justinus Soejintono	ボゴール食用作物研究所 昆虫部長	42年	昆虫	ボゴール農大 (博)	岡　田		
20	Miss. Wedanimbi Tangkans	昆虫部 研究員	48年	昆虫	ボゴール農大 (修)	岡　田		
21	Dr. Budihardjo Soegiarto	昆虫部 研究員	54年	昆虫	ボゴール農大 (博)	岡　田	害虫個体群生態（63.2～63.11） 農研センター	

番号	カウンターパート氏名	職名	配属年月日	専門分野	学歴	指導専門家	研修受入分野（期間）	備考
22	Mr.Muhammad Arifin	昆虫部 研究員	54年	昆虫	ガジャマダ大学	岡田	大豆害虫生態（62.7〜62.12） 農研センター	Dr論文執筆中
23	Mr.Sutrisno	昆虫部 研究員	52年	昆虫	ガジャマダ大学	岡田	集団研修（53.3〜53.7）神戸 殺虫剤（57.6〜57.12） 九農試、農環研	遠藤専門家（短期）の C/P Dr論文執筆中
24	Mr.Toto Djuwarso	昆虫部 研究員	49年	昆虫	ボゴール農大	岡田	畑害虫（59.6〜59.12） 農研センター	
25	Mr.Nono Suyono	昆虫部 研究員	60年	昆虫	スディルマン大	岡田		
26	Dr.Fathan Muhadjir	ボゴール食用作物研究所 植物生理 部長	45年	植物生理	ガジャマダ大 ウイコンシン大（修） 京都大（博）	井上		
27	Dr.A.Karim Makarim	植物生理部 植物栄養 主任	50年	植物生理	ボゴール農大 ノースカロライナ大（修，博）	井上	作物栄養生理（52.5〜52.9） 農技研、北陸農試	
28	Mr.Irwan Nastion	植物生理部 研究員	53年	植物生理	ボゴール農大（修）	井上	作物栄養生理（56.8〜57.2） 北農試	
29	Mr.J.Supriaman	植物生理部 研究員	61年	植物生理	パンジャジャラン大	井上		研究室には殆ど欠席
30	Mr.Mono Rahardjo	植物生理部 研究員	45年	植物生理	ナショナル大	井上	作物栄養生理（60.8〜61.2） 東北農試	
31	Mrs.Rasti Sarawati	植物生理部 研究員	55年	植物生理	パンジャジャラン大 ボゴール農大（修）	井上	大豆根粒菌（62.2〜62.10） 農環研、北農試	
32	Mr.A.Choliluddin	植物生理部 研究員	46年	植物生理	農業高校	井上	作物栄養生理（59.2〜59.11） 北農試	
33	Mr.Sukarman	植物生理部 研究員	46年	植物生理	パクワン大	井上	63年度派遣予定 種子成分分析（食総研）	

番号	カウンターパート氏名	職名	配属年月日	専門分野	学歴	指導専門家	研修受入分野（期間）	備考
34	Mr. Endang yuni Hastuti	植物生理部 研究員	62年	植物生理	ガジャマダ大学	井上		研究室には殆んど欠席
35	Mr.Hidayat	植物生理部 研究員	47年	植物生理	化学分析アカデミー ニューサウスウェルズ大（修）	井上	作物栄養生理（50.3～50.9） 農技研	C／P 補助
36	Mrs.Ratna Fathan	植物生理部 研究員	47年	植物生理	ガジャマダ大学	井上	作物栄養生理（59.6～59.12） 農研センター	C／P 補助
37	Mr.Iskandar	植物生理部 研究員	43年	植物生理	東京農工大（修）	井上	作物栄養生理（48.2～48.7） 農事試	C／P 補助
38	Mr.Zainab Nunung	植物生理部 研究員	62年	植物生理	ボゴール農大	井上		
39	Mr.Sapotowo J.P	植物生理部 研究員	62年	植物生理	ガジャマダ大学	井上		
40	Rahmat	植物生理部 研究員	48年	植物生理	農業高校	井上		

第４章　合同委員会の協議事項

４－１　経緯と概要

今回の調査団来訪時には合同委員会は開催されていない。調査団出発前は合同委員会が予定されていたが、現地に到着してみると「合同委員会構成者を招待したジョイント・ミーティング」に変更されていた。通常インドネシアでは調査団来訪時に合同委員会は開かれていないことなどから、インドネシア側に「合同委員会」に対する理解不足があったものと思われる。

今回開催されたミーティングは「ＡＡＲＤ－ＪＩＣＡ PLANNING, COORDINATION AND REVIEW MEETING」という名称で、下記の内容であった。

(1) 各部による現在までの研究成果の発表・討論

(2) 各部による来年度研究計画に係る発表・討論

(3) 本年度までの事業実績の発表・討論

(4) 来年度からの事業計画の発表・討論

調査団は、前日迄の日本人専門家、現地スタッフとの協議の結果、今後の協力推進に当って、重大な障害になると思われる、次の事項を現地サイドへの要望事項として取りまとめ、会議の席で折にふれて強調した。

1. ローカルコストの負担については今後共努力をお願いする。

   a) 年度末に突然の予算執行、消化出来ない場合の吸い上げは止めてほしい。
      効果的に予算が使われるよう計画的に執行する。

   b) 消耗品的な現地調達可能な小物品はインドネシア側で購入する。財政的にそれが不可能な場合は日本より機材供与で購送する必要がある。

   c) 無償施設の運営経費（ランニングコスト）の確保

2. 技術移転の対象であるカウンターパートの配属
   特に日本研修等海外研修期間中にも欠員が生じない様に手当する。

3. 研究者の研究環境の充実
   例えば、実験室の拡充、実験室間及び外部との電話コミュニケーション設備の設置等。

インドネシア側では、無償資金協力によるPioneering Research Laboratory for Parawijaの完成に伴い新たに、1989年から始まる研究５ヶ年計画が策定され、これに基づいて、バイオテクノロジー等の先進技術研究を促進すると共に、従来大豆のみに力が入れられていた研究分野を他のパラウィジャ作物であるとうもろこし、落花生、マングビーン等にも取り組み、育種にも力を注いでいく方向が打出された。

インドネシアＢＯＲＩＦの研究５ヵ年計画は、Ｒ／Ｄに記載される本技術協力研究計画とは重複する部分も多く、今後も両計画をすり合せて研究を進めていくことが重要であり、計画の拡大に

は、経費負担の増加が必要とされ、インドネシア政府の出費増加が避けられないこと、ＢＯＲＩＦの先進計画に合わせて進むにしても残る協力期間が２年半しかない事から、限られた予算、限られた期間、限られた研究スタッフで最大の成果を上げるためには、何が一番必要とされている最重要事項かを考え、日本人専門家と十分協議、検討して、詰めていく必要がある事が強調された。

4－2　会議資料

Ⅲ. ＡＡＲＤ－ＪＩＣＡ Meeting

Time	Topic	Speakers	Chairman/Sec.
Monday, November 28, 1988			
09：00－09：50	Opening Remarks	Y. Kitano Soetatwo Hadiwi-geno	
09：50－10：10	Coffee break		
Session Ⅰ			
10：10－10：50	An Overview of CRIFC-JICA Collaborative Acitivities	Ibrahim Manwan T. Igarashi	Soetatwo Hadiwi-geno / A. Dimyati
10：50－11：30	Review of Program Avtivities	A. Syarifuddin Karama S. Nishiyama	
Session Ⅱ　：　Program Review			
11：30－12：00	Research on Entomology	J. Soejitno T. Okada	Ibrahim Manwan / A. Karim Makarim
12：00－12：30	Research on Phytopathology	Mukelar Amir S. Takaya	
12：30－13：00	Discussion		
13：00－14：00	Lunch break		
Session Ⅲ			
14：00－14：30	Research on Plant Physiology	M. Fathan H. Inoue	Paransih Isbagio / Adi Widjono
14：30－15：00	Research on Agronomy	Sutjipto Ph. H. Mikoshiba	
15：00－16：00	Discussion		
16：00－16：15	Coffee break		
Session Ⅳ			
16：15－16：30	Facility Development	S. O. Manurung	A. Syaifuddin / M. Fatchurochim
16：30－16：45	Training	Mahyuddin Syam	
16：45－17：30	Discussion		

Time	Topic	Speakers	Chairman/Sec.
Tuesday, November 29, 1988 Future Plan			
Session V			
08 : 00－08 : 30	Research on Biotechnology	RDM. Simanungkalit T. Igarashi	A. Syarifuddin / A. Karim M.
08 : 30－09 : 00	Research on Plant Breeding	Darman T. Igarashi	
09 : 00－10 : 00	Discussion		
10 : 00－10 : 30	Coffee break		
Session VI			
10 : 30－11 : 00	Research on Plant Physiology	A. Karim M. H. Inoue	Sutjipto Ph. / Inu G. Ismail
11 : 00－11 : 30	Research on Agronomy	Amsir Rifin H. Mikoshiba	
11 : 30－12 : 30	Discussion		
12 : 30－13 : 30	Lunch break		
Session VII			
13 : 30－14 : 00	Research on Entomology	Harnoto A. Naito	IDM. Tantera / Novianti S.
14 : 00－14 : 30	Research on Photopathology	M. Machmud S. Takaya	
14 : 30－15 : 30	Discussion		
Session VIII			
15 : 30－16 : 00	Facility Development	S. O. Manurung S. Nishiyama	H. Anwarhan / M. Fatchurochim
16 : 00－16 : 30	Training	Mahyuddin S. S. Nishiyama	
16 : 30－17 : 00	Discussion		
Closing			
17 : 00－17 : 30	Closing Remarks	T. Kajiwara Ibrahim Manwan	

INTRODUCTION TO THE AARD/CRIFC-JICA
PLANNING, COORDINATION AND REVIEW MEETING
28 AND 29 NOVEMBER 1988

A.Syarifuddin K

BORIF

1. JICA-AARD/CRIFC have associated and collaborated for more than 17 years.

2. Many scientist have been involved. Almost 40 long term and almost 50 short term from JICA.

   More than 30 Indonesia scientist have been trained or visited Japan research institutes.

