3. 土壌肥料部門

1985年3月新実験室が開設され，3月中には整理が略々完了する予定である。

業務内容はボホール州の土壌の区分と土壌特性を明らかにし，土壌保全および改良対策を明らかにするとともに，作物の栄養診断を行い施肥改善，微量要素欠乏対策を明らかにする。さらにBureau of Soil, Bohol Laboratoryの吸収に伴い，その実験室の主たる任務である農家圃場土壌の個別診断および指導の業務を継承し，継続しなければならない。

職員配置は土壌肥料 Researcher 3，Chemist 3，実験室補助員 2，農夫1名であるが，分析および試験についての基礎技術は殆んどないので，各種業務を通じて基礎技術の訓練指導が必要である。

1) 1985年度事業計画は次のとおり。

(1) ボホール州東北部に分布する(約8,000ha)酸性土壌の化学特性と土壌改良対策試験

① Land System 13 地帯土壌の化学的特性調査

② 酸性土壌の改良対策試験：石灰，苦土の施用効果と天然資源利用に関する試験

③ 酸性土壌地帯の作物栄養診断と施肥改善試験：燐酸苦土の効果と施用量

④ 現地改良対策試験圃設置と展示

(2) アルカリ性土壌地帯における微量要素欠乏の実態調査と対策試験

① 水稲に対する微量要素欠乏症診断技術と対策試験；亜鉛，鉄，満俺，その他

② 畑作物に対する微量要素欠乏症診断技術と対策試験；亜鉛，鉄，満俺，硼素等

(3) 作物の栄養吸収特性と施肥肥料の肥効率調査

① 各作物の三要素吸収特性調査

② 各作物に対する施肥の肥効率調査

③ 肥効率向上に関する試験

(4) ボホール州農家の土壌診断と処方箋の発布

主にBureau of Soil, Bohol Laboratryの職員を充当し，業務を継承する。

2) ボホール島東北部に分布する砂頁岩に由来する波状丘陵地帯土壌の酸性特性に関する調査

ボホール島の東北部には砂頁岩に由来する砂壌質～埴壌質土壌が広く分布しており，波状丘陵地形を形成している。その面積はおおよそ7万haにも達するが，土地利用は非常に遅れており，その大部分が生育の貧弱なチガヤの原野として放置されている。もしこれら土壌を改良することによって農用地として活用できれば，ボホール州の農業振興に寄与するところは極めて大きいものと考えられる。

これら土壌における植性の劣悪な原因としては永年の塩基洗脱による土壌pHの低下とアルミニウム飽和度の上昇および極度の燐酸欠乏が考えられるので，土壌改良の第1段階として本地域土壌の酸性特性について調査し，2，3の知見を得たので報告する。

(1) 調査および実験の方法

本地帯は道路および農道の発達が遅れているので，計画的土壌調査および土壌試料採取が困難なため，自動車通行の可能な国道および州道に添って，一定距離ごとに試穿を掘り断面を観察すると同時に主に表層土と次表層を対象として土壌を採取した。調査地点は第1図に示すごとくである。

土壌の酸度の測定は，土壌 20g に純水あるいは1モル塩化加里溶液の 50mℓ を加え，土塊をすり潰した後約5分間よく攪拌し，その懸濁液についてガラス電極pHメーターを用いてpHを測定した。

(2) 結果および考察

各調査地点ごとの調査結果を示すと第1表のとおりである。

表土について pH (H_2O) と pH (KCl) の分布を図示すると第2図に示すごとくで，pH (H_2O) については pH 5.6 以上 (Moderate) と pH 5.5 以下 (Strong acidity) が不規則に分布しており，一定の傾向は認められなかった。しかし pH (KCl) についてみると，全体の 20% に当る6地点が pH 4.4 以上 (Moderate) を示した以外は約 80% の地点が pH 4.3 以下 (Strong acidity) を示していた (第3図)。

同様に次表層について pH の分布をみると第4図のとおりで，上記の傾向がより一層明瞭となることがわかった。

第5図は表土と次表層における pH (H_2O) と pH (KCl) の関係を示したもので，斜線は pH (H_2O) と pH (KCl) の差が1となる位置を示した。通常の酸性土壌は両者の差が略々1に近いので，測定値は斜線の近辺に分布することが予想される。

しかし，両図についてみると，いずれも多くの地点で斜線を大きくはずれており，両者の差が1以上を示しており，全体の差の平均値はいずれも約1.6であった。これらの特異な値は塩化加里による交換性酸度が非常に大きいことを示しており，その多くが交換性アルミニウムによるものではないかと懸念される。

このような土壌は極度に塩基が欠乏し，アルミニウム飽和が高く，高換性アルミニウムによる作物根の障害を生ずるほか，燐酸固定力が強いために，作物は燐酸吸収が阻害されやすいと考えられる。このような土壌では石灰および苦土のような塩基を補給することによって土壌反応を矯正し，アルミニウムを不活性にすると同時に，燐酸の適量，合理的施肥について検討することが大切である。

なお，これらの点については塩基飽和度，アルミニウム飽和度，交換性アルミニウム含量および燐酸固定力の諸点から再確認する必要があり，また石灰および燐酸施用試験によって作物の生育反応を明らかにして行かねばならない。

(3) 要　　約

ボホール島東北部に分布する砂頁岩由来の波状丘陵地帯土壌の農用地化を計る研究の一環として，土壌の酸性的特性について調査した。

その結果を要約すると以下のとおりである。

① 土壌のpH(H_2O)については強酸性(pH 5.4 以下)を示すもの表土 31%，次表層土 45%で，中～弱酸性(pH 5.5 以上)を示すものが多く，その分布についても一定の傾向は認められなかった。

② 土壌のpH(KCl)については強酸性(pH 4.3 以下)を示すもの表土 79%，次表層土 95%で，特に他土壌の隣接する地点を除いてはほとんどの地点で強酸性を示すことが明らかとなった。

③ pH(H_2O)とpH(KCl)の差は全体に大きく，表土および次表層土とも全地点平均で 1.6 を示し，特異な酸性特性を示すことが認められた。

④ 以上の諸点から，これらの土壌は塩基の極度の溶脱により，アルミニウム飽和度が上昇し，交換性アルミニウムによる植性障害と燐酸欠乏が併発している可能性が大きく，石灰および苦土のような塩基と燐酸の適量，合理的施用について検討する必要があることを指摘した。

Table 1. Texture, Color, Spot and pH of Soils

Sample №	Soil system №	Location (km from Tagbilaran)	Layer	Depth (cm)	Text ure	Soil color	Spot color	Spot content	pH (H_2O)	pH (Kcl)	Differ- ence	Note
7	13		I	0~11	SL	10YR 2/3			5.1	3.8	1.3	corn
			II	11~23	SL	10YR 4/6			5.0	4.0	1.0	
			III	23~	SL	10YR 4/6	10YR 1.7/1	Concret- ion P.	5.3	4.6	0.7	
9	13	Near the air port (R1 129km)	I	0~10	SL	10YR 4/3			5.9	5.0	0.9	Upland (following)
			II	10~16	SL	10YR 3/3		Gravel M.	5.7	4.2	1.5	
1	13	Trinidad (R3 96km) (Kinano-an)	I	0~10	CL	2.5YR 4/2			5.4	3.8	1.6	Cogon
			II	10~16	LiC	2.5YR 6/2			5.3	3.9	1.4	
			III	16~	LiC	2.5YR 7/3	10YR 5/8	Fragil Stone P.	5.5	3.8	1.9	
13	13	Carmen (R3 60km)	I	0~16	CL	10YR 2/3			7.4	6.6	0.8	Banana
			II	16~30	LiC	10YR 3/3			6.7	5.0	1.7	
			III	30~70	LiC	10YR 5/4			5.6	3.8	1.8	
14	13	Antose (R4 68km)	I	0~10	LiC	10YR 3/2			5.8	3.8	2.0	Upland Rice
			II	10~24	LiC	10YR 3/2			6.2	4.4	1.8	
			III	24~	LiC	7.5YR 6/1	7.5YR 5/6	Fragil Stone P.	6.2	4.5	1.7	
15	13	Pilar (R4 76km)	I	0~14	SiCL	10YR 2/3			6.0	4.4	1.6	Coconut
			II	14~	SiCL	10YR 6/4	10YR 6/8	Fragil Stone P.	6.0	4.2	1.8	
16	13	Kat punar Mahayag 87km to tagbilaran	I	0~13	SiCL	7.5YR 4/3			5.5	3.8	1.7	Upland Rice
			II	13~25	SiCL	7.5YR 4/3			5.2	3.8	1.4	
			III	25~	SiC	10YR 7/8	10YR 6/8	Fragil Stone P.	5.2	3.7	1.5	
17	13	Kat punar Mahayag 87km to Tagbilaran	I						6.0	5.1	0.9	Rainfed Rice
18	13	Kat punar Mahayag 81km to Tagbilaran	I	0~8	SCL	10YR 4/3			6.0	4.0	2.0	
			II	8~	SL	10YR 5/6	10YR 5/8	Fragil Stone M.	5.8	3.7	2.1	Cogon
19	13	Kat punar Mahayag 81km to Tagbilaran	I						5.5	4.2	1.3	Rainfed Rice
20	13	San antonio (near the bridge)	I	0~20	SiCL	10YR 4/3			6.2	3.9	2.3	Banana and Cassava
			II	20~	SiCL	10YR 7/8	10YR 6/8	Fragil Stone M.	5.4	3.8	1.6	
21	13	San antonio (near the bridge)	I						5.4	4.5	0.9	Rainfed Rice
22	13	Camtangay to gobi Between Bayongan to gobi	I	0~20	SiCL	10YR 3/3			6.0	4.1	1.9	Cogon
			II	20~	SiCL	10YR 5/4	10YR 6/8	Fragil Stone P.	5.8	3.9	1.9	
23	13	Cambangay to gobi gobi	I		CL				5.8	4.1	1.7	Coconut
24	13	Ubay Agr. Exp. stan. APC field	I		CL				5.6	3.8	1.8	New Lowland
25	13	〃 〃	I		L				5.6	3.9	1.7	Upland

