(農開)　業務参考資料①

タイとうもろこし開発技術協力事業

TECHNICAL CO-OPERATION PROJECT ON MAIZE DEVELOPMENT IN THAILAND

昭和52年3月

国際協力事業団
農業開発協力部

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1. RECORD OF DISCUSSIONS

ON THE RECORD OF DISCUSSIONS BETWEEN THE JAPANESE AGRICULTURAL SURVEY TEAM AND THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF THAILAND CONCERNING TECHNICAL CO-OPERATION PROJECT ON MAIZE DEVELOPMENT IN THAILAND

The Japanese Agricultural Survey Team, organized by the Japan International Cooperation Agency and headed by Mr. Motonaga Ohto visited Thailand from August 31 to September 17, 1976, for the purpose of formulating concrete co-operation plans for the Technical Co-operation Project on Maize Development which will be carried out with the Co-operative Demonstration Center as its core.

During its stay in Thailand, the Team exchanged views with the authorities concerned of the Government of Thailand on the necessary measures to be taken by both Governments to successfully implement the Technical Co-operation Project on Maize Development. The Team also conducted necessary survey for the implementation of the project.

As a result of the exchange of views and survey, both parties agreed to recommend to their respective Governments to carry out the matters referred to in the attached Record of Discussions.

Bangkok, September 17, 1976

Motonaga Ohto
Head of the Japanese Agricultural Survey Team
Japan International Cooperation Agency

Surin Cholpraserd
Director-General
Cooperatives Promotion Department

in the presence of

Wanchai Sirirattna
Deputy Director-General
Department of Technical
and Economic Cooperation

RECORD OF DISCUSSIONS

I. (1) Both Governments will co-operate with each other in implementing the Technical Co-operation Project on Maize Development (hereinafter referred to as the "Project") with the Co-operative Demonstration Center as its core for the purpose of promoting the enhancement of the productivity of maize, and contributing to the development and strengthening of the agricultural co-operatives and the modernization of agriculture through the quality improvement of maize and their production technology.

(2) The Project will be implemented in accordance with the Master Plan as stipulated in Annex I and in close contact with the maize development project between Thai and Japanese agricultural co-operatives.

(3) The Project will be implemented in accordance with the annual operational work plan to be formulated annually by the Joint Committee referred to in VI. The annual operational work plan will be submitted to the authorities concerned of both Governments for their approval.

II. (1) In accordance with laws and regulations in force in Japan, the Japanese authorities concerned will take necessary measures to provide at their own expense the services of the Japanese experts as listed in Annex II through the normal procedures under the Colombo Plan Technical Co-operation Scheme.

(2) The Japanese experts referred to in (1) above and their families will be granted in Thailand the privileges, exemptions and benefits no less favourable than those accorded to experts of third countries working in Thailand under the Colombo Plan Technical Co-operation Scheme.

III. (1) In accordance with laws and regulations in force in Japan, the Japanese authorities concerned will take necessary measures to provide at their own expense such equipment, machinery, implements, vehicles, tools, spare parts and other materials required for the implementation of the Project as listed in Annex III through the normal procedures under the Colombo Plan Technical Co-operation Scheme.

(2) The articles referred to in (1) above will become the property of the Government of Thailand upon being delivered c.i.f. to the Thai authorities concerned at the ports of disembarkation, and will be utilized exclusively for the implementation of the Project in consultation with the Japanese team leader referred to in Annex II.

IV. (1) In accordance with laws and regulations in force in Japan, the Japanese authorities concerned will take necessary measures to receive the Thai personnel engaged in the Project for technical training or study tour in Japan through the normal procedures under the Colombo Plan Technical Co-operation Scheme.

(2) The Government of Thailand will take necessary measures to ensure that the knowledge and experience acquired by the Thai personnel mentioned in (1) above through technical training and study tour in Japan may be utilized effectively for the implementation of the Project.

V. The Government of Thailand will take necessary measures to provide at its own expense:

(1) the services of the Thai counterparts and other personnel as listed in Annex IV;

(2) land and buildings as listed in Annex V. as well as incidental facilities;

(3) foundation seeds of good varieties needed for the extension purposes;

(4) supply or replacement of equipment, machinery, implements, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than those provided by the Japanese authorities concerned under III (1);

(5) suitably furnished housing accommodations for the Japanese experts and their families;

(6) transportation facilities and the grant of the travel allowance for the Japanese experts for the official travel within Thailand.

VI. The Government of Thailand will take necessary measures to meet:

(1) expenses necessary for transportation within Thailand of the articles mentioned in III (1) as well as for the installation, operation and maintenance thereof;

(2) all running expenses necessary for the implementation of the Project;

(3) customs duties, internal taxes and any other charges, imposed in Thailand in respect of the articles referred to in III (1).

VII. The Government of Thailand will be responsible for the administration and implementation of the Project, and the Japanese experts will provide primarily technical guidance and advice for the implementation of the Project.