3. Many equipments (lab. & field) included vehicles have been donated by JICA to CRIFC.

4. Some buildings (lab. and green houses) also have been donated by JICA.

5. A lot of money have been spent granted by JICA and also provided by GOI.

6. Many results of research and collaboration have been achieved, published and recommended.

7. Two phases of collaboration had elapsed. We are in the third phase April 1986-March 1991. Therefore, now we are in the middle of the third phase.

8. It is time for us to review what we have achieved from our third phase until today. Where we are

according to the plan. And then we should look to our 2.5 years coming. How can we make the best use of the time. What should we do. This collaboration covers several aspects:

1. Research
2. Facilities
3. Training

9. The facility and training are developed to support research activities. During the first phase the research disciplines those we collaborated were Plant Pathology and Plant Physiology. In the second phase the research areas were added with Entomology and Agronomy. These are still remain the same for the first 2.5 years of the third phase.

10. For the rest of the phase three period we'll continue the four research areas. However, we consider to propose two new areas. This proposal is related to the development of technology and science in the world and the collaboration title Strengthning of Pioneering Research for Palawija Crop Production.

11. Therefore, we propose to add in collaboration activities Biotechnology and Plant Breeding of palawija crops. During this meeting we hope we could listed the achievement of the last 2.5 year of third phase. And also learning from previous experiences and recent progress in science and technology we'll be able to agree and develop research agenda of six areas in the coming 2.5 years: Plant Pathology,

Plant Physiology, Entomology, Agronomy, Plant Breeding and Biotechnology. Concomitanly we should also plan to back up those research activities with :

- equipments (laboratory and field).
- other facilities such as green houses or maybe laboratory or other research buildings.
- experts (long term and short term)
- training.

12. And finally, may not be able to complete during this two days is the implication of those plan on financial support from GOI as well as from JICA.

13. So these are the expectation as output of our meeting. Please feel free in the discussion and suggest the best rational plan we could have. We praise to God for blessing our meeting with brilliant ideas and discussions and off course finally produce brilliant results, conclusions and recomendations.

f.introduc.4.eksa

RESEARCH HIGHLIGHT ON INSECT PESTS OF SOYBEAN (1986-1988) BORIF/CRIFC-JICA (ATA 378)

INTRODUCTION

The average yield of soybean in Indonesia is relatively low (less than 1 ton/ha). Insect pest is one of the major contraint in increasing the soybean production. There are many insect pests associated with the soybean plant, from seedling stage to maturing pod stage. The major pests include bean flies (*Ophiomyia phaseoli, Melanagromyza sojae*), leaf feeders (*Bemisia tabaci, Aphis glycines, Spodoptera, litura, Plusia* spp., and *Lamprosema* spp.) and pod feeders (*Etiella* spp., *Riptortus linearis, Nezara viridula and Piezedorus* sp.).

Many researches on soybean pests have been conductec, but most of the activities are very scare partial, not coordinated and discontinued. Upto now the control tactic to suppress the insect pest population on soybean plant is mainly based on insecticides use. Information regarding the plant resistance, insect bioecology, natural enemies, and other control tactics is very limited.

Objectives

In the cooperation between BORIF/CRIFC-JICA (ATA 378), some research related to the composition and distribution, bioecology, varietal resistance, natural enemies, and insecticide effect on major soybean insect pests have been conducted.

The objective of these researches are as follows :

1. To find out the information regarding the composition and distribution of major insect pests in various soybean areas

2. To find out the resistant varieties to major insect pests

3. To determine the population fluctuation of major insect pests as a basis for formulating the control tactics

4. To determine the potential and role of natural enemies in regulating the pest population

5. To determine the resistance level of *Spodoptera litura* to insecticide

RESULTS

1. Insect pest composition and distribution

Survey of soybean insect pests were conducted in Java, Bali, Sulawesi, Kalimantan and Irian Jaya in 1987-1988 cropping seasons. The dominant insect pests observed in those areas were bean flies pod suckers, pod borers, pod feeders and leaf sucker/feeders.

Bemisia tabaci could be found in all of the surveyed areas, while *S. litura, Plusia* spp., *Lamprosema* spp., *Empoasca* spp., *A. glycines and Agromyza* spp. were observed in 9, 7, 8, 9 and 9 provinces, respectively.

The pod insects found on the survey were *R. linearis*, *N. viridula*, *P. rubrofasciatus*, *E. zinckenella*, *E. hobsoni*. The new pod sucker that observed in this survey were *Melanacanthus* sp., *Plantia* sp., and *Riptortus* sp.

N. viridula were found in 14 provinces including 11 provinces of soybean production areas. There are different colour of *N. viridula* among the different areas. The green ones found from Irian Jaya, while the yellow ones were found from East Java and South Sulawesi. *P. rubrofasciatus* occured in 12 provinces, including 8 provinces as soybean areas.

R. linearis was the predominant species among the genus of *Riptortus* in 15 provinces. Another species were *Riptortus anmulicornis* in Irian Jaya, *Riptortus* sp. in North Sulawesi and *R. pedestris* in Lampung, East Java and West Sumatra. *Melanachantus* sp. were dominant in South Sulawesi only.

There were two species of pod borer, namely *E. zinckenella* and *E. hobsoni*. *E. zinckenella* was found more predominant species. The pod feeders that observed in this survey were *Phaedonia inclusa* and *Heliothis armigera*. *P. inclusa* were dominant in Yogyakarta and East Java, while *H. armigera* were dominant in Lampung, West Java, Central Java and East Java.

2. Varietal resistance of soybean to bean fly and pod bugs

A total number of 207 soybean varieties lines had been screened for their reaction to bean fly (*O. phaseoli*) under field condition in Bogor (West Java) and Mojosari (East Java). Twenty five varieties/lines showing low damage in the first screening were then retested in four replicates.

Six varieties or lines showing low percent of death plant were Kerinci, 1343/2335-I-3-5, B 3357, Lamp/1248-3-5, 16/II.MSC 8507-B-7 and 31/II MSC 8502-B-22. Kerinci was found to be the most tolerant while Orba was the most susceptible to bean fly.

Another set of 98 soybean varieties were tested under field condition in East Java against pod bug (*Piezodorus* sp.) and feeding.

Five varieties showed low percent of seed-damaged by pod-bugs. Varieties with the low percent seed-damage will be retested in four replicates under synchronous process of the flowering time.

3. Population studies of soybean insect pests

The population peak of *Ophiomyia phaseoli* was observed at 10 days after sowing (DAS), and that of *Melanagromyza sojae* was at 20 DAS. The peak of oviposition of bean fly (*O. phaseoli*) was occured at 7 DAS and most eggs were deposited on cotyledon. Judging the observation result from several locations, it was assumed that the dominant species of bean flies was shifted from *M. sojae* to *O. phaseoli*.

Vertical distribution of *Bemisia* and *Aphis* on standing plant was analised. The whitefly *B. tabaci* occured from the seedling stage up to the flowering stage of soybean. From 18 DAS to the flowering stage, about 93% of insect population was found on two third lower part of soybean plant. After flowering stage the population shifted on two-third upper part of the soybean plant. Most of populations (99% of nymphs and pupae) were found on the lower surface of the soybean leaves.

The yellow sticky traps that placed on vertical position-to east direction was found better for capturing *B. tabaci* compared to that horizontal position.

The peak of *Aphis glycines* population was observed at the flowering stage. The population fluctuation of aphids was mostly found on one third upper part of soybean plants. More than 90% of aphids population were found on the leaves which attached on the main stem of soybean plants.

During the study, the population of army worm (*Spodoptera litura*) and leaf roller (*Lamprosema indicata*) were recorded in a relatively low number. The population peaks occured at 24 and 37 DAS respectively. There are two generations of these insects during the soybean growth.

During the study, various pod feeders were observed, namely *Etiella* spp., *Riptortus* sp., *Nezara* sp., *Piezodorus* sp. and *Heliothis* sp. Based on the occurence of pod borer (*Etiella* spp.) there was no significant different between the life cycle of *E. zinckenella* and *E. hobsoni*.

From the observation revealed that the eggs of pod borer and pod bugs were found at the early flowering stage. Based on these data, monitong of these insects should be done at that period to considering of insecticide application.

4. Study on the natural enemies of soybean pests

The natural enemies of soybean insect pests in term of parasitoids were frequently observed during the study.

Agromyza spp. parasitized was observed at 11 DAS and the presentage of parasitism was about 40%. The *A. glycines* parasitized could be observed at 33 DAS but the level of parasitism was very low. Under low population density, the percent of parasitism on Lamprosema was 100%, while on *Plusia* spp. was 55%, and on *Spodoptera litura* was 32%.

Four species of egg-parasitoids were recorded on *Nezara viridula*, 5 species on *R. linearis*, 3 species on *Piezedorus rubrofasciatus*. *Anastatus* sp. and *Ooencyrtus* sp. were found to be the pre dominant species among the parasitoids of pod suckers. *Telenomus* sp., *Gryon* sp. B. and *Gryon* sp. C were found on *N. viridula* and *R. linearis*, white *Gryon* sp. A and *Gryon* sp. D were found on *P. Rubrofasciatus*. The parasitism of by *Gryon* sp. C and *Telenomus* sp. on *N. viridula* was 75-100%, while the parasitism of *Ooencyrtus* sp., *Telenomus* sp. and *Gryon* sp. B and *P. rubrofasciaus* was 70-90%.

5. Studies on the insecticide resistance and residue

S. litura from Lampung was susceptible to diazinon, carabaryl, permetrin, fenitrotthion, chlorpirifosmetyl, fentoat, EPN, tetrachlorvinfos, profenofos, salition, asefat, dimetylvinfos, monocrotofos and fenvalerat. While *S. litura* colonies from Garut and Bogor showed slightly resistant to those insectisides.

Residu analysis of insecticides on soybean seeds showed that the amount of gamma-BHC, dieldrin, BPMC, MIPC, chlorpirifos and fention were 0.004-0.012, 0.0029-0.0049, 0.1223-0.8530, 0.1373, 0.0067-0.0141 and 0.0024-0.0055 ppm, respectively. These residu are lower than maximum residual limit or in another word is safe for consumption.