Sample No.	Soil System No.	Location (km from Tagbilaran)	Layer	Depth (cm)	Texture	Soil color	Spot color	Spot content	pH (H_2O)	pH (KCl)	Difference	Note
27	13	Buenavista R3 67km R.	I	0~12	L	7.5YR3/3			5.2	4.2	1.0	Cogon
			II	12~	CL	7.5YR3/2			5.4	4.0	1.4	
28	13	R3 70km L.	I	0~12	CL	10YR3/4			5.2	3.8	1.4	Cogon
			II	12~19	LiC	10YR6/3			5.3	3.7	1.6	
29	13	R3 75km L.	I	0~12	SL	7.5YR4/4			5.4	3.9	1.5	Upland Rice
			II	12~22	SL	7.5YR4/3			5.3	3.7	1.6	
30	13	Mahayag to Danao Prov. Road 82km L.	I	0~6	SL	5.0YR3/4			5.3	3.7	1.6	Cogon
			II	6~12	SL	5.0YR3/3			5.0	3.7	1.3	
31	13	R3 83km L.	I	0~11	CL	10YR3/2			5.8	4.1	1.7	Cogon
			II	11~20	LiC	10YR2/2			6.0	4.3	1.7	
32	13	R3 88km L. 800m	I	0~13	SL	7.5YR4/3			5.6	4.0	1.6	Cogon
			II	13~24	CL	7.5YR4/4			5.7	3.8	1.9	
33	13	R3 90km R. 1,000m	I	0~5	SL	7.5YR4/4			5.6	4.0	1.6	Cogon
			II	5~11	SL	7.5YR4/6			5.4	3.9	1.5	
34	13	R3 92km L. 500m	I	0~8	SL	7.5YR4/6			5.3	3.7	1.6	Cogon
			II	8~18	L	7.5YR5/8			5.0	3.7	1.3	
35	13	Trinidad to Ubay R1 136km	I	0~10	L	7.5YR4/3			5.1	3.8	1.3	Cogon
			II	10~16	L	10YR4/4			5.3	3.8	1.5	
36	13	Soum to San Miguel (from Soum 4km)	I	0~12	L	10YR3/3			6.1	4.1	2.0	Cogon
			II	12~24	CL	7.5YR4/3			6.1	4.1	2.0	
37	13	Lanacienda to Mahayag (from Lanacienda 4km)	I	0~12	SL	7.5YR4/4			5.5	3.9	1.6	Cogon
			II	12~30	L	7.5YR5/2			6.0	3.9	2.1	
		R3 86km L. 200m to Alicia	I	0~9	CL	7.5YR4/3			6.1	4.1	2.0	Cogon
			II	9~	LiC	7.5YR4/2			6.1	4.1	2.0	
		R3 87km	I	0~16	LiC	7.5YR4/3			7.0	5.3	1.7	Cogon
			II	16~30	HC	7.5YR4/2			6.9	5.2	1.7	

Fig 1. Soil Sampling Sites

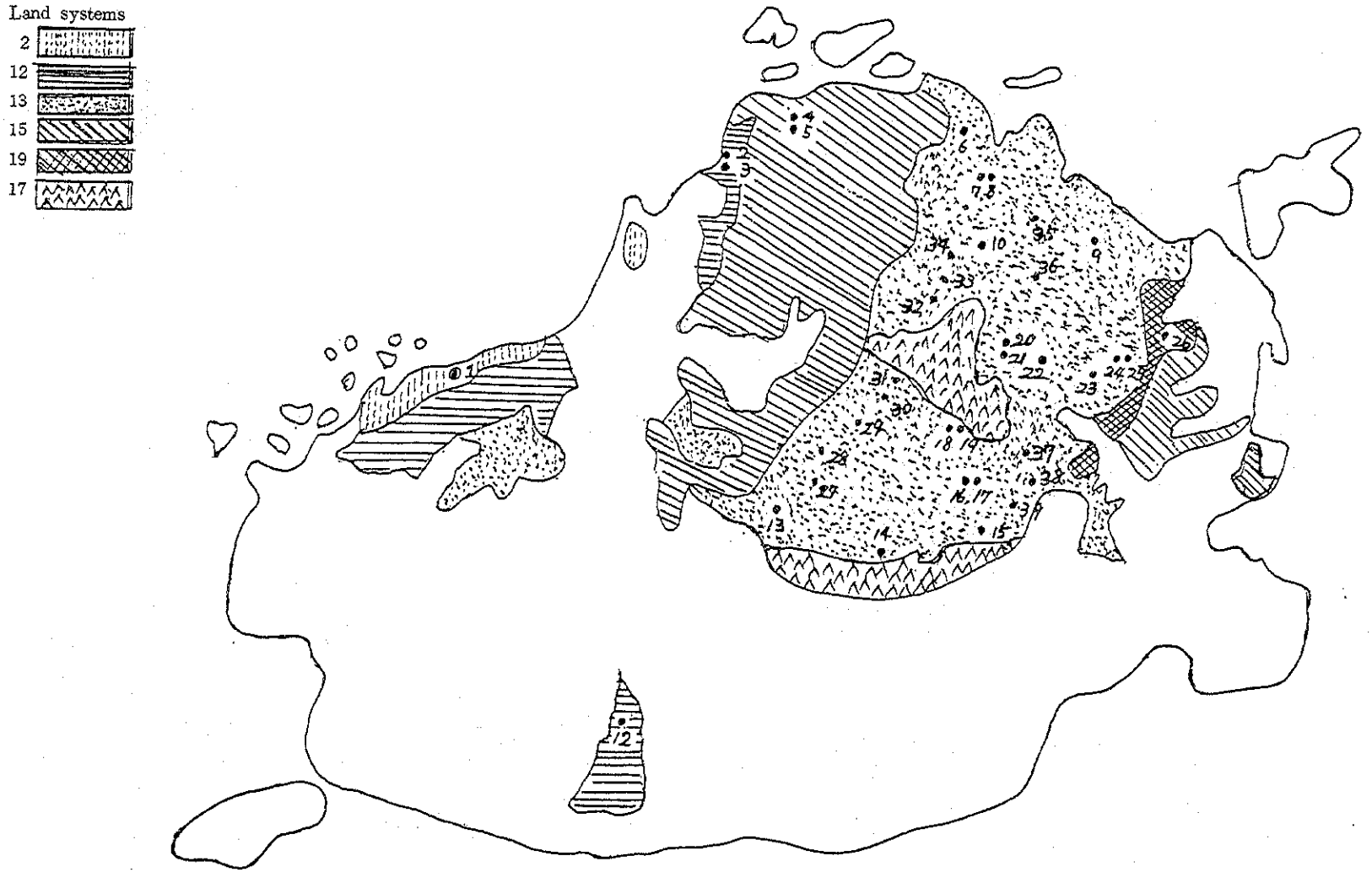


Fig 3. pH Distribution of Soil

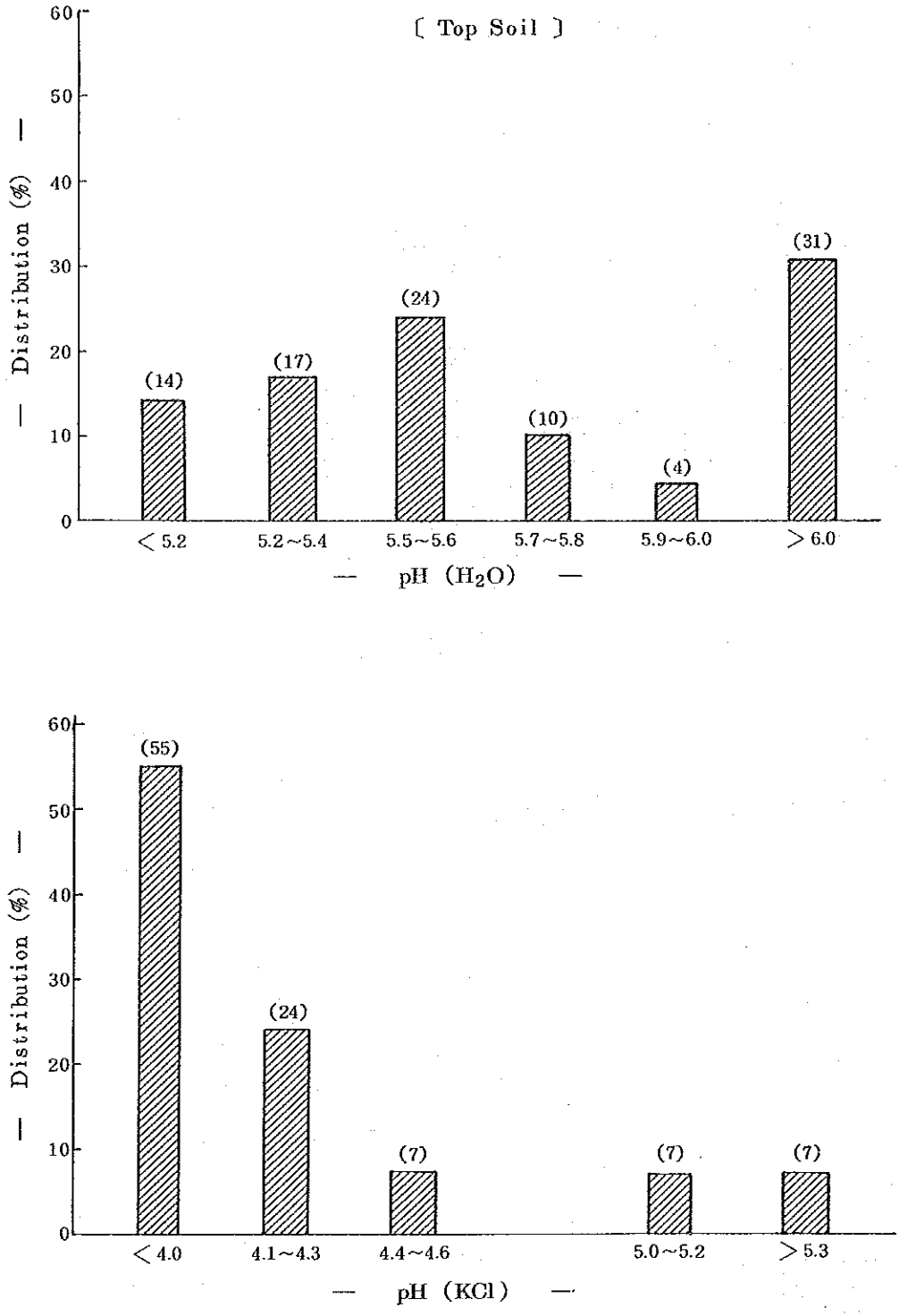


Fig 4 pH Distribution of Soil

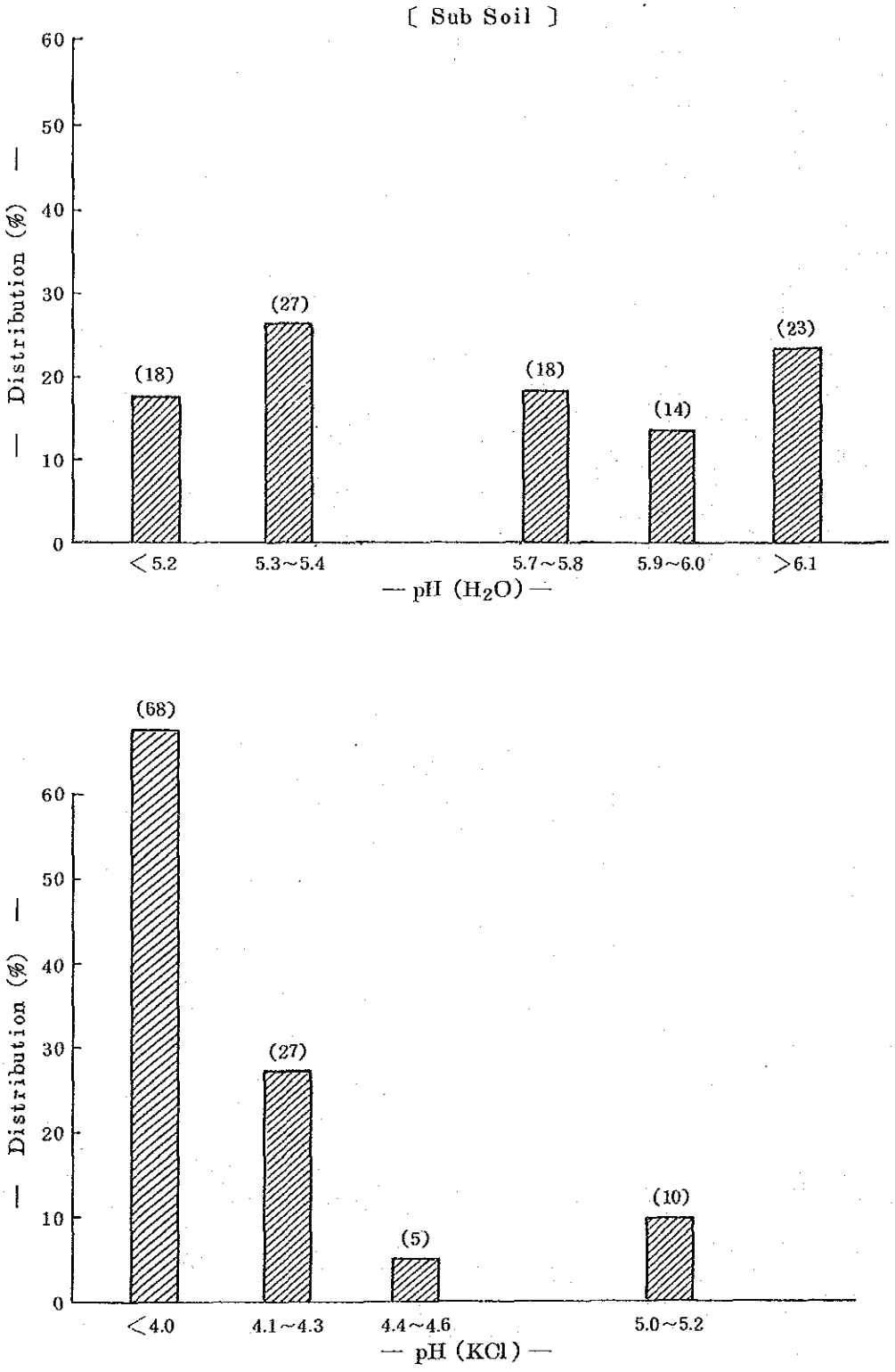
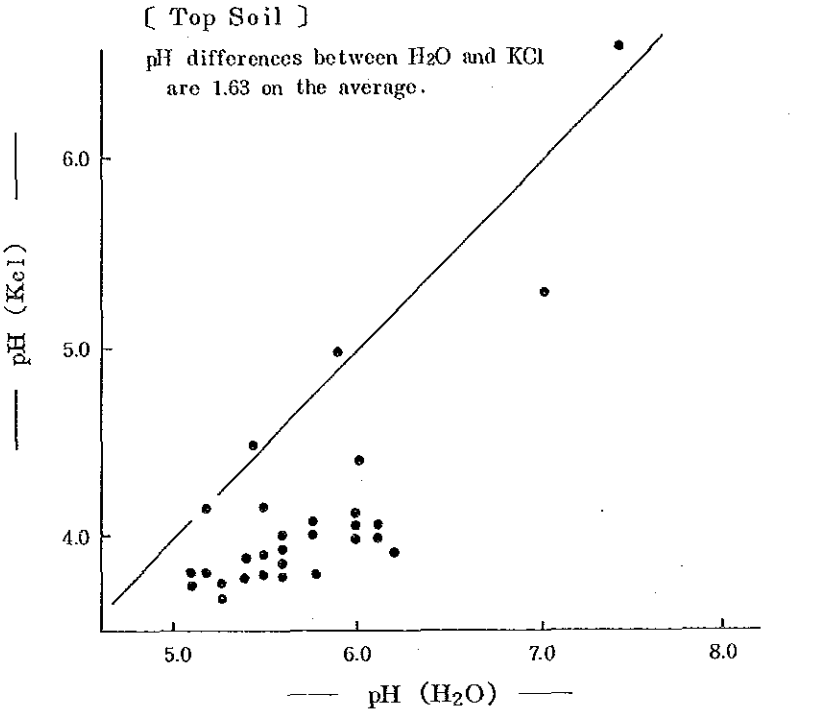
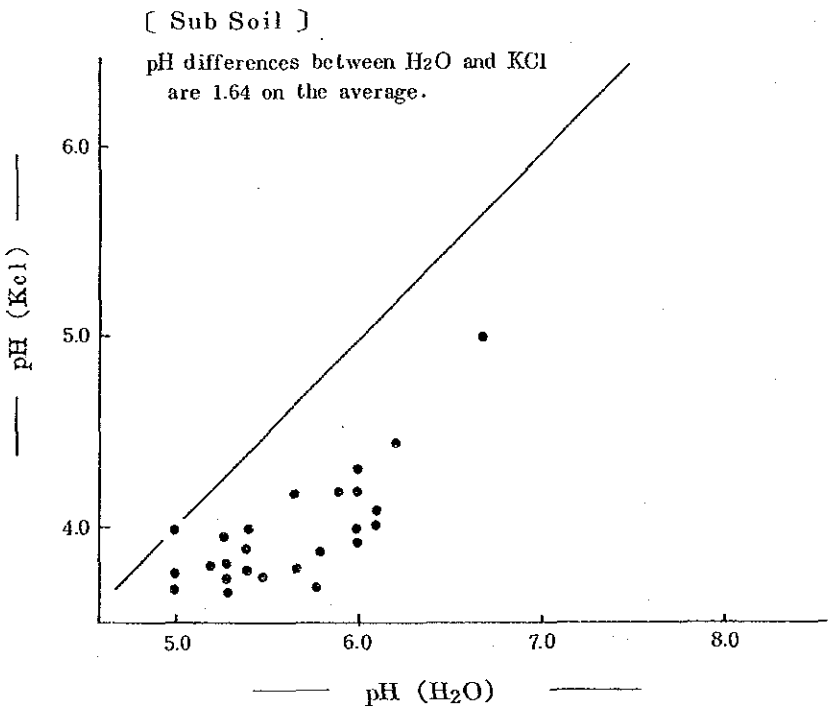


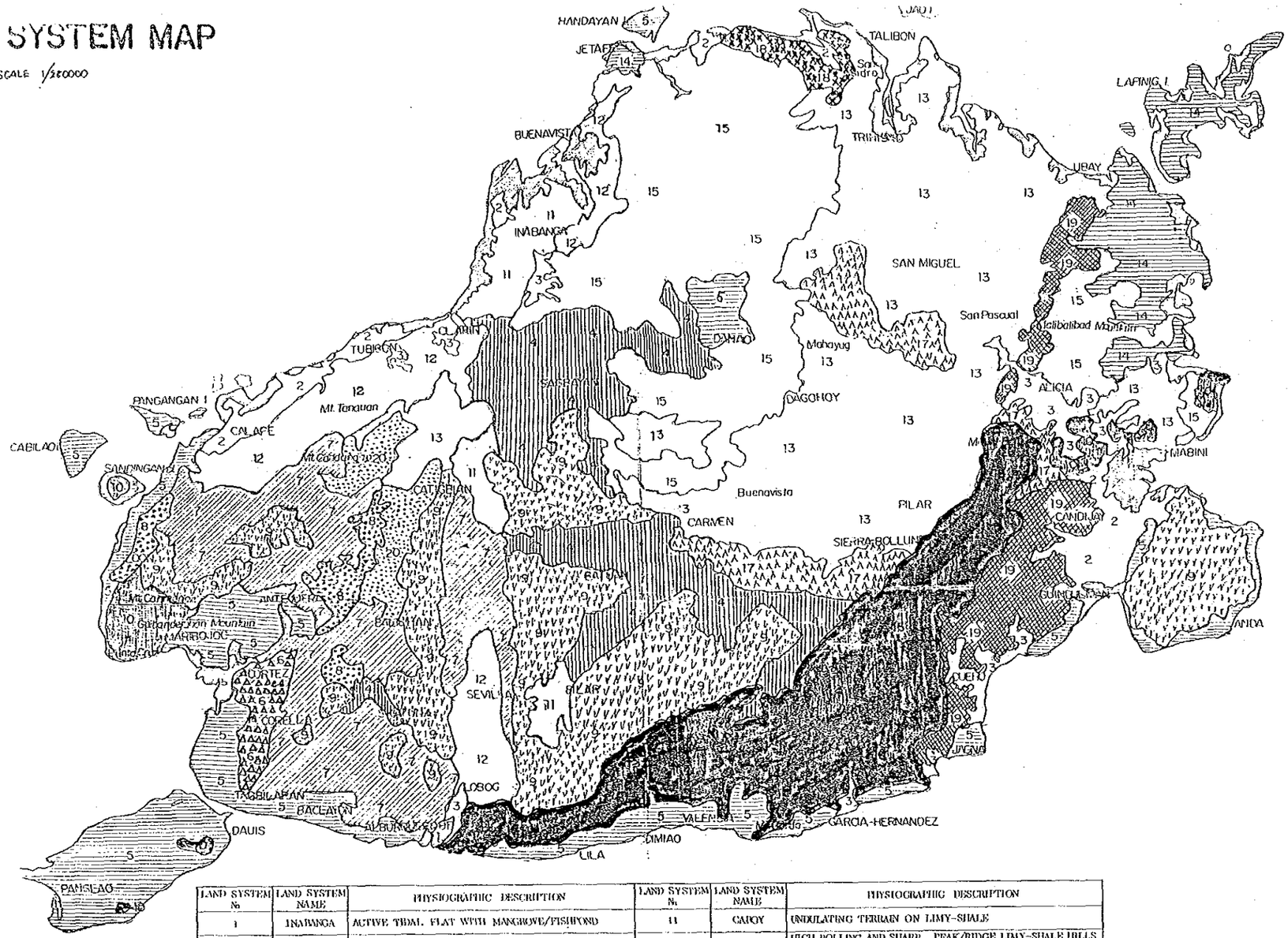
Fig 5. Interrelation between pH (H_2O) and pH (KCl)





SYSTEM MAP

SCALE 1/500000



LAND SYSTEM №	LAND SYSTEM NAME	PHYSIOGRAPHIC DESCRIPTION	LAND SYSTEM №	LAND SYSTEM NAME	PHYSIOGRAPHIC DESCRIPTION
1	INABANGA	ACTIVE TIDAL FLAT WITH MANGROVE/FISHPOND	11	CARQY	UNDULATING TERRAIN ON LIMY-SHALE
2	TUBIGON	COASTAL-ALLUVIAL PLAIN	12	TANAUAN	HIGH ROLLING AND SHARP PEAK/RIDGE LIMY-SHALE HILLS WITH ALLUVIAL VALLEYS
3	LOBOC	RIVER TERRACES AND FLOODPLAINS	13	BUENAVISTA	UNDULATING TERRAIN ON SHALE/SANDSTONE
4	BATUAN	KARST PLATEAU WITH ISOLATED LIMESTONE HILLS	14	UBAY	LOW ROLLING BASIC VOLCANIC HILLS WITH ALLUVIAL VALLEYS
5	DAO	KARST PLAIN	15	MALIBALIBOD	MODERATELY DISSECTED AND ROLLING HIGH BASIC VOLCANIC HILLS
6	TIWI	KARST PLAIN WITH PREDOMINANT SINKHOLES	16	SAGINGAN	ROLLING TO VERY STEEP LIMESTONE MOUNTAIN
7	CORELLA	MINOR KARST WITH INFILLED VALLEYS	17	BABAG	MODERATERATELY TO HIGHLY DISSECTED AND SHARP RIDGE LOW SEDIMENTARY HILLS
8	CABANGDAN	MINOR KARST	18	TANGHALIGUE	LOW UNDULATING TO ROLLING DIORITE HILLS WITH ALLUVIAL VALLEYS
9	OWAK	MAJOR KARST	19	DUAY	MODERATELY TO HIGHLY DISSECTED ULTRABASIC HILLS
10	LOON	HIGH DENUDATIONAL LIMESTONE HILLS	20	HAGUILNAN	CORRUGATED KARST PLAIN