Research Personal

1. Experts :

- Long term : T. Okada
- Short term : Y. Hiroshe
  S. Endo

2. Counterpart :

Wedanimbi Tengkano
Toto Djuwarso
Budihardjo Sugiarto
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RESULTS OF RESEARCH ACTIVITIES
OF PHYTOPATHOLOGY (ATA 378) 1986-1988

INTRODUCTION

Lack of Healthy seed is one of the contraints to support palawija crop production in Indonesia. For that reason ATA-378 Project in the field of plant pathology was focused on seed pathological studies. Mainly on seed borne viral diseases and fungal diseases. Studies on yield loss coused by seed borne pathogen are very important in relation with seed certification. Development of new techniques on the detection of seed borne pathogen were also considered in next fiscal year.

Objectives

- To support seed technology there strengthening research on seed pathology

- To strengthen pioneering research in integrated disease management

- To study the extent of damage due to seed transmissible viral diseases of soybean

- To study the extent of damage of "Anthracnose", pod rot, and frog eye leaf spot of soybean

RESEARCH ACTIVITIES OF PHYTOPATHOLOGY

- Viral diseases of soybean in Indonesia with reference on seed transmissible virus

- Studies on seed-borne fungal diseases of soybean in Indonesia with special reference to "Anthracnose"

- Pod rot of soybean caused by *Rhizoctonia solani*

- Occurrence of frog eye leaf spot of soybean (*Cercospora sojina*) in Indonesia

Soybean stunt virus (SSV) was the only virus detected when seed samples, collected in Lampung and East Java, were checked their contamination with SSV, soybean mosaic virus (SMV) and soybean stunt virus (SSV) by ELISA. SSV was found in 8 among 18 samples. Eleven among 13 leaf samples which showed virus diseases-like symptoms, collected in Sumatra, contained any of flexous rod shaped of filamentous flexous particles. The viruses were not yet identified.

Among 28 cultivars of soybean tested, 4 cvs were resistant to SSV-42A and 14 cvs were resistant to SSV-13C. A diseased sample collected in Lampung was supposed to be infected by peanut stunt virus through host range study.

"Anthracnose" caused by *Colletotrichum dematium* is one of the most popular fungal disease of soybean in Indonesia. Seed samples from East Java and Lampung provinces were checked their association with the causal fungus. Sporulation of *C. dematium* on germinating seeds was rare in this investigation. There was no difference in weight of seed among 3 different categories of acervulus formation on the surface of pods. Artifical inoculation of *C. dematium* at different growing stages of soybean resulted clear symptoms on stem, petiole, and pod until they reached 15-20 days old but the appearance of symptoms were generally mild. So it was that "anthracnose" is a minor disease on soybean in Indonesia.

Causal fungus of a pod rot of soybean had been identified as *Rhizoctonia solani* AG-1A. The causal fungus of rice sheath blight also belongs to the same group. So, some isolates from rice were inoculated to soybean, and they caused severe pod rot. The intensity of roting depended on the developing stage of the pod. Young pods of less than 20-30 mm usualy decayed completely. Some improved varieties such as Americana, Davros, Dempo, Galunggung, Kerinci, Lokon, Merbabu, Orba, Shakti, Tidar, Wilis and TK 5 were all susceptible to the patogen. Some fungicides were effective to control the pod rot such as. Mepronil 75 WP (diluted : 1:3000); Benomyl 50WP (1:2000); Iprodione 50 WP, (1:3000); Validamycin (1:2000).

A spot disease on leaf stem and pod of soybean, observed midly in May 1988, in Jabung, Lampung province was "Frog eye leaf spot" caused by *Cercospora sojina*. Damage of seeds directly in contact with pod lesions was not so high before the pods matured. When the pods with the spots were exposed to high humid condition after the maturity, rotted and discolored seeds increased remarkedly. So, the pathogen was considered to be important as a causal agent of postharvest damage.

The symptoms were easily produced by artifical inoculation. Incubation period for leaf and pod infection was 8-10 days and 10-12 days, respectively. Young leaves of less than 1 week, pods of less than 2 weeks after the development could be infected by the pathogen producing clear spots.

The use of result

1. Soybean stunt virus (SSV) was predominant in the collected seed samples. Its transmission rate was 50% of seed samples. The role of seed borne virus should be considered as a constraint to produce healthy seed in Indonesia

2. Pod rot caused by *Rhizoctonia solani* can be managed by propertive of planting and chemical control

3. *Cercospora sojina* was considered as a important causal agent of post harvest damage. Proper time of planting and *harvesting* was expected to reduce the *intensity* of this disease

Researchers :

- S. Takaya
- Y. Honda
- Nasir S.
- Jumanto H.
- M. Muhsin
- M. Djaeni
- Anggiani Ns

RESEARCH ON PLANT PHYSIOLOGY
joint with JICA (ATA 378)

INTRODUCTION

The joint researct project of ATA 378 started from April 1986. The objectives of the project is to establish appropriate technology for palawija crop production through pioneering research for the improvement of crop production system, crop nutrition technology, and pests and diseases management. To produce good seed, harvesting time and drying method play an important role. The decision as when to harvest is always arbitary. Harvesting too early meanse an excessive amount of shatter and seed fall to the ground and be lost. Seed must be dried before storage, as high seed moisture content during storage is one of the main reason for the loss of ability to germinate. To increase the grain yield, it should be needed the amount of nutrient uptake and water absorption. Most of experiments have been done from the viewpoint of soil chemistry, that is the improvement of top soil problems. It is important for the nutrient uptake, water absorption and nodule growth to improve the soil conditions, not only topsoil but also subsoil. Expectency on *Rhizobium* in improving legume production, particularly in soybean production. Especially in Indonesia, with gradual and great extension of soybean cultivation into newly-cleared lands outside Java, it is expected to be able to save chemical nitrogen fertilizer by utilizing *Rhizobium* inoculants. *Rhizobium* can work well only when nitrogen is limited.

Objectives

This project is expected to support research in palawija crop production, and to contribute the development of soybeans and corn production through the establishment of appropriate technology. The objectives of research on plant physiology covered seed physiology, plant nutrition, and soil microbiology :

1. To study the effect of drying methods, storage and environment conditions, on the quality of soybean seed, expressed as germinability

2. To study plant-soil interaction in palawija production

3. To select and to idetify high N-fixing ability *Rhizobiium* strains for inoculant production

Research findings

It is generally accepted that soybean seed viability in storage very much affected by air temperature and humidity. To keep germinability of soybean seed, experiment was conducted in a stalactite cave in Ciampea Bogor, to know the possibility of a cave as a store of seeds. From this experiment it was found that after 13 months soybean seed storage at a mountain cave, the germination percentages was still 81% by using vinyl bag as a container. Storage at Cimanggu with room temperature and vinyl bag, germination percentages was 16%. By using cotton bag, at 79 days after storage at Ciampea, and 285 days after storage at Cimanggu, germination percentages was 0%. Observation on soybean seed storage under farmer's condition have been done in Garut. From the sample collected, moisture content at harvest 33.2% in average, and drying seed for storage 9.5%-10.5%. After five months by using plastic bag with initial moisture content at 7.8%, germination percentages showed the highest (94% for small size, and 89% for big size). On the other hand by using cotton bag small size gave lower germination percentages than big size (93% and 96%).

Yields of several crops, namely corn, soybean, peanut, sweet potato, and lowland rice were compared under no fertilizer and with fertilizer at Citayam. The highest response was corn, followed by lowland rice (IR36). Under no fertilizer, corn and sweet potato decreased on harvest index, but on soybean, peanut, and lowland rice nearly constant. Generally nutrient uptake on corn decreased under no fertilizer, but not for other crops. Same trend as nutrient uptake, nutrient removal on corn decreased under no fertilizer.

Several problem soils from different locations have been collected to study on the growth recording factors of problem soils. Seven soil types namely Red Yellow Podsoliz, Latosol, Peat soil, Acid-sulphate, Andosol, Grumusol, and Regosol have been analyzed.

Studies on the effect of soil physical properties on soybean have been done by using soil sample from Central Lampung at the Center of soybean production. The results of this experiment indicated that available water holding capacity has gradually decreased with cultivated time. Available cations decreased. especially K was clearly decreased. Nitrogen and potassium content in leaf, stem, and pod clearly decreased with elapse of cultivated time.

From East Java, Lampung and West Java at soybean production area have been collected 149 *Rhizobium* strains. Six and 29 *Rhizobium* strains have been introduced from USDA and Japan respectively. As a beginnig to select acid-Al tolerant inoculants, variation in tolerance among strains was examined by a simple agar plate method. The result showed that there is a wide variation in acid-Al tolerances. Fourty seven strains were in tolerant, 3 strains were tolerant to highly tolerant, and 9 strains were tolerant.

Impact of the research findings

Utilization of vinyl-bag with airtight condition at low initial moisture content of seed ($\pm$ 8%) could increase viability of soybean seed.

Cave condition for soybean seed storing experiment can be simulated by establishing an under ground room. This possibility have to be studied further. We have to consider how to maintain not only good soil physical condition but also chemical or nutritional conditions.

Use of *Rhizobium* in soybean production in Indonesia is very important. Investigation of acid-Al tolerant *Rhizobium* is one of the benefit due to increasing soybean production.

Counterparts :

I Seed Physiology

- Sukarman
- Endang Yuni Hastuti
- Supriaman

II Plant Nutrition

- Irwan Nasution
- Mono Rahardjo
- Rahmat Suhadi
- A. Choliludin
- A. Karim Makarim

III Microbiology

- Rasti Saraswati
- Zainad Nunung

RESEARCH REVIEW OF BORIF-JICA RESEARCH ACTIVITIES, AGRONOMY DIVISION 1986-1988

INTRODUCTION

The geographical location shows that the groups of islands which make up Indonesia spread widely and entirely within the tropic. Climatic conditions as well as soil types are varies.

Agricultural land for major soybean growing areas according to the National coordinated grain legumes research program are classified into four types, they are : irrigated wetland, rainfed wetland, rainfed dryland, and new opened land. Considering differences in production system, constraints, and cultural practices among the land types, it is very important to select types of soybean variety which is suited to respective land type.