4. 訓練・普及部門

1) 59年度の活動実績

普及活動は research division において開発される技術を農村に確実に定着をはかり技術移転を主なる任務とするが，当初はおいては，まずボホール農業の実態を把握しかつ技術的問題点の摘出をはかるため，農村調査活動を行ってきた。短期間の調査から考えられることはつぎのとおりである。

(1) 島内の地質，土壌の分布は極めて変異が大きい。

(2) 農業用水の利用の困難な地域が相当残されている。

(3) 作物生産に関する適正技術は未だ農家段階では定着，消化されていないよう見受けられる。

したがって現在の生産技術は地域間，作物ごとの生産技術の隔差が極めて大きく，農家ごとの作物収量が異なり，かつ作物生産に要する生産費も高くなっているように思われる。

今後はさらに具体的調査を試み，APCの活動推進の Beuchmark とするとともに，新しく開発される技術の移転につき活動をすすめる予定である。

2) 60年度の活動計画

(1) 普 及 活 動

① 現在の普及組織における普及活動の効果的な推進をはかるため農業普及員の農家指導に対する具体的手法を具体的に改善するとともに，農家集団の育成方法(農業技術集団，青少年集団，農家の主婦集団等)についてあわせて指導する。

② 農村に作物栽培技術展示ほ場を設定してAPCほ場における必要な技術を展示指導する。

③ 農村の実態調査及び診断指導を実施する。

農家調査は農家家族，農業経営条件，農業(作物)生産技術，農業経営技術，農家生活等の実態および推移を調査する。

さらに農民組織の調査については集団の目的，組織，機能，特色，活動の成果等につき調査を実施する。

(2) 訓 練 活 動

APC基本計画にもとづく訓練の内容につき具体的効率的な訓練活動の展開をはかる。

① 訓練計画の体系化につき改善する(年次別及び年間)。

農業普及員研修，市町村技術員の訓練，中核農民の訓練

② 訓練(研修)カリキュラムを作成する。

③ 訓練の実施方法の改善(集合研修の具体的実施方法を設定する)

講義による訓練，実施訓練(APCほ場，現地ほ場)，現地視察訓練，Domitoryの活用計画

④ 訓練後の評価を実施する。

DEC. 1st 1984

No	町村	学歴	専兼	耕作総面積	土地保有	かんがい水	労力源	保有労力	ローテーション	主要作物 作物	主要作物 品種	主要作物 面積	施肥 基肥	施肥 追肥
1	DIMIAO	ELEM.	専	0.04 ha	借	Grav	牛	借	米，豆	米	IR 36	0.04ha	(14-14-14) – 10gts	2gts
2	〃	〃	兼	種子 3gts	自1/2 借1/2	〃			米，豆	〃	〃 36 42		(14-14-14) – 1袋	(尿素) – 3gts
3	〃	COLLE.	兼	0.45	自	〃	牛	自	米，豆	〃	〃 56	0.45	(14-14-14) – 2.5袋	(14-14-14) – 0.75袋
4	〃	ELEM.	兼	0.50	借	〃	〃	〃	米	〃	〃 42	0.50	(14-14-14) – 4袋	(尿素) – 1袋
5	〃	COLLE.	専	1.20	借	〃	〃	借	米，豆	〃	〃 36	0.90	(14-14) – 3袋	(尿素) – 2回，3回
6	GARCIA FELNANDES	ELEM.	専	種子 2gts	借	〃			米	〃	〃 42		(3-4-14) – 0.5袋	(尿素) – 0.5袋
7	〃	〃	兼	0.75	借	Rainfed	牛	借	米	〃	〃 56	0.60	(尿素-14-14) – 2袋	
8	〃	〃	兼	1.00	借	〃	〃	〃	米	〃	〃 56	0.20	(14-14) – 1.5袋	
9	〃	HIGH.	専	0.06	自借	Grav	〃	自	米	〃	〃 56	0.06	(14-14-14) – 8袋	
10	〃	ELEM.	専	1.00	自借	Spring	〃	借	米	〃	〃 56	0.20	(尿素) – 1袋	
11	DAGORIOY	ELEM.	専	4.00	自借		〃	自	米	〃	〃 36	2.00	4袋	
12	〃	HIGH.	専	0.50	借	Rainfed	〃	借	米	〃	〃 36	0.50	(14-14-14) – 3gts	
13	〃	〃	兼	2.00	自	〃	〃	自	ココナッツ キャサバ	ココナッツ キャサバ	在来種 ゴールデンイエロー	1.00 0.002	Kacl – 10袋 (14-14) – 1袋	
14	SAN MIGEL	〃	専	2.00	借		〃	借	キャサバ	キャサバ	JAVA BHEIA	1.00	(14-14-14) – 6袋	
(戸数)	(町村別戸数)	(学歴)	(専兼)	(総面積)	(土地保有)	(かんがい水)	(労力源)	(保有労力)	(ローテーション)	(主要作物と品種)			水田 (1a当り)	(施肥)
14戸	デミアノ 5戸	小卒 8戸	専 8戸	~0.1ha – 4戸	自 2戸	Gravity 7戸			米 9戸	米 IR 36 – 5戸			1/3袋 5.6袋	
	ガルシヤF 5戸	高卒 4戸	兼 6戸	0.5~0.75 – 4戸	借 8戸	Rainfed 7戸	役牛 10戸	自家用 4戸	米，豆 3戸	〃 42 – 3戸			2.0 〃 7.5 〃	(追肥する農家)
水田 12戸	ダグホイ 3戸	短大卒 2戸		1.0~1.2 – 3戸	自借 4戸	Spring 1戸		借用 6戸	計 12戸	〃 56 – 5戸			3.3 〃 8.0 〃	6戸/12戸
畑 2戸	サンミゲル 1戸			2.0 – 2戸					ココナッツ キャサバ 1戸	ココナッツ – 在来種			4.4 〃 (計8戸)	
	計 14戸	計 14戸	計 14戸	4.0 – 1戸					キャサバ 1戸	キャサバ – ゴールデンイエロー JAVA，BH			5.0 〃	

No	主要作物の生産高 面積	総生産量	オペレータ料	支払労賃	販売量	単価	外農場経費 (全面積) かんがい水料	労賃	1人1日労賃	質問
1	0.01 ha	600 kg	300.50 kg	100 kg	–	–	₱ 24	自家	₱ 15	○
2		400	100.25	₱ 180	–		米 65kg/1a	18人/日	₱ 10	○
3	0.45	米 3,250 ▲ 豆 130	–	₱ 250 ₱ 75	1,500 kg	₱ 135/袋 ₱ 18/gt		₱ 1,955	₱ 14	○
4	0.50	2,500 ○	1,250.50	–			₱ 9,400	₱ 450		○
5	0.90	米 4,000 ○ 豆 150	1,000.25	500 kg 1/8	1,000 kg 100 kg	₱ 150/袋 ₱ 22/gt	米 80kg/1a	1/8 gts		○
6		600	300.50	–	–	–	7 kg/peason			
7	0.60	1,500 ○	750.50					○	₱ 15	○
8	0.28	1,300 ○	650.50	5 gts/1人			₱ 80	○		○
9	0.06	3,400 ○	1,700.50	–	1,500 kg	₱ 150/袋	₱ 150	₱ 1,800	₱ 15	○
10	0.20	900 ○	450.50	₱ 125			₱ 80	₱ 245	₱ 15	○
11	2.00	2,000 ▲	–	₱ 900	1,000 kg	₱ 120/袋	–	₱ 900	₱ 30	○
12	0.50	600 ▲	450.66	₱ 200	–		–	₱ 1,100		×
13	1.00 ココナッツ 0.002 キャサバ	700Nuts 200 kg	–	₱ 25 –	₱ 700 20 Cavs	₱ 3/Nut ₱ 5/Cav				○
14	1.00	キャサバ 22 ton	15 ton	₱ 1,000	₱ 8,000	₱0.35/kg		₱ . 930	₱ 30	○

(1.0aあたり生産量)	(オペレータ料) (生産量に対する割合)	耕起，移植，除草，収穫(脱穀)，その他
kg 5,000 kg		
4,450 , 2,500	米農家	
6,500 , 5,670	66% – 1戸	
4,500	50% – 7戸	
	25% – 2戸	
(9戸平均) 4,227 kg	計 10戸	
(6戸平均) 4,770 kg		

農業事情調査（1）

（Summary）

BILAR　　8 Jan. 1985

農家戸数　1,829戸（OLT 12.8%＋Lease Hold 53.7% → Tenant 66.5%）
耕地面積　1,632ha（1戸当り　0.89ha）
Soil pH　7.0～8.0

rainfed	645ha	(40%)
imigation	980ha	(60%)
計	1,625ha	(100%)

水稲施肥料と収穫量（調査農家4戸平均）
肥料（14-14-14）2.4bag/ha → 56bag/ha（IR 18%, Local 82%）
（よい例）2.5 〃 → 65 〃 （〃 50%, 〃 50%）
（よくない例）1.0 〃 → 50 〃 （〃 10%, 〃 90%）
施肥回数（平均）1.5回（14-14-14, Buts Bawel）
作付型　水稲－水稲－休閑（4・5月）

水稲種子の更新　IR品種は70% 2～3作付して更新するが，local種は30%程度で，種子はprivate，農家が生産しMAの検定をうけたものを利用する。
種子代　₱160/45kg，Carmen，Ubyに種子農家が多い。

Buts Bawels
地域内ほとんどの農家が利用するが，施用法（量，施肥技術）や効用は確定，確認されていない。

Vegetable　Cabage（₱14/kg），pechay（₱4），Mustard（₱4），Eggplant（₱4.12），pepper（₱18），Squash（₱6），Mangbeans（₱19），Stringpeans（₱19），radish（₱10），onion（₱8），Okura（₱3），Mango（₱15）
種類は相当多く作られ，TAGBILARANにも輸送されている。
農家直売による。Rice，cornの仲買人（Middle Man）町内15人位ある。

Samapang Nayon － Cooparative Rural Bank（SN）
'80 ₱60,000（10カ月）利子年45%（Milling），'84（6月）₱3,750（6カ月）年24%（36%）
Farmer Association（FA）－ rice，corn，Vegetable，livestock，△Hllut，House Hold，assisted（　-assisted）farmer

1. 農業改良普及員の活動は何故に，何に焦点を当て指導しているか？
2. 農家階層間，農家個別間の生産技術，意識などにおいて相当の間隔がみられるものと推測する。

TUBIGON　　10 Jan. 1985

農家戸数　2,527戸（OLT 5.4%＋Lease Hold 28.3% → Tenant 33.7%）
耕地面積　3,064ha（1戸当り　1.21ha）
Soil pH　6.0～7.0，upper land 亜鉛欠がみられる。

水稲施肥と収穫量（4戸平均）
肥料（14-14-14）3.1bag/ha → 64bag/ha（IR 81%, Local 19%）
（よい例）8.0 〃 → 120 〃 （〃 75%, 〃 25%）
（よくない例）1/4 〃 → 15 〃 （IR 100）
施肥回数（平均）1.7回（14-14-14，16-20-0，21-0-0）→（よい例）
IR種とLocal種の収穫量の差は10bag/ha位といわれる。

水稲作履傭労力
移　植　6～18人・頭/ha（cararao）×₱30/day
除　草　10人/ha × ₱15/day
収　穫　1人/ha × ₱15/day
後始末　2人/ha × ₱15/day

Corn－White 45bag/ha，yellow 65bag/ha，hillycorn 20～23bag/ha
輪作　corn － corn － Idle － peanuts
（April～July）（August～November）各4 monthes

Vegetable － Beans（Mang-bean，string-bean），banana，upo，umpalaya，squash，pechay → Market（vegetable strageを要求している。CeveとVegetableを交換している。

Irrigation－Dam（proposal 200ha）
（IRIHAN DAMの効果）
1. 平年作の収穫は施工以前と同様だが干ばつ期などは安定的に生産されるので長期間では相当の生産増加となる。
2. 改良品種が増加している。
3. 農家の生産意欲が高まり適期適作業（施肥，防除など）を行うようになった。

農業事情調査（2）

（Summary）

Carmen

（現地の意見）

1. 50% farmer borrow money from rural Bank return to Bank not in time.

2. High cost of fertilizer.

3. Soil erosion & rolling place.
   pH 5.5

4. 50% Cassava chip （30%）
   50% for fresh tubers （70%）

5. 20% Human foods
   80% Animal feeds & starch

6. Cassava chip－60% water, 40% dry matters

7. 7 tracters－Canava Factory（300㏊）
   5 〃 － Farmer private
   } carmen to Sav migea area.
   Hire ₱ 700～800/㏊（Plowing Harrowing）≒ 8 hour（1day）
   Harvest 20 manpower/㏊, 20 t/㏊

◦ Survey farmers（4戸）（Ave. 49.5 years）

Rice	0.92㏊	(Tenunt 13.6%)
cassava	2.42 〃	(〃 18.2%)
total	3.34 〃	(〃 16.8%)

Rice IR 36-4, IR 42-1, Fertilizer 3.75bag/㏊ → Harvests 95.5bag/㏊

Cassava Golden-yellow 3, 〃 1 bag/㏊ → 〃 10 t/㏊

（考 察）

1. Cassava ベース農家は Rice + Cassava（cash crop）+（Co-Conut） の経営といえる。

2. Cassava 地帯は比較的一戸保有耕地が大きい。

3. Small farmers → 1.0㏊未満（とくに 0.5㏊以下），主要道路から遠距離，家族労力に余剰がある。耕地せまく生産物少ない。農家数が多い。
   0.5～1.0㏊農家は cassava only が多い → cassava を dry chip にする。

4. bigger farmers → 2.0～10.0㏊耕地作付，トラクター及び水牛利用

   Caravas（manpower） → { plowing 10人/㏊ / Horrawing 10人/㏊ } > Harvest 15～18 t/㏊

5.

（row tubers）	（dry chipes）
bigger farmers	Small farmers
Improved Variety（20 t/㏊）	Local Variety（15 t/㏊）
use to starch	use to cattle feeds
機械，畜力による生産	人力，畜力による生産
50（70）%	50（30）%
₱ 0.40（庭先），0.45（工場）/㎏	₱ 1.35/㎏
水分 60%, DM 40%	水分 12%, DM 88%（raw の 2.2倍）
₱ 0.40～0.45 × 2.2 → ₱ 0.88	₱ 0.99/㎏（₱ 0.47, ₱ 0.36 高価）

6.

	(10 t/㏊)	(15 t/㏊)	(20 t/㏊)
₱ 0.40/㎏	₱ 4,000/㏊	₱ 6,000/㏊	₱ 8,000/㏊

Rice ₱ 3.30/㎏ × 3 t/㏊ × 2作 → ₱ 19,800/㏊

6人家族の消費量（Rice）（18 cups → 1 gts）

1 cup（0.122㎏）× 3回 × 6人/1日 → 2.2㎏（1 gts）/6人×1日

2.2㎏（1 gts）×365日 → 803㎏/年×6人 = 16bag/年 = 2.7bag/年×1人

7. bigger farmers → tracter（27ps～）
   Small 〃 → Cassava chopper
   } request あり。

農 業 事 情 調 査 (3)

(Summary)

Loon

(現地の意見)

1. Lack of Capital
   Rice - Hirecost/season ₱1,000~2,000/ha - fertilizer, seeds, pesticide, ladon (plawing, transplanting)
   50% Farmers borrow the money from CRB. (25% interest - 36~42% (PNB, DBP)

2. Protect of pest, disease
   75% Farmers can decide regarding pest, disease occurred.
   35% area puddy occurred.
   20% rice decrease in harvest amount.

3. Unfavourable climatic condition.
   Soil pH 5.5~6.5, upper land → maddy,
   rainy month Oct. to Jan.
   corn growth ···
   roling lay of the land → no irrigation.

4. Camote - 7.5 t/ha (local variety) → proposal VISCA.
   700ha area planted, pest (BOKUBOKU, REBRORE BRD)
   ₱25/can (20kg) farmers gate price.
   ₱30/can, Market price.

5. Vegetable - eggplant, tomato, upo; onion, string-bean, squash, mang-bean, gobi, sayote, radish.

Cassava - 500ha local (Golden yellow) 5 t/ha (eatug).

UBI - planting, Dee, 6 t/ha.

Coconuts - 15 nut/tree × 4 seasen → 60 nuts.
dry coprra - 3 nuts → 1kg ≒ ₱6

(考 察)

1. Hilly 地帯は地形起伏が激しく，傾斜地に小面積の田畑を開いている。比較的降雨が多くしかも地質の排水がよくない。したがって各種の植生を持っているが，upper とはいえ湿地が相当にみられる。

(camote, cassava)

2. 作物はわずかの rice, corn, root crop, coconats, livestock の作目を持つが，農家の経済，生活は低い。農民の民情は豊かである。耕作地は少なく tenunt による借地が相当多い。

3. 調査農家14戸の平均は，米0.84ha, corn 0.17ha, camote 0.25ha で，計 1.11ha (うち 0.15ha は corn, camote が重作されている)，Tenunt 63.7%，(Rice) IR (36,52,34,42) が多く (73%)，C-4 (27%) も作られている。
   肥料 1.8bag/ha → 37.2bag/ha rice 程度と考えられる。

   (corn) 乾期の作付は収量もあるが，適期をはずした作付が相当みられる (万一の収穫を見込んで作付する由)。
   品種は Trinigul が多い。
   肥料は 46bag/ha に対して 10.4bag/ha 程度を生産している。

   (Camote) 700ha の面積があり，土地を借りて作付している。
   品種は San Pedro, Kinampay, Kapining などが作られる。
   Hilly 地域の特作物的存在にあると思われる。
   肥料はほとんど無肥料が多く，平均でみると 14-14-14 肥料を 9.5kg/ha 施用して，1.2 t/ha の Camote を収穫している。

   (Vegetable) 種類は相当多く作られているが，自家用が多く，市場に持ち出されるのは一部である。
   狭い耕地の小農的経営としては，降雨量や地形を利用した野菜の振興は，今後可能性があると考える。

Production Cost of Rice, Corn, Cassava, Mung-beans, Peanuts

Cost of Production on Rice

〈 0.5 ha 〉

	(M×D)	(M×A×D)	(Amount. P)
Land Preparation			
1. Plowing		3	90.00
2. 1st Harrowing		3	90.00
3. 2nd Harrowing		2	60.00
4. Fixing of dikes	3		45.00
5. Seed bed preparation	1		15.00
〈 Total 〉	〈4〉	〈8〉	〈300.00〉
Trans Planting			
1. Pulling of seedlings	2		30.00
2. Fertilizer Applieation (Basal)	2		30.00
3. Final Levelling & Harrowing	1		15.00
4. Transplanting	10		150.00
〈 Total 〉	〈15〉		〈225.00〉
Care & Management			
1. Water	1		15.00
2. Weeding	5		75.00
3. Side dressing	2		30.00
4. Spraying	1		15.00
〈 Total 〉	〈9〉		〈135.00〉
* (Total)	(28)	(8)	(₱660.00)
Inputs - Materials			
* Fertilizer			(₱616.00)
2 bags - 14·14·14			487.00
6.5 bags - 45·0·0			129.00
* Chemical			(₱200.00)
Pesticides			150.00
Rodenticide			50.00
Grand Total			₱1,476.00

Cost & Return Analysis on Corn production

〈 0.5 ha 〉

	(M×D)	(M×A×D)	(Amount. P)
Land Preparation			
1. Plowing (2×)		5	150.00
2. Harrowing		2	60.00
3. Furrowing		1	30.00
4. Planting, Fertilization	5		75.00
5. Cultivation (2×) 3	3		45.00
6. Fertilization (side dressing)	1		15.00
7. Spraying (2×) 3	1		15.00
8. Harvesting, Husking, Haulling	3		45.00
9. Shelling at ₱1.50/bag			
10. Drying at ₱1.00/bag			30.00
〈 Total 〉	〈13〉	〈8〉	〈465.00〉
Materials			
1. Seeds /ha			40.00
2. Fertilizers			
14-14-14 2 bags			487.00
45 - 0 - 0 (Urea)			73.50
3. Pesticide (Furadan) 10 kg			75.00
〈 Total 〉			〈675.50〉
Grand Total			₱1,140.50

Cost of Productionon Cassava

(1.00 ha)

Labor	(M×D)	(M×A×D)	(Amount. ₱)
1. Land preparation			
Plowing (Twice)		10	300.00
Harrowing		4	120.00
2. Planting			
Preperation of materials	1		15.00
Hauling of seeds pieces	2		30.00
Traus-planting	10		150.00
3. Replanting	1		15.00
4. Weeding & Cultivation			
1st off baring		2	60.00
Hilling up		2	60.00
Weeding (3-4 wks. DAP)	10		150.00
5. Fertilization	4		60.00
6. Cleaning Prior to harvest	3		45.00
7. Harvesting (₱ 20/MT. at)			400.00
8. Hauling at (₱ 25/ton/truck-10 ad)			500.00
(Total)	(31)	(18)	(1,905.00)
In Puts			
1. Planting Material			200.00
2. Fertilizers (4 bags 14-14-14) (at ₱ 264.50)			1,058.00
(Total)			(1,258.00)
Contengency (10%)			(316.30)
Grand Total			₱ 3,479.30

Production cost of Mungo-beans

(0.5 ha)

Labor	(M×D)	(M×A×D)	(Amount. ₱)
1. Land Preparation			
Plowing		7	210.00
Harrowing (Twice)		3	90.00
Furrowing		2	60.00
2. Planting	2		30.00
3. Fertilization	1		15.00
4. Weeding	3		45.00
5. Spraying (Twice)	2		30.00
6. Harvesting	10		150.00
(Total)	(18)	(12)	(630.00)
Inputs			
Seeds (12kg, at ₱ 14/kg)			168.00
Fertilizers 2bags (14-14-14)			487.00
Inoculant (3 gm)			5.00
Pesticide			100.00
Fungicide			100.00
(Total)			(860.00)
Grand Total			₱1,490.00