A stable supply of good quality is prerequisite for efficient and high yield of soybean production. Hot, wet climates, diseases and insects under tropical conditions however, seem to thrive conditions that are detrimental to seeds. Soybean seeds are classified as "least storable", can not withstand high temperature and relative humidity. Therefore, packages which are resistant to watervapor or other methods which able to keep low seed moisture content are needed.

In irrigated wedland, soybean planted after rice harvest may facing excessive soil moisture. Without draining the high soil moisture conditions resulting in poor seedling emergence. Drainage canals can be also used for irrigating the field if drought stress occurs during the later stages. Weed infestation and lodging due to excessive growth may reduce soybean yield significantly. Management practices such as hilling up may suppress weed growth and prevents lodging.

In upland rainfedland and new opened land, soybeans are widely grown in intercropping with other crops such as corn and cassava. Under such conditions soybean yields are usually reduced. In order to obtain higher productivity of soybean, as well as the intercropping systems. Soybean varieties which are suited to the system are needed.

There are many soil management problems in upland areas and a lot of research has been done. Physical and chemical properties diteriorate rapidly if cultivation continues without benefit of fertilizers and good crop residu management. Liming pratice has been recommended to ameliorate acid soils. Methods, which ensure good long term results such as the use of coarsely ground limestone however, are still lacking.

Objectives

General :

- To find ways and means of establishing production technique for stable supply of high quality seed of soybean

- To find ways and means of establishing economical technique for stable and high yield production of soybean

Specific :

- To find out some high storability seeds of collected local varieties
- To find out a proper soybean seed storage method
- To evaluate growth and yield performances of five soybean varieties under intercropping with corn
- To determine the effect of artifical shading on growth and yield of ten local and improved varieties
- To study long term effects of rate and particle size of limestone on soybean grown in acid soils
- To clarify the effects of green manure, lime and phosphate fertilizer on soybean performances in acid soils
- To study the effects of saturating soil moisture, hilling up and variety on soybean growth and yield
- To compare the response of soybean varieties to hilling up
- To clarify the responses of soybean varieties on soil moisture stress imposed at different growth stages

Research activities

The research activities during the wet season 1986/1987 to dry season 1987 covering seven titles, they are :

1. Selection of high soybean seed storability under natural conditions

2. Effect of storage on soybean seed quality

3. Growth and yield performance of several varieties under intercropping with corn

4. Effects of shading on the performance of several local and improved soybean varieties

5. Increasing soybean yield through improving acid soil by using coarsely ground limestone

6. Effect of green manure, lime and phosphate fertilization on yield performance of soybean grown in acid soil

7. Effect of soil saturation, hilling up and variety on soybean growth and yield

8. Responses of improved soybean varieties to hilling up

9. Response of soybean varieties to water stress

RESULTS AND DISCUSSION

Soybean local varieties had been collected from West Java, Central Java, East Java, Lampung, Aceh and East Nusa Tenggara provinces during 1986-1987 period. Of 113 "local varieties" collected, 14 varieties have been selected and were considered superior the other varieties. To select varieties with high germinability some seeds of the collected varieties were stored in cotton bags and kept under ambient air. Although growing evidences shows the existence of genetic defferences in soybean seed quality, germination test done at six months after storage showed that none of the local varieties could germinate. Seed moisture content just before germination test was 13 to 14% and probably was the main factor causing the viability of the seed had been lost faster.

To find out a proper storage technique, the effectiveness of eight different combinations of packaging materials and dehydrated materials used for maintaining of four soybean varieties were compared. The results showed for 9 month-storage under natural conditions, the highest percentage of germination was given by seeds which was placed inside sealed Al-foil bag together with silicagel. Among varieties, Tidar has had highest seed storability. Several works also reported that small seed size of soybean has better germinability than those of big sizes. As expected, aluminium foil which is more resistants to water vapor maintained the viability of the seed better than the less resistant one such as polyethylene bag.

The growth and yield response of five soybean varieties under intercropping with corn showed that light intensity reached the soybean was affected by rows position and sunlight direction. Under intercropping, significant differences among rows were found where the yield of middle rows, fourth and first row was in the order high to low. Among the soybean varieties tested (Galunggung, Orba, Lokon, and Kerinci). Galunggung was the most tolerant to intercropping. Suggests that certain soybean varieties have a trait tolerant to shading. Total seed weight of soybean under intercropping was not significantly differences from that of monoculture.

Artifical shading imposed on 10 soybean varieties during different growth stages indicated that higher pod number was obtained without shading throughout the soybean growth but there was no significant difference between shaded and non shaded plants. Shaded imposed during the entire growth reduced yield of soybean by about 24%. Variety "No. 62" yielded best in both conditions, suggested that some local varieties more tolerant to shading. Evaluation of more soybean varieties for intercropping system is needed.

Soil amelioration on acid soil has been carried out at Cigudeg, Jasinga and Batumarta, South Sumatra.

At Cigudeg (pH = 4.9, exchangeable Al = 3.6 me/100 g, Al saturation = 53%, available P-Bray II = 6.0 ppm), green manure, lime and P appications showed that the effect of P and lime was more significant in contributing to soybean yields. The effect of green manure (*Clotalaria juncea* was not clear). The combination of 90 kg P_2O_5/ha and 5.6 ton/ha of lime was considered sufficient. At Batumarta where the soil pH = 5.1, exchangeable Al = 2.3 me/100 g and Al-saturation = 49% showed that the effectiveness of granules limestone (dolomite and calcite) was not significantly difference indicating that the granule size has had similar effectiveness to that of finersite. The rate of lime 1.5x exchangeable Al (t/ha) = 3.45 t/ha was sufficient. Monitoring the long term effect of this experiment is needed in order to obtain a comprehensive effects of treatments tested.

Two field experiments at Citayam experimental station in which the main objective was to clarify the effects of hilling up on soybean performance has been conducted. The first experiment showed that saturating the soil moisture increased yield by 21% and hilling up in addition to irrigation increased soybean yield by 37%. The benefit of hilling up in preventing plant lodging and suppresing weed growth were noted. Irrigation promote growth but hilling up suppressed weed growth and reduced lodging.

In the second experiment the responses of five soybean varieties (Wilis, Kerinci, Tidar, Orba and Americana) to hilling up were evaluated. As with the effects of treatments on growth and yield components hilling up increased soybean grain yield significantly rangesd from 28 to 124%. The percentages of yield increase were 28% for Orba, 47% for Wilis, 57% for Kerinci, 63% for Americana and 124% for Tidar variety. Both experiment showed that a considerable yield increases can be obtained by hilling up the soybean plants and there was difference responses among soybean varieties. Similar experiments needed to be tested in other agroecosystems. Hilling up practice is very promising as way of boosting soybean yield. A simple tool equipment in making the ridge and economic evaluation of the management practice are needed.

Research Personal

1. Experts :

- H. Yarimizu
- H. Mikoshiba

2. Counterpart :

- Soetjipto Partohardjono
- Djuber Pasaribu
- Sri Hutami
- Endang Suhartatik
- A. Rasyid Marzuki
- Ig. V. Sutarto

CRIFC-JICA MEETING
November 28-29, 1988
BOGOR

PHYSICAL
RESEARCH FACILITIES
AND EQUIPMENTS DEVELOPMENT

Introduction

The Central Research Institute for Food Crops (CRIFC), formerly known as The Central Research Institute for Agriculture (CRIA) has been trying to make it to be the "center of excellence" of food crops research in Indonesia. For this purpose, it hed been stated in 1971 by this Institute that adequate laboratory and greenhouse facilities must be provided, together with manpower development. Therefore, rehabilitation of the physical fasilities for research was started in 1968, when the Muara Sees Center was completed. In 1971, a complete set of laboratory equipments for seed technology was donated by the Danish Government. Machineries and instruments were donated by the Japanese Government through OTCA (Overseas Technical Cooperation Agency).

Two years later (1972), eight new greenhouses were built under the Japanese and Netherlands technical assistance schemes. Prior to this construction, an agreement on Technical Assistance beetween the Indonesian Government and the Japanese Government was signed in the late of 1970 for the initiation of in Indonesia-Japan Joint Food Crop Research Program, where the Japanese OTCA supports CRIA in promoting research activities in the field of plant pathology, plants virology and plants physiology. The laboratory equipment and greenhouses received by

CRIA from the technical assistance programs of the Japanese OTCA were valued at ¥64.140.860,00.

Activities of Japan - Indonesia Joint Food Crop Research Program based on the agreement between the Government of the Republic of Indonesia and the Government of Japan, which was signed in October 23,1970, was continued in 1972 and 1973 at CRIA. A plant nutrition laboratory with a green house for Department of Plant Physiology were completed at Sindangbarang as weel as the rehabilitation of facilities for the Sub Department of Diseases and the Sub - Department of Pest.

CRIA together with its units was developed and expanded in 1980 involoving Lembang Horticultural Research Institute and then reorganized in 1983, and is now known as CRIFC (Central Research Institute for Food Crops) which coordinates 6 Research Institutes for Food Crops in Indonesia. By this new organizational structure of CRIFC, Bogor Research Institute for Food Crops (BORIF) became as an unit of research institute composed of 3 departments (i.e. Physiology, Agronomy and Pest & Disease . Under this new organizational structure, BORIF consist of 7 researcher groups, i.e : Agronomy, Entomology, Pathology, plant Breeding, Physiology and Socio - Economic. The recording physical facilities was previously centralized, but by this new structure, it became decentralized. Therefore, this reorganization to some extent resulted in the loss of record and information.

The Devision of Research Physical Facilities within CRIFC was formed in 1980 and again restated in the Presidential Decree in 1983. This division is supposed to evaluate the efficiency of every facility used for research, and to formulate a technical specipication of physical facilities requirements.

Laboratory and equipments

During 1977 - 1988, the equipments received from The Government of Japan are listed as follows :
a. 1977 - 1982.

Year	Items	Quantity	Value*) (¥)
1977	1. Vinyl Tube	1 set	35.580
	2. Vacum Pump & Aethers	1 unit	($419,00)
	3. Parts for Centrifugal	1 set	310.000
	1. Reagent chemicals	1 case	72.160
	2. Reagent chemicals	10 cases	659.215
	3. Sample & Tech.Eq	1 case	145.341
	4. Shibata mills	2 cases	326.320
	5. Color Foil,etc	1 case	1.319.905
	6. Reagent chemicals	8 cases	524.567
	7. Microscope, etc	1 case	385.000
1979	1. Reagent chemicals	3 cases	172.713
1980	1. Reagent chemicals	11 cases	2.219.490
	2. Driying oven	7 cases	3.685.818
1981	1. Fuji Green Meter Mdl. GM. 1	29 cases	37.281.340
	2. Distributor Yarn	1 case	50.960
	3. Reagent chemicals	12 cases	1.234.141
1982	1. Soil Tester	3 cases	319.560
	2. Medicine	15 cases	1.234.915
	3. Balance	1 case	2.961.444
1977 - 1982			¥2.939.371 and $419.000

Handling cost (GOI) : Rp. 10.374.226

b. 1983 - 1988

Year	Items	Quantity	Value (¥)
1983	1. Electron Microscope	1 case	807.835
	2. Instrument and others	18 cases	14.262.368
			15.070.203
1984	na		
1985	na		
1986	na		
1987	na		
1988	1. Automatic Recording Tension Meter	1 set	2.458.000
	2. Tension Cup	18 pcs	342.000
	3. Extraction Apparatus	4 sets	996.000
	4. Kjeldahl Digester	2 sets	126.000
	5. Automatic Weather system	2 units	7.800.000
	6. Microreader	1 set	950.000
	7. Micro drop dispenses	1 set	1.970.000
	8. Autowasher for Microplate	1 set	950.000
	9. Microplate	580 pcs	290.000
	10. Disposable Tips for Dispenses	2 cases	18.000
	11. Disposable Tips for Excell pipets	4 cases	21.600
	12. Turbidimeter	1 set	700.000
	13. Pippetman P-200	1 set	44.500
	14. Ditto P - 1000	1 set	44.500
	15. Ditto P - 5000	1 set	63.000
	16. Tip case	1 set	2.500
	17. PT Atomizer for A.A. photometer	1 pc	53.000
	18. Angle for Rotor for High Speed Centrifuger	1 set	480.000
	19. Tube for Centrifuges for 250 ml Angle Centrifuges	12 sets	13.200
Total value for 1988 only			¥ 17.322.300
CIF Jakarta			17.920.240

na = datas are not available

Those equipments listed above, are parts of the equipments which were delivered under ATA 378 project that had been signed on October 9,1986 between the JICA Team and AARD, which included:

I.	Seed Technologi sector	:	16 items
II.	Biochemistry sector	:	8 items
III.	Shared Test sector	:	13 items
IV.	Microbiology sector	:	15 items
V.	Glass ware sector	:	2 items

Farm machinery and field equipments

Farm machineries and field euipments include thresher, moisture tester, sprayer, power tiller, and other technical equipments which were formerly grouped into Agricultural equipments. From 1977 - 1982, the total value of those equipments were ¥280.151.225 and $ 1.991.16 excluding Rp 29.727.519 for handling cost. Further itemization of these equipments are not known so far, because it was difficult to identifythe respective item and some of them were already disposed.

In 1983, the total value of this group of equipments were ¥ 50.652.288 and Rp. 160.000 excluding amount of Rp.4.835.000,- for handling cost. In this group , included TOA Conferences for CRIFC. Repairing materials, automatic voltage regulators and personal computers were received in 1984.

In 1985 and 1986, the following items were delivered to CRIFC :

1. Hygrometer/Digital Thermometer ¥100.000
2. Measuring, Test equipment, and machine parts (10 cases) 19.789.645
3. Color Scale Belt 393.198
4. Agricultural Machinery (21 cases) 31.519.492

Total ¥ 51.802.335

Under ATA 378 project, there were 4 hand traktors, 2 power sprayers, 10 automatic sprayers, 3 knapsack sprayer, 5 power brush cutter and 2 hammer knife mower were delivered to BORIF and had been distributed in April 1988 by BORIF to its unit of stations.

Construction

There were many units of green houses which had been built since the signing of the agreement betwen the Government of the RI and the Government of Japan on October 23, 1970. The accurate datas for this sector are not available and scattered in Physiology, Agronomy as weel as in Pest and Disease Department. The latest and the most expensive laboratory ever built under JICA-CRIFC project, is the Laboratory for Bioteknology Research in BORIF which was inagurated recently by the Minister for Agriculture. This building composed of 1.850 m² floor for labortory and an 120 m² of green house :

Rearing glass house for Pathology Department was donated by JICA this year through The Directorate of Food Crops Protection. This green house measures 5.4 x 12 m.

Vehicles

The newest vehicles donated under JICA - CRIFC project was NISSAN T 720, manufactured in 1983 and the oldest car were 2 units of Toyota Land Gruiser, 1977. Those vehicles consist of :

11 units of Toyota Land Gruiser
2 units of ISUZU Micro Bus
1 units of Toyota Coaster Deluxe
1 units of Datsun Pick - Up
9 units of motorcycle

The total value of these vehicles were ¥72.652.276 and $ 11.765,34,excluding an amount of Rp. 13.135.407,28 for handling cost. Some of those vehicles were being sold to its respective holder based on the Presidential Decree in 1984.

RESEARCH PROGRAM OF BIOTECHNOLOGY FOR STRENGTHENING PIONEERING RESEARCH FOR PALAWIJA CROP PRODUCTION PROJECT (ATA 378)

INTRODUCTION

The objective of the food crops research is to support the food crops development program including :

1. Increasing food production for sustaining food self-sufficiency

2. Increasing food production for local industry, export, and import substitutes

3. Supporting food diversification

4. Increasing income and employment opportunities• through the generation of appropriate technologies

Infact, Indonesia has succeeded to attain self-sufficiency in rice in recent years. However, it is not an easy task to maintain it Increasing population pressure has caused the expansion of food crop production into problem soils such as red yellow podzolics. Shifting of food crops into other most profitable commodities, pest and disease outbreak,drought and flood remain serious problems affecting the efforts to increase food crop production. In order to produce sufficient food crops in the future, new brekthroughs should be created.

There is an increasing interest in developed and developing countries in applying biotechnology to solve problems of their agricultural production. Until now conventional plant breeding is still the principal tool for crop improvement. In recent years, however, new techniques for combining and modifying plant germplasm have been developed. While these techniques may produce important improvements in some major food crops, they have demonstrated exciting potential for speeding breeding processes, increasing the diversity of germplasm and accomplishing crosses that are biologically impossible by using conventional methods.

The manipulation of microorganisms is another aspect of biotechnology. A number of beneficial soil microorganisms associated with crop species have been known strongly influencing the biological output of the related crop production system. The most obvious examples are where there is an interdependent relation, such as the symbiosis between *Rhizobium* and its legume hosts, and between mycorrhizal fungus and its hosts. The utilization of these microorganisms can improve nutrient uptake of the crops and increase fertilizer efficiency.

In view of the BORIF mandate for conducting pioneering research, it is essential to strengthen its research capacity on biotechnology.

RESEARCH OBJECTIVE

Based on the background described above the following research objectives are proposed :

1. Establish a germplasm resoursce of microorganisms

2. Explore the potential of biotechnology in the endeavour to increase yield and quality of food crops, to maximize the role of microorganisms in the improvement of fertilizer efficiency and nutrient uptake.

RESEARCH PROGRAM

Activities related to biotechnology research actually have been undertaken in recent years with emphasis in the area of soil microbiology. In relation to ATA 378 some research activities have been conducted including : collection, isolation and identification of rhizobia, evaluation of effectiveness and compatibility of rhizobia strain, and screening for tolerance to acid and aluminium toxicity.

The proposed research activities are presented in Table 1.

Table 1. Proposed research activities

Research areas	Research activities
Microbiology	1. Collection and isolation of micro-organisms (Rhizobia and mycorrhizal fungi)
	2. Effectiveness and compatibility of rhizobia strains
	3. Selection of rhizobia strain tolerant to environmental stresses (drought and high temperatures)
	4. Methods of ehizobia and mycorrhizal fungi storage
	5. Methods of interplying mycorrhizal fungi on axenic culture
	6. Selection of efficient mycorrhizal fungi strains
Tissue culture	1. Embryo rescue for major food crops
	2. Production of haploid food crops
	3. In vitro propagation of planting material for food crops
Biochemistry	1. Identification of biochemical substances for hig yield and good quality
	2. Identification of pathological agents of food crops

TRAINING AND RESEARCH FACILITY REQUIREMENT

Table 2 presents the current number and specialization of research staff working for the implementation of the research program. To gain knowledge and skills in biotechnological techniques, post graduate and short term trainings for the staff are necessary. The sort of training and number of participating staff is presented in Table 3.

Table 2. Number and specialization of the current research staff

Specialization	Education level		
	PhD	MSc	BSc
Microbiology	1	1	3
Tissue culture	1		2
Biochemistry		1	
Plant Pathology	1	1	
Bioconversion			1

Table 3. Short of training and number of participating staff

Short of training	Number of participating staff	
	Post graduate	Short term
Microbiology	1	3
Tissue culture	1	2
Biochemistry		2

Counterpart :

- H. Inoue

Researchers :

- RDM. Simanungkalit
- M. Fathurochim
- Rasti Saraswati
- Nunung Zaenab
- Kosim Kardin
- Masdiar Bustaman
- Saptowo
- Diah Nuraeni
- Selly Salmah
- Alberta Dinar Ambarwati

BREEDING RESEARCH OF BORIF AND COLLABORATION PROGRAM WITH JICA

INTRODUCTION

The mandate of BORIF are on pioneering research and commodity analysis. Therefore, the ultimate objectives of the breeding research program are to develop and to provide breeding materials, informations, knowledge and methodologies that will be used by other sister Institutes.

The research program on breeding should be aimed at solving problems or constraints in production system and at opening new opportunities through genetic manipulation of the crops.