Cost of Production of Peanuts

〈 ha〉

	(M×D)	(M×A×D)	(Amount. ₱)
Labor			
1. Land Preparation			
Plowing (Twice)		7	210.00
Harrowing (Twice)		3	90.00
Furrowing		2	60.00
2. Planting	2		30.00
3. Fertilization	1		15.00
4. Weeding	3		45.00
5. Spraying (Twice)	2		30.00
6. Harvesting	10		150.00
〈 Total 〉	〈18〉	〈12〉	〈630.00〉
In puts			
Seeds (50kg. Shelled)			660.00
Fertilizers 16-20-0 2bags			470.00
Pesticide 1 litter			100.00
Inoculant 3gts			5.00
〈 Total 〉			〈1,235.00〉
Grant Total			1,865.00

Price ₱ 13.20/kg

Corn & Root-crops

Corn

Local Variety (80%)

1. Teniguib	80%	18~20 bag/ha	
2. Kataro	10%		
3. Pasaray	5%	16~18 bag/ha	
4. Masyao	5%		

Improved Variety (20%)

1. DMR II (Daony Mudeu Resistance)	20%	30~40 bag/ha
2. UPCA (University Philippines College Agri)	15%	25~30 bag/ha
3. MIT selection (Mindanao Institute Technical)	5%	

Cassava

Local Vaisty (%)			Improved Vaisty (%)		
1. Jara Brown	%	20 t/ha	1. Codavao	%	15 t/ha
2. Brasrian	%		2. Cavibrog	%	
3. Golden yellow	%	18 t/ha			
use to eat dry chipes			use to starch row tubers		

(Water % resame)

Camote (Sweet-Potato)

Local Variety (90%)

1. Kapining	50%	10~15 ton/ha
2. San Pedro	15%	
3. Kalugti	10%	
4. Samarino	10%	
5. Kinampay	5%	
6. Mangiles	5%	
7. Tapol	5%	

Improved Variety (10%)

1. Visa I, II, III	12~20 ton/ha
2. BNAS I, II (San Pedro → Original)	10~15 ton/ha

農　業　情　報

（カウンタパートより）　1/3

Bohol 農業の課題

1. Capital 不足，農家収入年平均 ₱1,000～2,000（高収入 ₱5,000　低収入 ₱500）
自家食費を含む

政府農村銀行より資金借入農家は Bohol で約 100 戸位で，土地購入に主として利用され，一部農外事業（農業関連）に使用する。年利 32%（M 99 同様）。

土地代　水田（かんがい）　₱50,000/ha

〃　（天水用）　₱15,000～20,000/ha

畑　　₱15,000/ha

2. High cost 経営 － 肥料代，農薬代，労賃（₱15/人日，₱30/人日頭）

3. 農産物の流通（個立市場 2，中間業者が多い。中間流通コストが大きい。）

作物別技術的課題

Rice ； 地方品種が多い，pHの修正ができない，肥料施用が少ない（浸漬液肥税が多く，篤農家で 4 bag（200Kg）/ha，尿素の場合 1 bag（50Kg）/ha），病害虫の対策をやらない，2 期作以上（他作物）の作付をしない，稲わらを焼いてしまう，借入金をやらない。

種子は同品種を 2 年間作付して新種子を導入する（ウバイ農試，ウバイ地方の採種農家，セブ農試等から導入する）

Corn ； 種子代が高い（ハイブリッド）₱18/Kg，施肥料量が少ない（1～2 bag/ha），病害虫の対策をやらない，販売価格が安い　₱2.10/Kg。

Cassava ； 肥料 0～4 bag（平均 2 bag × 50Kg）/ha，降雨（適期耕転），農具・機械が殆んどない，市場価格 ₱0.35（ほ場），₱0.40（工場渡）。

Legumes ； 施肥は殆んどやらない，農薬は使用しない。

A Study on Bohol Agriculture

A. Classification according to speciality area in Bhol

1. Reasons and special characters about how it was classified.

Bohol is a first class - A province centrally situated in this Visayas. It is the 10th largest island of the archipelano with a total land area of 411,726 ha of which 50% is approximately suitable for agriculture.

2. Explanation to each of the classified area.

* The lay of the land in Bohol - Although there are flat areas, majority are rolling and hilly and has around 167 mountains.
* The nature of the soil - The nature of the soil in bohol is predominantly limestone along the coastal areas. Soils originated from shale rock making it favorable for corn, tobacco and sugar cane growing.
* The Clinate is usually warm along the coast and cold and humid in the interior. Bohol is classified under type four with no distinct dry and wet season. The temperature is 27.4°C and the rainfall is 159 m.m. Rainfall in Bohol is more or less evenly distributed throughout the year.
* The resource of land water-Several rivers are found in the island province. Some of these rivers are topped for irrigation and power. Rain water in the hinterland are impounded for irrigation purposes. Some of the big rivers found in the north are the Ipil and Inabanga river and in the south are the Abatan and Lobac river.

* The classification of farm products.

  Rice, corn, coconut, root crop, legume and livestock are classified under major farm products. Cacao, coffee, fruit, tobacco etc., are under special farm products. Farmers have their customary way of rotating their crops.

* The farmers status and economy

  50% are full time farmer

  40% are part timer

  10% are full non-farm farmer

OPERATION LAND TRANSFER AREA*

Tenants - 4,042 farmers

Landowner - 443 farmers

Leasehold area:

Tenants - 16,853 farmers

Landowner - 16,306

* Farmers Income

Average farmer - ₱1000 - ₱2000 per annus

High Level farmer -₱5000 plus

* Farm Marketing

Private Individual (middlemen)

AMC (Area Marketing Cooperative)

NFA (National Food Authority)

B. ESSENCE OF AGRICULTURAL PRODUCTION IN BOHOL (to each crop)

1. Present condition for every crop

Crops	Area planted (has.)	Farmers served
Rice		
Corn		
Root crops		
Legumes		
Vegetable		
Fruit trees		

2. Selling price of farm product

Product	Price per kilo	Market outlet
Rice	₱2.90-/kg.	NFA,AMG & Private Person
Corn	₱2.50 /kg.	NFA,AMG & Private Person
Root crops:		
Ubi	₱6.00 /kg.	Local buyers
Sweet Potato	₱3.50 /kg.	Local Buyer

Mungo ₱14.00/kg.

Copra ₱3.20 /kg. Local Market

3. Labor on each crop

Rice ..... ₱2,000.00/ha. Corn. ...₱1000.00/ha.

Cassava ...₱1,905.00/ha. Peanut ..₱1,200.00/ha.

4. Question in Agricultural Promotion in Bohol

a. The soil is not yet stabilized

5. ACCOMPLISHMENT REPORT 1984

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BACKGROUND

The Bohol Agricultural Promotion Center (APC) is a joint undertaking between the Japanese government represented by Japan International Cooperation Agency (JICA) and the Philippine government through the Bohol Integrated Area Development Project (NACIAD-BIADP).

In 1978, Bohol was identified as a priority area for development by the National Council on Integrated Area Development (NACIAD). Thus, a master plan of the province was formulated in 1979 by NACIAD and JICA. This was completed in February, 1980, identifying the establishment of the Agricultural Promotion Center, which is intended to accelerate agricultural development of the province.

In May, 1980, a series of JICA missions in cooperation with Bohol Integrated Area Development Project (BIADP) were dispatched to survey possible sites of the center, which were later identified to be at Dao, Tagbilaran City, Bilar, and Ubay. Then in February, 1983, the Records of Discussion was signed by the Japanese government and the Philippine government which was represented by BIADP Director and Minister of Agriculture and Food.

Furthermore, BIADP requested the Japanese government to extend financial grant for the construction of the APC buildings. The grant was approved and signed in July 1983 assigning Kume Architects and Engineers of Japan to undertake the design of the center. In November, 1983,

Kumagai-Gumi Company Limited of Japan was awarded the contract for the construction of the buildings given a time frame of twelve months to complete its work.

OBJECTIVES AND ROLE OF APC

1. Objectives:

Its main objective is to promote Agricultural Development through the generation and diffusion of technology suited to the specific condition in the province of Bohol.

Through the agricultural development, the project aims pushing up the situation of farmers, and furthermore, contributing to the economic and social growth of Bohol province.

2. Role of APC

In order to supplement the package of improved agricultural technology, support farm resources requirements and increase the technical capacity of personnel and farmers engaged in the project, the center shall undertake the following:

a) Trials, field studies and demonstrations centering on improved agricultural techniques at the farm level;

b) Enhance production of high quality seeds through research, training and demonstration on seed production techniques;

c) Guidance and advice on post-harvest techniques and demonstration thereof;

d) Guidance and advice for the purpose of strengthening the existence of agricultural extension network;

e) Training of technical personnel and farmer leaders particularly within the project areas;

f) Planning the transfer of farm inputs such as fertilizers and agricultural chemicals and scheduling the operation, usage and maintenance of farm machineries to be rented out to farmer cooperatives and/or associations in and around the leading Extension Areas; and

g) Conduct other educational, promotional and information services related to the transfer of packaged technology.

Furthermore APC will identify municipalities for expansion on extension services. Farmers will be provided with the proper guidance and support in improved techniques of farming. Problems identified in the extension area will be fed back to the APC for in-depth analysis and proper/appropriate action.

FACILITIES OF APC

APC is composed of main Center at Dao and sub-centers at Bilar and at Ubay.

The Experimental farm is supplied with water from three different waterworks systems; Sprinkler and drip irrigation system from Underground water in Dao Center, gravity irrigation from river and pump up irrigation system from reservoir in Ubay.

The APC-Infra-farms covers six hectares distributed to three areas:

1. Dao ..... 1 hectare (upland) + 1.5 hectares Orchard
2. Bilar ..... 2 hectares (Lowland)
3. Ubay ..... 2 hectares (Lowland) 1 hectare (Upland)

MODEL INFRASTRUCTURE

JICA MADE FARMS: Development Cost and Duration

FARM	DEVELOPMENT COST	Month Completed
1. DAO Upland Farm) 2. BILAR Lowland Farm)	2.3 million Pesos	March, 1984
3. UBAY Lowland Farm) UBAY Upland Farm)	1.3 million Pesos	December, 1984
TOTAL	3.6 million Pesos	

EQUIPMENTS FROM JICA

1982 ..... 3.6 Million Pesos

1983 ..... 4.1 Million Pesos

1984 ..... 3.6 Million Pesos

RICE

1) Lowland rice yield survey.

Cropcut yield survey of lowland rice was conducted on 16 farmers' fields in 9 municipalities of Bohol on October 13 to 25, 1983, and it was found out that an average yield of 2.8 tons/ha. with 3.8 tons/ha. yield for irrigated ricefield and 2.4 tons/ha. yield for rainfed areas.

Fertilization was observed to be practiced by 70% of the farmers including rootdip method. Average fertilization rate was found to be N: 20.1 kg/ha.; P: 12.5 kg/ha.; and K: 12.5 kg/ha.

Seventy five (75%) percent of the farmers were observed to have random planting thereby having an average plant density of 22.1 hills/m^2 (max: 35 hills/m^2; min: 14 hills/m^2).