In order to meet the goals of the breeding program, there must be : (1) available gene sources for trait (s) being improved, which is transferable to breeding population, (2) practicable and reliable selection methods to identify genotypes carrying the improved traits, (3) No strong negative correlation between the improved traits and desirable agronomic characters (yield, quality, maturity, etc.).

The success of a plant breeding program does not depend only on availability of genetic variability of the traits to be improved, but also depends on personnel capability and facilities availability. The manpower involved in breeding program as well as research facilities are still limited (Table 1). Therefore, opportunities for collaboration work with other agencies like JICA will be helpful for strengthening the breeding research program.

RESEARCH PROGRAM ON PLANT BREEDING

The general objectives of the breeding program are to develop varieties adapted to each agroecological zone, with high and stable yields and good quality.

The characteristics that need to be considered for each crop in breeding program are as follow :

Soybean

a. For rainfed dryland area, non-marginal land

- Early maturity, 80-85 days
- Tolerant to shading
- Tolerant to diseases (rust, leaf blight, anthracnose, bacterial pustules, viruses)
- Tolerant to adverse wether (good seed or grain quality under high moisture or heavy rainfall)
- Tolerant to insect pests (beanfly, pod sucking insects)
- Lodging reistance

b. For dryland, acid soil

- Tolerant to acid soil and Aluminum toxicity
- Tolerant to diseases (rust, leaf blight, anthracnose, bacterial pustule, viruses)
- Early maturity, 80-85 days

c. For wetland, dry season crop

- Tolerant to water logging during vegetative stage
- Early maturity, 70-80 days
- Tolerant to diseases (rust, viruses)
- Tolerant to insect pests (beanfly, pod sucking insects)
- Tolerant to drought stress at generative stage

Peanut

- Early maturity, 80-90 days
- Resistant to diseases especially bacterial wilt, leaf rust, Cercospora leaf spot, and viruses (peanut stripe virus)
- Seed with short dormancy, 2-3 weeks
- Tolerant to acid soil and Aluminum toxicity for specific area

Mungbean

- Early and synchroneous maturity, 55 days
- Resistant to diseases especially Cercospora leaf spot, leaf rust, scab, powdery mildew, and Rhizoctonia stem rot
- Tolerant to drought stress
- Good cooking quality

Corn

- Early maturity, 80 days
- Resistant to downy mildew
- Tolerant to acid soil and Aluminum toxicity
- Tolerant to drought stress
- Tolerant to water logging

Cassava

- High starch content
- Good root shape and configuration
- Non-branching plant type
- Drought tolerance
- Early bulking (harvestable at < 8 months)
- Resistance to major pests and diseases (red spider mite, cassava bacterial blight, bacterial wilt, Cercospora leaf spot)

Sweet potato

- High dry matter and starch content
- Good root shape and configuration
- Bushy plant type
- Earliness (harvestable at < 4 months)
- Resistance to major pests and diseases (weevil, scab, viruses)
- Good taste, texture and performance of root

A side from the above breeding goals of the crops, there are several characteristics that need to be considered during the selection, or may become specific breeding objectives of the crop, as follows :

Soybean

- Good seed quality (round, yellow, small to medium, size : 10-13 g/100 seeds, light hillum color)
- Seed longevity, under room temperature storage
- Compatible to Rhizobial strains
- Suitable for food industries (tofu, tempe)
- High protein content, over 45%
- Low lenoleic acid, for better oil quality

Peanut

- Good eating quality, suitable for food industries
- Large, round kernel, with light seed coat color
- Resistant to fungus producing aflatoxin
- Seed longevity under room temperature storage

Mungbean

- Good eating quality as porridge, no hard seed
- Good storability
- Seed sizes suitable for various food industry requirement (small seed for bean sprout, large seed for porridge)
- Long pod, on top of canopy so as to facilitate easy harvest

Corn

- Good husk cover
- Medium plant height
- Good agronomic characters

Cassava

- Easy peeling
- Adaptability to low land conditions after rice crop
- Low cyanide content

Sweet potato

- Non-sweetness suitable for vegetable (as potato substitute)
- Adaptation to either rainfed low land (drought) or excessive moisture conditions

The breeding activities are organized in several stages, where each stage is complementary to the others, leading to the release of improved varieties accepted by farmers. The stages of the breeding activities are as follow :

1. Germplasm introduction, collection, maintenance and characterization
2. Varietal screening to identify varieties/strains as a gene source of the desirable traits
3. Population development through manual or natural hybridization program
4. Selection and line development
5. Preliminary yield tests
6. Advanced yield tests
7. National or multilocational yield tests
8. Initial increase of breeder seed or planting material
9. Breeder seed production and maintenance

Table 1. Research and technician working on palawija breeding at BORIF

Comodity/unit	Educational level				Total
	S3	S2	S1	SO/SMTA	
Germplasm	-	2	-	2	4
Soybean	2	-	-	4	6
Peanut	-	1	-	2	3
Mungbean	-	-	2	1	3
Corn	1	1	3	4	9
Cassava & Sweet potato	1	1	-	3	5
Total	4	5	5	16	30

EXPECTED COLLABORATION WITH JICA

The research topics or activities of high priorities to be developed in collaboration with JICA are as follows :

1. Germplasm introduction, collection, maintenance and characterization of palawija crops (soybean, peanut, mungbean, cassava, sweet potato, and corn)
2. Selection and screening for acid soil and Aluminum tolerance on soybean and peanut
3. Selection and screening for drought tolerance on soybean and mungbean
4. Selection and screening for high protein content on soybean
5. Anther or pollen culture of corn
6. Selection and screening for acid soil and Aluminum tolerance on corn
7. Selection and screening for drought tolerance on corn
8. Selection and screening for low cyanide content on cassava
9. Selection and screening for high starch and high dry matter content on sweet potato
10. Study on flowering behavior of cassava and sweet potato
11. Cytogenetic studies on all major crops

Researchers :

- Darman M.
- Arsyad
- Ahmad Dimyati

RESEARCH PROGRAM OF PHYSIOLOGY DEPARTMENT OF BORIF ON PIONEERING RESEARCH FOR PALAWIJA CROP PRODUCTION PROJECT (ATA 378) (1989-1991)

INTRODUCTION

The development of agriculture in Indonesia in REPELITA V has the objectives among others are to increase crop production; and to broaden crop diversification within each region in order to meet the needs for high nutritive value of food. Therefore, Palawija, especially soybean, has been given attention by the government to be increased in its production.

BORIF as a pioneering research institute may support the National program by generating methodologies, strategies, and basic knowledge and information on several aspects that could be used by applied researchers or other end-users. Physiology department will participate and conduct research on the aspects of plant nutrition, seed physiology, and ecophysiology. Collaboration with other institutes could be expected to strengthen and accelerate the achievement of high quality pioneering research.

The technical cooperation of the Japan-Indonesia Joint Agricultural Research has been well established for 15 years. Since April 1986 the Strengthening of Pioneering Research for Palawija Crop Production Project has been conducted by BORIF's staffs and JICA's experts including research, training, and equipment support. The benefit of this project for the department of Physiology of BORIF are plenty such as more research activities on important topics of plant nutrition, seed technology, and microbiology;

technical training for researchers and technician on those aspects in Japan; equipment support for research activities etc. For the next three years, Physiology department will continue collaborate with JICA's expert in research activities, but will concentrate more on pioneering research in accordance to BORIF's Five Year Master Plan.

Objectives

The objectives of this program are as follows:

1. To package existing/maturing research on soil management and plant nutrition, and seed technology into technological packages and data basis that could be extended to end-users

2. To find new methodologies on aspects of soil amelioration, fertilization, and suitable agroecology that could be utilized by applied researchers

3. To undertake pioneering research activities that will provide information and knowledge on the roles of nutrients in the plant, the control mechanism by plant and its environment on nutrient uptake, distribution, and utilization; physiological and biochemical aspects of seed quality, the mechanisms of seed deterioration and germination; production and partitioning of carbohydrate, protein, and lipids during plant growth and development.

RESEARCH PROGRAM

The Physiology Department of BORIF has three major aspects of reseach, namely plant nutrition, ecophysiology, and seed physiology. The main research subjects of each aspect are described below.

1. Plant Nutrition

The importance of plant nutrition aspects in increasing crop production are well known. Large areas of agricultural uplands in Indonesia have specific problems in relation to plant nutrition and crop production. Soil characteristics are need to be described in order to efficiently, effectively support high crop yield by addition of small inputs. The role of organic matter either naturally present in the soil or freshly applied may increase crop yields. Study this aspect in detail is useful for increasing soil productivity. The full understanding of the role of nutrients in the plant, the control mechanism by plant and its environment on nutrient uptake, distribution, and utilization are important. The interrelated events with crop growth and production need to be formulated bymean of crop modeling.

The following topics of plant nutritions are arranged in priority.

1. Study on soil fertility maintenance at soybean based cropping system

2. Soil characteristics related to soybean and corn yield

3. Study on nutrient distribution and translocation during soybean growth

4. Study the roles of organic matter on improving and maintaining soil productivity

5. Study on plant nutrition aspects using water culture technique

6. Crop modeling for soybean and corn

2. Seed Physiology

It is important to understand the factors affecting seed dormancy and germination; and the processes occur within seeds during seed development and maturation either under control or uncontrolled storage in order to effectively, efficiently, and economically establish soybean seed preservation. Utilizing antioxidants, germination inhibitors or promotors, good condition of seed strorage are also important as a follow up the above pioneering research results.

Several research topics are arranged below based on priority.

1. Effects of drying methods on germination percentage of soybean seed.

2. Study on clarification of factors affecting germinability of soybean seed.

3. Investigation of soybean seed storage condition by farmers.

4. Study the roles of antioxidants in seed quality maintenance.

5. Biochemical and ultrastructural changes during seed deterioration.

6. Development of seed vigor testing methods for soybean.

7. Influence of seed coat characteristics of soybean on the rate of deterioration and germination.

8. Identification of germination inhibitors and promotors.

3. Ecophysiology

Factors that control crop yields need to be identified on site specific. Yield potentials of palawija crops are climate and genetic dependent. Therefore, the knowledge of the effects of climatic factors on crop growth, several processes within plant including carbohydrate, protein, and lipid production and partitioning need to be understood.