Weed control using hand weeding was done by 88.5% of the farmers. Herbicide application is not being practiced by all the farmer respondents. However, 25% of the farmers use insecticide to control insect infestation.

2) Long term Fertility trial

IR-36 and Lubang (local) varieties were planted on Plot B-1 to B-4, Bilar Expt. Field. Half of the seedlings per variety were dipped into 4% ZnO solution just before transplanting.

Date of sowing:	July 16, 1984
Date of transplanting:	August 3, 1984
Date of harvest:	November 20, 1984

Treatment and Yield

	IR-36 (kg/ha) With ZnO	Without ZnO	Lubang (kg/ha) With ZnO	Without ZnO
1. Control	1960	2350	550	550
2. N: 50 kg	2440	2580	360	380
3. N: 50 kg P: 30 kg	1850	2130	290	570
4. N: 50 kg P: 30 kg K: 30 kg	1980	2000	590	370

Result showed non-significant yield difference between the fertilizer treatment and Zinc Oxide treated from the non-Zinc oxide treated plot. The total yield difference between IR-36 and Lubang was great. IR-36 had greater yield as compared to Lubang but the maturity period of IR-36 was extended to 20 days. A physiological disorder could be the possible cause and therefore, further study is needed on the causes on the delay of maturity.

3) Fertilizer trial

IR-36 and Lubang (local) varieties were planted on plot B-7 to B-10, Bilar Expt. Field.

Date of sowing: August 9, 1984
Date of transplanting: August 30, 1984
Date of harvest: December 18, 1984

Treatment:

1. Control
2. N: 40
3. N: 80
4. N: 120
5. N: 40 P: 30
6. N: 80 P: 50
7. N: 120 P: 70
8. N: 120 P: 70 K: 50

Yellowing of leaves was observed on both IR-36 and Lubang during mid-October. Dr. I. Watanabe and Dr. O. Mochida of IRRI visited the experimental area and collected plant samples for testing the presence of Tungro virus. IRRI Data showed (refer Table I) 100% infection on Lubang variety while 45% on IR-36 variety which resulted to zero yield for Lubang and 150-200 kg/ha. yield for IR-36.

4) Varietal x Fertilizer Trial

Eight varieties of rice, namely: IR-36, IR-42, IR-58, IR-60, Lubang, Cainte, Panganahaw, and Nihonbare, were planted on the field with six different levels of fertilizer treatments, i.e.:

1. Control (No fertilizer)
2. N: 50
3. N: 50 P: 30 K: 30
4. N: 75 P: 45 K: 45
5. N: 100 P: 60 K: 60
6. N: 120 P: 75 K: 75

Tungro virus disease infection was observed in all plots. However, IR-60 showed a high resistance to Tungro (refer Table I). On the other hand, IR-42 and Lubang were cut before harvest due to severe infection. Outbreak of ricebug (Leptocorisa oratorius) infestation was observed in the field especially at the period when rice plants reached heading stage. IR-60 was observed to have the best growth behavior among the nine test varieties, however, it showed delayed maturity especially in plots with less fertilizer treatment.

Tungro. Table I

Detection of four rice viruses by ELISA on leaf samples collected from Bohol (Plant Pathology, November 1984). O. Mochida's samples, Bohol on 12-13 November 1984.

	Variety name	No.of samples reacted to:					No Reaction	Total samples tested	% RTV infected
		B Only*	S Only	Both	RRSV	RGSV			
Leaves	IR36	1	1	2	1	0	6	11	45
	IR42	2	4	3	0	0	1	10	90
	IR58	0	0	1	0	0	10	11	9
	IR60	0	0	0	0	0	10	10	0
	Cainte	0	5	5	0	0	0	10	100
	Lubang red	1	0	9	0	0	0	10	100
	Nihonbare	3	0	9	1	0	8	20	60
	Pang-anahaw	1	1	9	0	0	0	11	100
Hills	Lubang red (Carmen)	1	0	1	0	0	0	2	100
	Lubang red (Biral)	1	0	3	0	0	0	4	100
	IR36 (Biral)	0	1	2	0	0	0	3	100

*B only = RTBV; S only = RTSV; Both = RTBV + RTSV

5) Seed production

IR-58, IR-62 and Cainte were transplanted on plot C-2, 3, Bilar Expt. Field on October 15, 1984. Generally good growth was observed on the three varieties. After heading, ricebugs and rats infestation was observed which resulted to the unfilled grains and nibbled tillers.

6) Sesvania Aculeta trial planting

Sesvania Aculeta (for green manuring) was sowed under zero tillage condition on plot C-1, Bilar Expt. Field on October 25, 1984. Germination was good but growth was rather poor due to water logged condition of the area and competition of weeds.

7) APC-IRRI collaborative trial on upland rice.

Genetic evaluation of drought resistance on upland rice was conducted on Dao Expt. Field. Thirty (30) upland rice lines were sown on October 18, 1984 and showed good germination and growth. Water stress was observed at some times when rain was absent for a week. Of the 30 different lines of upland rice, IAC 25 and Brown Gora were outstanding in drought and pest-disease resistance.

Summary and Recommendations:

1. Tungro virus disease infection was not only observed in Bilar Expt. Field but also on the farmers' fields in Bilar, Batuan and Carmen. Non-Tungro resistant varieties such as Lubang, Cainte, Panganahaw, IR-42, are dominantly planted in these areas and their yield are rather low. But farmers in these areas prefer to plant local varieties because of their eating quality and their being moderately tolerant to Zinc deficiency. Thus, Tungro virus is a big problem in these areas.

Only planting resistant varieties such as IR-58, IR-60, IR-62 are the effective countermeasure for this problem. (MAF and IRRI disclosed that IR-36, 42 are not

Tungro resistant varieties anymore). The countermeasures against Tungro virus should be taken immediately in these areas.

2. IR-36, 58, 60, 62 showed delayed maturity period for 10-40 days. This may be caused by physiological disorder. Further studies are needed on its causes and effects.

3. Insect outbreaks such as Rice Bug and stemborer were observed in Bilar Expt. Field and effective insect control method should be established.

4. Fertilizer response was very low, that appropriate fertilizer rate, application method and time of application studies are needed.

5. Planting upland crops after lowland rice field study is also needed.

Upland Crops (DAO)

DAO Experimental Field, elevated 40 meters above sea level with dark colored loamy soil, was newly constructed early this year. The results of the experiments this year was disturbed because of uneven soil fertility level in the field. However, we could somehow clarify several points mentioned below through those trials.

A. IRRI-APC Joint Varietal Trial

1) Mungbean

Favorable growth through whole period was observed in general.

Together with dry weather during growth periods, breakout of aphids, powdery mildew and cercospora leaf spot were observed. Despite the cultivation in newly opened field, root nodule-setting was rather good.

Due to uneven fertility distribution, an average yield was 1.2 ton/ha. (Max. 1.7; Min. 1.0 ton/ha.). Promising varieties/cultivars are Pag-asa 1, Pag-asa 2 and IPBM-79-22-117.

2) Soybean

Rather poor growth was observed. It seemed that poor quality and low yield were due to severe ricebug attack.

Average yield was 0.9 ton/ha. (Max. 1.1 ton/ha.; Min. 0.8 ton/ha.). Promising varieties/cultivars are UPL sy 2 and 7207-1. Further varietal trial together with studying the planting density is necessary.

3) Cowpea (for green pods)

Growth was favorable in general. Breakout of aphids was severely observed.

An average yield was 3.5 ton/ha. (Max. 6.4 ton/ha.; Min. 2.1 ton/ha.). The promising varieties/cultivars are all season, CP 4-1-3-1 and TVX' 133-16-D2.

4) Bush Sitao (for green pods)

Growth was favorable in general. Paid attention to aphids' attacks.

Average yield was 2.0 ton/ha. (Max. 2.2, Min. 1.6 ton/ha.). The promising are B.S. 7, Los Baños B.S. # 1, and B.S. 1.

5) Sorghum (Grain)

Growth was remarkably good, showing tolerance against High pH, poor soil fertility and dry soil condition like Dao field.

Average yield was 1.8 ton/ha. (Max. 2.6 ton/ha.). The promising varieties are C.S. 116, UPL SG5, and C.S. 137.

6) Peanut

Growth was moderate with showing bacterial wilt in late stage.

Average yield (dry-shelled) was 0.9 ton/ha. (Max. 1.2, Min. 0.4). The promising varieties are M 10, CES 103 and UPL PN-2.

B. Three Elements Response Trial on UBI

The results of three elements response trial are as follows:

1) Application of Nitrogen and/or Phosphorous fertilizer didn't influence Ubi yield under the condition where there is absence of potassium application.

2) Application of N-P-K fertilizer showed good effect in yield, 15.2 ton/ha., about three (3) times the tuber yield against control, N and N-P plot.

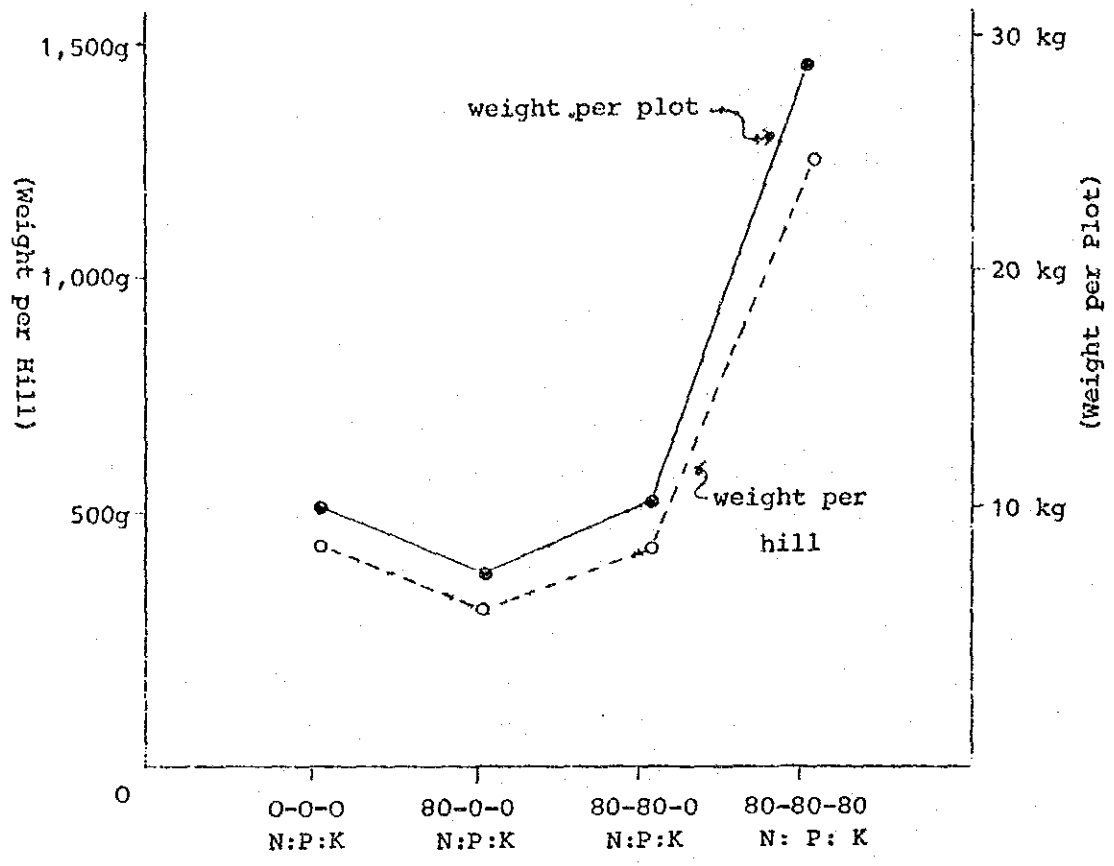


Figure 1

Tuber yield with different rate of fertilizer

From the above, an effect of Potassium application to Ubi was remarkable. It is necessary to study on how N and P play in the process of enhancing the application

effect of K and to study appropriate levels of each fertilizer.