The following topics are arranged based on priority.

1. Distribution and translocation of carbohydrate and protein on corn and legume.

2. Study on plant type of soybean related to high yield potential.

3. Agrometeorological aspects of growth, yield, and water relations with special reference to legumes.

EXPECTED IMPACTS

The expected impacts of this program are as follows:

1. New methods of fertilization and soil amelioration for soybean that include utilization of chemical and/or organic matter to achieve high and stable soil productivity with reasonable and feasible costs and labor.

2. Basic knowledge on several aspects of soil-plant system for soybean and corn, including soil characteristics; nutrient uptake mechanism and regulation; nutrient distribution and translocation; carbohydrate, protein, and lipid production and partitioning; and plant types in relation to adaptabilty to their environment and high yield potential. Those knowledge could be extended to develop new methods of soil and crop management for site specific that will become more efficient and beneficial for crop production.

3. Basic knowledge on the mechanisms of seed deterioration and germination; the roles of seed coat and other factors regulate dormancy and germination. Those knowledge could be extended to develop new technology for better seed storage, more efficient use of inhibitors or promotors for seed, and to develop seed vigor testing method for soybean.

EXPERT NEEDS

Within next three years Physiology department needs the following expert.

Table 1. Expert needs for Physiology Department within 1989-92

Research field	1989/90	1990/91	1991/92
Plant nutrition	x	-	-
Seed physiology	x	x	x
Ecophysiology	-	x	x

TRAINING NEEDS

In order to improve the skill of either researchers or technicians, the department of Physiology needs their staffs trained as shown in Table 2.

Table 2. The needs of training for Physiology Department in 1989-92 period.

Field of training	1989/90	1990/91	1991/92
Plant nutrition	x	-	x
Seed technology	-	x	x
Ecophysiology	-	x	x

RESEARCH PLAN FOR 1988-1991 AGRONOMY DIVISION, BORIF

INTRODUCTION

One of the major contraints to expand soybean and improving production efficiency in Indonesia is lack of availability high quality seeds. Producing and maintaining good quality soybean seeds for planting is problematic. High quality seeds are needed to obtain rapid and uniform emergence, equally healthy seedling and in turn adequate plant stand.

Soybean seeds inherently deteriorate rapidly. There are evidences on genetic differences of soybean seeds in resistant to pathogen, rate imbihition of seed tissue and to deteriorate during storage.

Proper harvesting time is very important in maintaining high quality seeds. They are very susceptible to such extreeme dehydration and rehydration, particularly during the latter stages of seed maturation, are quite detrimental to seed quality.

Farmers usually store soybean seeds for a few months before they are planted. Soybean seeds can not withstand ambient storage conditions of high temperature and or high relative humidity. Identification of suitable storage conditions and method of storage is needed. Aside from planting good quality seeds, good cultural and management techniques need to be incorporated to produce high quality soybean seeds.

Soybean grown under upland/rainfed condition often experiencing drought, shading effects of intercropping system and nutrient imbalance due to low soil acidity related with Al toxicity, low P, Ca and other nutrients. Ways to overcome or alleviating such problems need to be clarified in order to obtain stable high yield of soybeans.

The general objective of the research is to find out better ways for maintaining and producing good quality soybean seed and high stable soybean production in the line with National Coordinated grain legumes research program.

The specific objectives are

1. To determine a proper harvesting time for soybean seed production and techniques for soybean seed storage

2. To determine the effect of shading on photosynthetic rate and yield of soybean under intercropping

3. To study the long term effects of coarsely ground limestones soybean performance grown in acid soils

4. To clarify soybean varietal response to hilling up in combination with plant spacing or fertilization

Title of experiments for 1988-1991

- Interaction effects of hilling up and plant spacings, varieties and fertilization on growth and yield of soybean

- Method of soybean seed storage

- Effects of water stress on soybean seed germination and seedling emergence

- Harvesting time and related factors affecting soybean seed germination

- Photosynthesis activities of soybean crop under intercropping/shading

- Water stress on soybean

- Increasing soybean yield through improving acid soil by using coarsely ground dolomite and calcite.

Personal JICA Expert :

- H. Mikoshiba

Counterpart :

- Soetjipto Partohardjono
- Djuber Pasaribu
- Sri Hutami
- Endang Suhartatik
- Ig. V. Sutarto
- Yati Supriyati
- A. Rasyid Marzuki

RESEARCH PLANT ON ENTOMOLOGY 1989-1991
BORIF/CRIFC-JICA (ATA 378)

Soybean yield productivity in Indonesia is still low at about 0.97 t/ha in 1985. This is due to a wide range of factors including insect pests. More than 20 species of insect pests attack the soybean plant, but only some of them are important. They include bean flies *Ophiomyia phaseoli*, *Melanagromyza sojae* and *Melanagromyza dolichostigma*; leaf feeders *Spodoptera litura*, *Chysodeixis chalcites* and *Phaedonia inclusa*; leaf rollers *Lamprosema indicata*; pod borers *Etiella zinckenella* and *Etiella hobsoni*; pod suckers *Riptortus linearis*, *Nezara viridula* and *Piezodorus rubrofasciatus*. Recently the white fly *Bemisia tabaci*.

Integrated pest management combine all possible control tactics to suppress the insect pest population under the economic threshold level. The control tactics include crop rotation, sanitation, synchronized planting, varietal resistance, use of natural enemies and insecticides. Many studies have been conducted in the areas of insect bioecology, varietal resistance and pesticide use. Most of the studies were only partially completed.

The following are the objective of the study

1. Population dynamic of the major insect pests on soybean

- To determine the key pest status in different soybean ecosystem and to determine the key factors regulating the pest population growth

- To clarify biotic charactors tropical soybean insets

2. Economic threshold

To determine economic threshold of leaf feeders especially *S. litura* and pod borers/suckers.

3. Biological control

- To determine the role of natural enemies for regulating the population growth of major insect pest
- Possibility of biological control of soybean insect pests by introduced natural enemies
- To evaluate the NPV for controlling leaf feeders under field condition
- To study the population dynamics of eggs parasitoid of pod suckers

4. Varietal resistance

- To screen soybean varieties on resistant to leaf feeder, pod sucker, pod borer, white fly
- To study the mechanism of resistance

5. Integrated pest control

To evaluate the effectiveness and efficiency of different combination or integration of several control tactic for reducing the population of soybean insect pests.

The target of the studies are to get information of : resistant varieties to some major soybean insect pests, economic threshold of leaf feeders and pod borer/pod suckers, biological control agents, key pest and key factor in different soybean ecosystem.

We expect our finding would be usefull in improving insect pest management on soybean.

The following are the research personel during 1989-1991.

Expert :

- Long term : A. Naito
- Short term : Biological control specialist
  Insect pathologist/toxicologist

Counterparts :

- Wedanimbi Tengkano
- Toto Djuwarso
- Budihardjo Sugiarto
- M. Arifin
- Harnoto

団長レター

以下の通り、調査団で団長レターに取りまとめ、R／DサイナーのＡＡＲＤ長官に提出した。

1) インドネシアスタッフと日本人専門家の意志疎通、インドネシア人同志、日本人専門家間のコミュニケーションを改善し意志の疎通を計る必要がある。

2) 予算の強化、特に新しく完成した無償資金協力施設に係る運営経費への配慮

3) 今後の研究協力計画にバイオテクノロジー及び育種技術が上げられており、R／Dの記載範囲で協力可能であるが、実施に当っては、日本人専門家と十分協議する。

（詳細は別添団長レター写しのとおり）

2 December 1988

Dr. Soetatwo Hadiwigeno
Director General,
Agency for Agricultural
Research and Development,
Ministry of Agriculture

Dear Sir,

It is our pleasure to submit herewith the summary report on the Technical Guidance for the Strengthening of Pioneering Research for Palawija Crops Production Project (ATA-378).

The Japanese Technical Guidance Team was organized by the Japan International Cooperation Agency, visited the Republic of Indonesia from 21 November to 3 December 1988.

During its stay in the Republic of Indonesia, the team had a series of discussions with Indonesian 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 kindfull arrangement extended to us.

Very truly yours,

Dr. Toshihiro KAJIWARA
Team leader, The Japanese
Technical Guidance Team

cc.:

- Dr. Ibrahim Manwan,
  Director, CRIFC.
- Dr. A. Syarifuddin K.,
  Director, BORIF.
- Dr. Takanori IGARASHI,
  Team leader, ATA-378.
- Mr. Y. KITANO,
  Resident Representative,
  JICA Indonesia Office,
- Mr. G. YUKAWA,
  First Secretary,
  Embassy of Japan.

SUMMARY REPORT OF THE JAPANESE TECHNICAL GUIDANCE TEAM
FOR
THE STRENGTHENING OF PIONEERING RESEARCH FOR PALAWIJA CROPS
PRODUCTION PROJECT (ATA-378)

SUMMARY REPORT OF THE JAPANESE TECHNICAL GUIDANCE TEAM FOR THE STRENGTHENING OF PIONEERING RESEARCH FOR PALAWIJA CROPS PRODUCTION PROJECT (ATA-378)

I. Introduction

The technical cooperation for the Strengthening of Pioneering Research for Palawija Crops Production Project (hereinafter referred to as "the Project") started on 1 April 1986, based on the Record of Discussions and Tentative Schedule of Implementation signed on 31 January 1986.

At the third year of the project, the Japanese Technical Guidance Team (hereinafter referred to as "the Team") headed by Dr. Toshihiro KAJIWARA has been dispatched to the Republic of Indonesia to make smoother progress of the project activities, from 21 November to 3 December 1988. (Ref. ANNEX I and II).

The purpose of the team activities are:

(1) To grasp and evaluate the progress of the activities of the project.
(2) To clear up the problems on the implementation of the project.
(3) To consult to make an annual work plan 1989/1990.
(4) To attend the opening ceremony of the facility for pioneering research for palawija crops.
(5) To attend the seminar about plant breeding by biotechnology.

Through the fruitful discussions with officials and researchers 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 Indonesian and Japanese government.

We are pleased to express our sincere gratitude and appreciation to the director of CRIFC, Dr. Ibrahim Manwan, and all officials concerned who extended us a heart-felt and effective cooperation during our stay in Indonesia. We are especially grateful to Indonesian counterparts and Japanese expert team headed by Dr. Takanori IGARASHI who have fully attended meetings with the team.

II. Comments and recommendations

From the results of our discussions and surveys, a summary of comments and recommendations on the project activities is as follows:

1. The cooperative research works could be well carried out under condition that Indonesian counterparts and Japanese expert team work together. Mutual communication is one of the most important things for cooperative research works. The relationships not only between Indonesian counterparts and Japanese experts, also among Indonesian researchers and Japanese experts in each Department should be more close. We would like to recommend that Indonesian staffs and counterparts communicate with Japanese experts more deeply rather than as before.
In this connection, it is recommendable that meeting, which is effective for exchanging views on the project administration and implementation, is hold periodically, in addition to joint Committee and Joint Meeting.

2. It is recognized that Indonesian side has financial problem. Naturally budgetary problem is first limitation factor whether the project will be implemented smoothly or not. Then it's also considerable that some assistance for

local expenditures by Japanese side is very helpful for research activities. However, in principle, local running cost should be taken into necessary steps by Indonesian side. We request strongly to give special consideration on budgetary arrangement.
Especially the facility for pioneering research for palawija crops has been completed in this year. The budget for the running costs of this facility is needed to allocate from Indonesian side.

3. Indonesian side proposed to add in collaboration activities studies on biotechnology and plant breeding. We understand that the proposal from Indonesian side may be implemented in the line with the Record of Discussions and the Tentative Schedule of Implementation, however, the further discussion about details of activities is needed between Japanese experts and Indonesian staff members.

ANNEX I

MEMBER'S LIST OF JAPANESE TECHNICAL GUIDANCE TEAM ON THE STRENGTHENING OF PIONEERING RESEARCH FOR PALAWIJA CROP PRODUCTION PROJECT (ATA-378)

	Assignment & Name	Present position
(1)	Team leader Dr. Toshihiro KAJIWARA	Former Director General, Tropical Agriculture Research Center, Ministry of Agriculture, Forestry and Fisheries (MAFF).
(2)	Breeding Dr. Teruo ISHIGE	Chief of Laboratory of Plant Cell Breeding, Department of Cell Biology, National Institute of Agrobiological Resources, Ministry of Agriculture, Forestry and Fisheries (MAFF).
(3)	Research planning Mr. Toshinori ISHIKAWA	Chief of Research Cooperation Section International Cooperation Div., Agriculture Forestry and Fisheries Research Council, Ministry of Agriculture, Forestry and Fisheries (MAFF).
(4)	Coordinator Mr. Takeshi WATANABE	Technical Cooperation Div., Agricultural Development Cooperation Dept., Japan International Cooperation Agency (JICA).

ANNEX II

SCHEDULE OF THE JAPANESE TECHNICAL GUIDANCE TEAM

Date	Schedule
Nov. 21 (Mon)	Arrive at Jakarta (GA-873).
22 (Tue)	Courtesy call to the Embassy of Japan, Agency for Agricultural Research and Development (AARD) and JICA Indonesia Office.
23 (Wed)	Courtesy call to Central Research Institute for Food Crops (CRIFC), Bogor Research Institute for Food Crops (BORIF), Preparatory meeting with the personnel concerned.
24 (Thd)	Preparatory meeting with the personnel concerned.
25 (Fri)	Preparatory consultation with counterparts concerned.
26 (Sat)	Seminar about plant breeding by biotechnology Opening ceremony of the facility for pioneering research for palawija crops.
27 (Sun)	Preparation of Joint meeting.
28 (Mon)	AARD-JICA planning, coordinating & review meeting.
29 (Tue)	AARD-JICA planning, coordinating & review meeting.
30 (Wed)	Investigation on site for research.
Dec. 1 (Thr)	Investigation on site for research.
2 (Fri)	Reporting the results of the team to AARD, the Embassy of Japan, JICA Indonesia Office, Departure from Jakarta (GA-872).

「育種とバイオテクノロジー」に係る講演要旨

i)無償援助で完成した「Pioneering Research Laboratory for Palawija Crops」施設の開所式の前に行われたセミナーで講演を行った。セミナーでは育種を進める各段階で異なるバイオテクノロジーの手法が使えるが、従来型の育種手法の方が有効な場合も多いことを指摘した。また、各種手法の技術的な、効果と問題点についても検討した。また、これまで日本で研究された成果（主に農業生物資源研究所）について紹介した。

ii)バイオテクノロジーについてはその効果を、過大に期待されている向きもあり、正確な技術情報の把握の必要性とともに、研修を受ける等基礎的な技術の修得が必要であろう。また、専門家が少ないこともあり、研究目標を絞ることも肝要である。

iii)新しい研究施設は、必ずしもバイテクを意識して設計されたものではないので、無菌状態の確保に関する配慮など、多少の修正を要すると考えられる。また、バイテクの研究には培養試験管、シャーレ、滅菌フィルター等実験を実施していくうえで、消耗品を多く必要とする。こうした点を、配慮した技術援助の計画を作る必要がある。

iv)今後の研究プロジェクトのなかでバイオテクノロジーを中心的な課題としてとりあげていくか、それとも課題の一つとして位置付るかをプロジェクトの進行をみながら方針を定める必要がある。

Plant Breeding by Biotechnology

by Teruo Ishige
Department of Cell Biology
National Institute of Agrobiological Resources
Tsukuba, Ibaraki 305, JAPAN

1. Introduction

Recent remarkable progress in the field of plant cell culture, cell fusion and gene transformation has expanded the possibilities to improve existing crop plants and to produce new one. There are dynamic research activities using biotechnology in experimental biology. This movement affects plant breeding and many countries have been developing new projects for biotechnology. There is a great possibility for genetic improvement of plant by new biotechnology, because new technique will be able to break through the limits of traditional gene manipuration, such as crossing, mutation. However, conventional breeding is providing much benefits for agricultual production through newly released varieties. At this present, conventional breeding offeres more commercial varieties of crops than by biotechnology. We have to consider the interrelationships between conventional breeding and new biotechnology from a scientific point of view, otherwise we will lose much time and money without any new crop cultivers. Many questions must be answered in order to identify agricultual application of the new technologies.

2. Techniques for plant breeding

breeding aspect	technique(*biotechnology)
genetic resouces	field evaluation
	identify variation(isozyme analysis, *RFLP)
	screening traits(chemical component)
	*cryo-preservation
	data base system
genetic variability	crossing(back-cross,synthetics)
	polyploidy
	F_1hybrid (c. m. s., self incompatibility)
	mutation(*somaclonal variation)
	wide hybridization(*embryo culture)
	*somatic cell fusion
	*gene transformation
(fixation)	(single seed descend, winter nursery)
	(*anther,pollen culture)
selection	pedigree,mass,recurrent
	statistical genetics(computer simulaton)
	*_in vitro_ selection
adaptability	yield traials
	tests of resistantce to diseases, insects
seed multiplication	seed growers(hybrid seed production)
	*virus elimination(vegetative propagation)

3. Biotechnology

Cell culture	remarks(*advantage,**disadvantage)
meristem culture	*elimination of virus
	*clonal multiplication
	*<u>in vitro</u> preservation
anther, pollen culture	*reduce time to get pure line
	**low regeneration rate
	**many albinos
	**not so fast to get pure lines
embryo culture	*wide hybridization
suspension culture	*rapid multiplication
	**somatic variation
somatic embryogenesis	*artificial seed
	**somatic variation
somaclonal variation	*different mutation by other mutagens
	**difficult to control variation
<u>in vitro</u> selection	*resistant to chemicals
	(herbicide, disease toxin)
	**only selectable in media condition
protoplast culture	*regeneration from single cell
	*essential technique for cell fusion,
	and direct gene transformation
	**low regeneration rate
	**somatic variation

Cell fusion	remarks(*advantage,**disadvantage)
somatic hybridization	*introduce genes from other species
	*useful for vegetative propagating crops
	**low regeneration rate
	**low pollen fertility
	(ex. pomato(potato+tomato) produced no pollen)
	**fuse with a lot of undesirable genes
	**need selection system for hybrid cell
asymmetric hybrid	*discard undesirable genes
	*introduce cytoplasmic genes
	**low regeneration rate
	**need selection system for hybrid cell

Molecular technique	remarks(*advantage,**disadvantage)
Transformation	*transfer only the target gene
	*transfer genes from any organism
	**not so many genes cloned for agricultural aplication
	**difficult to control gene expression (need good promoters)
	**difficult to pick up the useful gene (especially, traits controled by multi-genes)
	**expensive experiment
	**need environmental assessments

4. Reseach Activities at N. I. A. R.

The National Institute of Agrobiological Resources coodinate basic and applied research to preserve, develop, and utilize biological resouces in agriculture.(established in December 1983)

Department of Genetic Resources collects and preserves valuable plant germplasms for distribution and use. New gene bank will be able to store 150,000 germplasms. Efficient use of collected genetic materials has been realized through a computerized information system from breeding stations. We join the international gene bank network project supported by C.G.I.R.

Department of Molecular Biology uses recombinant DNA technology to create new breeding resources. This involves the isolation and characterization of genes from higher plants, the elucidation of the mechanisms of gene expression and the development of new plant transformation system.

Department of Cell Biology develops new breeding methods based on cell engineering. Studies are made on the celluar mechanisms of gene expression, cell fusion techniques and the plant regeneration methods in the prosses of protoplast culture, cell fusion, and gene transformation. Recently, gene transformation system in rice has established by the electroporation technique.

Department of Applied Physiology studies in photosynthesis, carbon and nitrogen metabolism, tolerance to adverse environments, gene action mechanisms of physiologically active substances and other areas.

The Institute of Radiation Breeding expands genetic resources with the creation of mutants through irradiation and improves the genetic quality of crop and arboraceous plants.

JICA