C. Adaptability Test on Cassava

An adaptability test on Cassava at Dao has been conducted with no fertilizer application. Growth was remarkably good and harvested at the stage of seven month old.

Due to uneven soil fertility level in the field, difference between max. yield (=39.7) ton/ha. and min. yield (9 ton/ha.) was distinctively large. Average yield was 21 ton/ha.

Intercropped with Mungbean, cassava growth in early stages became stressed because of competitive demand of water. Intercropped Mungbeans showed hindered growth by competitive growth with cassava.

Further study of intercropping with Mungbeans, in appropriate levels of each fertilizer and of after-effect in soil fertility after the planting of cassava is necessary.

D. Three Elements Response Trial on Sweet Potato

Results of the trial show that application of Potassium on tuber yield, likely in Ubi trial, was effective and max. yield was 16.3 ton/ha. (N:P:K = 32:40:60).

Study on appropriate levels of each fertilizer, timing of cropping season, introduction of Sweet Potato into the paddy field and modification of present cultural

methods as countermeasures to reduce damage of sweet potato weevils and root-rot nematode are needed.

E. Adaptability Test on Sesbania Aculeta

Growth was remarkably good with deep tan root, showing tolerance against high pH, poor soil fertility and drought.

Study on adequate practical use of this crop is needed.

Summary and Recommendation:

1) Legumes: Severe outbreak of Aphids in the middle and/or late growing periods is a bottle neck of crop production. But there is a tendency that aphids infestation on leguminous crops in early rainy season is more severe than in late rainy season.

Therefore, it is urgently needed to study seasonal prevalence of aphids in a year and to set up agronomical countermeasures such as timing of cropping season to minimize aphids damage.

2) Cereals: It is classified that sorghum is one of the suitable crops and high yielding available for Dao station. But it is necessary to open up consumers' demands for giving farmers an incentive to produce it.

It is desirable to work together

with the animal husbandry section to study its value in feeding use and methods.

3) Root crops: From a viewpoint of land utilization in Bohol, rootcrop is one of the essential crops.

Fertilizer response trial on cassava and the devise for a counter-measure to sweet potato weevils damage (Buk Buk) are badly needed.

Further, it is also desirable to emphasize more on expansion of Ubi producing area and its quality improvement.

Trials to improve the acidic soils located on the Northeastern part of Bohol.

Sandy loam or clayey soils derived from sand stone and shell stone covers more than 70,000 ha. on the northeastern part of Bohol, and most soils of these areas are found in natural cogon grass lands. If this soil condition is improved and used as agricultural land, it would contribute largely to the progress in agriculture of Bohol province.

APC is set to investigate the characteristics of acidic soils, and to adapt suitable methods to improve soil conditions for crop planting.

A. Soil Acidity - soil survey and acidic characteristics investigation at 29 points with 57 soil samples were surveyed this year, the results are as follows:

1. The texture of the top soil samples consisted of 15 soils of SL-L, 11 soils of CL and 3 soils of Lic-HC.
2. 61% of the soil sample showed moderate acidity in pH(H_2O), but as for the pH(KCl), 84% of the soil sample showed strong acidity lower than 4.5 and only one soil sample showed moderate acidity higher than 5.5.
3. The ApH(pH H_2O-pHKCl) are generally large, 72% of the soils showed larger value than 1.5, and 1.6 in the average.

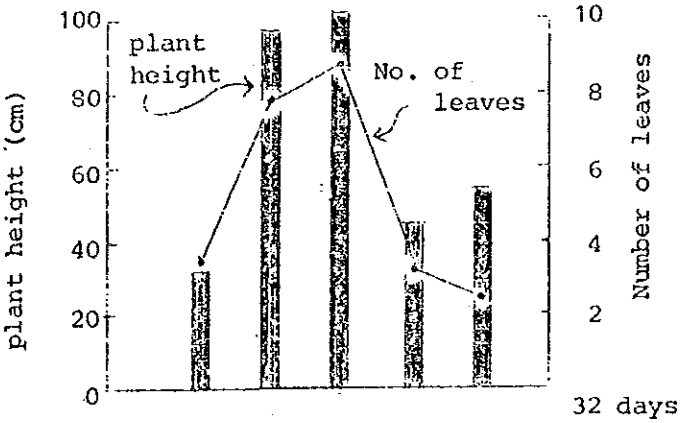
Basing from these results, it can be considered that the soils in this area are the bases

were severely leached off, lowered the base saturation, and raised aluminum saturation, consequently, phosphoric acid deficiency probably are deterring the crop growth.

B. Effects of liming and phosphoric acid application on corn growth:

The cogon grass land soil which is clay loam, pH(H_2O) is 5.2 and pH(KCl) is 3.8 were used for this experiment.

From the result, it showed that liming plus phosphoric acid application had a remarkably high effect, but single liming was scarcely effective, consequently, phosphoric acid application was an indispensable factor for the growth of crop on these soils.



$CaCO_3$ (t/ha.)	0	1.5	3.0	1.5	3.0
N (g/Pot.)	0	1.4	1.4	1.4	1.4
P_2O_5 (g/Pot.)	0	1.4	1.4	0	0
K_2O (g/Pot.)	0	1.4	1.4	1.4	1.4

C. Trials on the utilization of Guano powder for corn cultivation:

The soil which is 4.5 of pH(H_2O) was used for this experiment.

The effect of Guano powder (T-P_2O_5:25-35%) was inferior to superphosphate, but gave enough effect as fertilizer on the growth of corn plant.

Furthermore, experiments on the different guano, their texture and its effect will be conducted in the nearest future.

VEGETABLE SURVEY:

1. Nursery Bed

Preparation of nursery facility work has been started at the side of the workshop building near the reserve pond. It will be completed at the end of January 1985.

2. Marketing Survey

Vegetable marketing survey has been conducted in two markets (Agora and Cogon), Tagbilaran City every week with APC researchers assisted by JICA expert. The purpose is to grasp a price fluctuation, variety, quality, source and others throughout the season. And at the same time, researchers are finding and making a contact with some progressive vegetable farmers to whom they bring their products and will visit their vegetable farms for further survey of vegetable farming techniques on the spot.

EXTENSION DIVISION:

In the first place, agricultural techniques developed by the Research Division of APC should be applied exactly on the rural fields through Extension Division activities.

So far, we have proceeded with the field survey in order to know the present farmers' conditions and the technical problems of Bohol Agriculture.

Time was limited so that the survey was only in its initial stage. However, we are considering the following matters in the survey:

1. Soil varies area by area.
2. Most of the fields are under rainfed condition.
3. Techniques of every crops have not yet been understood by the farmers.

At present, farming techniques of the farmers differ area by area making the production cost very high for the farmers to meet.

In the future, the Division will try to have a detailed survey making a benchmark for APC activities and will promote the new techniques found by researchers to the farmers.

VERIFICATION TRIALS ON FARMERS' FIELDS

In parallel with doing basic research in Dao station, formation of applicable techniques by the farmers and evaluation of their economical effect for further extension activities are urgently needed.

Responding to this situation, as its first stop, APC research division has started setting the verification trials in small-scale to identify an effect of adequate amount of fertilizer on each crop in the farmers' fields.

1. Methods:

   - Selection of farmers who have ability and intention to conduct the trials.
   - Find adequate stage of each crop for first application on the field.
   - For wet rice field, choose one plot of paddy field and for upland crops, set 10 or 20 m^2 plot as fertilizer applied plot.
   - Data collection of further growth and yield should be done.

2. Kind of crops:

   Rice, Corn, Cassava

3. Treatments:

- Time of fertilizer application

  Early vegetable stage and beginning of reproductive stage.

- Method of fertilizer application

  Top dressing

- Amount of fertilizer application

Rice	(Early stage	- N:P:K = 24-30-0
	(Late stage	- N:P:K = waiting
Corn	Early stage	- N:P:K = 30-37-0
	Late stage	- N = waiting
Cassava	Early stage	1) N:P:K = 30-37-0
		2) N:P:K = 30-30-30

- Number of trial fields

Rice	- 14
Corn	- 17
Cassava	- 6

A fertilizer loan was given without interest to farmers in Bohol. An amount of One Hundred Fifty Six Thousand and Seventy-Five Pesos (₱156,075) was alloted for said project.

An initial release of Three Hundred Seventy (370) bags of fertilizer for cassava was made thru the cooperation of Philippine Starch Corporation in Carmen,

Bohol. Some amount will be released for rice and corn fertilizer and also chemicals.

This is one of the objectives of APC thru JICA to help the farmers get a fertilizer loan without interest.

SUPPLEMENTARY NOTE ON THE RECORD OF DISCUSSIONS
ON THE TECHNICAL COOPERATION
FOR THE BOHOL AGRICULTURAL PROMOTION CENTER PROJECT

Mr. Akihiro Mitarai, Resident Representative of the Japan International Cooperation Agency (hereinafter referred to as "JICA") in the Republic of the Philippines, and the authorities concerned of the Government of the Republic of the Philippines exchanged views on the special measures to supplement a portion of the local cost expenditures of the Bohol Agricultural Promotion Center Project (hereinafter referred to as "the Project").

As a result of discussions, both sides agreed to recommend to their respective Governments the following for the successful implementation of the Project:

For fostering the smooth promotion of the Project the Government of Japan, in accordance with the laws and regulations in Japan, will take necessary measures through JICA to supplement, when necessity arises, a portion of the local cost expenditures for the improvement works of the physical infrastructure of the Project, such as construction work of farm and reconstruction work of irrigation facilities

Manila, July 22, 1983

AKIHIRO MITARAI
Resident Representative
Japan International
Cooperation Agency
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SUPPLEMENTARY NOTE ON THE RECORD OF DISCUSSIONS ON THE JAPANESE TECHNICAL COOPERATION FOR THE BOHOL AGRICULTURAL PROMOTION CENTER PROJECT

Mr. Akihiro Mitarai, Resident Representative of the Japan International Cooperation Agency (hereinafter referred to as "JICA") in Philippines had a series of discussions with the authorities concerned of the Government of the Republic of the Philippines on the provision of Special Measures by the Government of Japan concerning the Technical Cooperation for the Bohol Agricultural Promotion Center Project (hereinafter referred to as "the Project").

As a result of the discussions, both sides agreed to recommend to their respective Government the following:

For fostering the smooth promotion of the Project, the Government of Japan, in accordance with the laws and regulations in force in Japan, will take necessary measures through JICA to supplement a portion of the local cost expenditures such as production cost for teaching materials, travel allowances related to travel tour and field training for instructors and trainees, Special instructors' fees, supply cost of training materials, etc., within the Republic of the Philippines.

Manila, Dec. 4 , 1984

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