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

IX. There will be close consultation between the Japanese experts and the officials concerned of the Government of Thailand for the smooth promotion and effective implementation of the Project. For this purpose, a Joint Committee will be established as specified in Annex VI. The Joint Committee will meet at least once a year.

X. For the successful implementation of the Project, both Governments will consult with each other when deemed necessary.

XI. The period of the technical co-operation mentioned in this Record of Discussions will be three (3) years from the date of signature and may be extended by mutual agreement between the authorities concerned of both Governments.

Annex I

Master Plan for the Project

A. Composition of the Project

1. The Co-operative Demonstration Center (hereinafter referred to as the "Center") which will include fields for trials, training, seed production and demonstration, will be established in Chaibadan, LOP BURI Province.

Trials, training and extension services, demonstration and other related activities in respect of technology for the improvement of maize production will be conducted at the Center.

2. For the purpose of effective extension of technical co-operation to the following five provinces, key extension bases will be established within these provinces.

Lop Buri Province
Sara Buri Province
Petchaboon Province
Pisanuloke Province
Sukhothai Province

(1) The following six agricultural co-operatives and five farmer's groups to be designated from each of the provinces mentioned in A2 above by the Joint Committee will be the key extension bases.

Chaibadan Agr. Co-op.
Prabuthabad Reclamation Agr. Co-op.
Petchaboon Agr. Co-op.
Prompiram Agr. Co-op.
Nongtom Agr. Co-op.
Sawankaloke Land Settlement Co-op.

(2) Demonstration fields of about 13 ha. will be set up at each of the eight key extension bases, excluding the Petchaboon Agricultural Co-operative, Nongtom Agricultural Co-operative and Sawankaloke Land Settlement Co-operative.

3. To ensure the smooth supply of extension seeds, seed production fields will be set up within the Center and at appropriate places in its vicinity.

The area required for the seed production fields will be approximately 100 ha in the first year, 140 ha in the second year and 160 ha in the third year of the Project.

B. Activities under the Project

1. Applied Experiments for Production Techniques

The following experiments will be conducted at the Center for the purpose of identification, utilization, confirmation of local adaptability and other items of specific techniques developed by agricultural experiment and research institutions.

Applied experiments for production techniques
Varieties adaptability tests
Fertilizer tests
Water management tests
Disease and insect control experiments
Cropping system experiments

2. Seed Multiplication

In collaboration with the Department of Agricultural Extension, the foundation seeds which are to be supplied by the Department of Agriculture will be multiplied to produce extension seeds at the seed production fields.

The extension seeds thus produced will be distributed to maize producing farmers in the five provinces mentioned in A2, through agricultural co-operatives and famer's groups.

3. Disease and Insect Control

Co-operation activities of the Center will be extended to the projects on the control of maize disease and insect which will be carried out by the Department of Agricultural Extension in the provinces mentioned in A2.

4. Extension and Demonstration

Improved cultivation techniques developed by the Center will be demonstrated at the demonstration fields mentioned in A2, and experts will conduct round trip guidance activities to promote their effective extension to the key extension bases.

5. Technical Training in Seed Production and Improved Cultivation Techniques

Technical training in seed production and improved cultivation techniques will be provided at the Center for the farmers associated with the seed production fields mentioned in A3 and also for the maize producing farmers.

6. Agricultural Mechanization System

To establish a system for the mechanization of maize cultivation and to promote its extension, applied experiments for the systematization of agricultural mechanization as well as training activities for agricultural machinery operation and repair will be conducted at the Center. At the same time, the agricultural mechanization system will be demonstrated at the Center and at the demonstration field mentioned in A2.

7. Guidance on the Management of Agricultural Co-operatives

To develop and strengthen agricultural co-operatives and farmer's groups, staff officials of agricultural co-operatives and other personnel will be trained and educated at the Center, and experts will conduct round trip guidance activities to the key extension bases.

Annex II

List of Japanese Experts

Category	Field
1. Team Leader	
2. Experts	Seed production
	Cultivation
	Farm machinery
	Agricultural co-operatives and extension
3. Coordinator	

Notes: Short-term experts may be dispatched, when necessity arises.

Annex III

List of the articles to be provided
by the Government of Japan

1. Equipment, machinery, implements, spare parts and fertilizer for crop production.

2. Equipment, machinery, implements and spare parts for seed processing and storage.

3. Equipment, machinery, and chemicals for insect and disease control.

4. Machinery and tools for repair work at the Centre.

5. Equipment, instruments, spare parts and other materials for laboratory work.

6. Vehicles.

7. Teaching materials including audio-visual aids.

8. Other necessary equipment, tools and materials to be mutually agreed upon.

Annex IV

List of Thai Counterpart Officials
and Other Personnel

	Category	Field
1.	Project Manager	
2.	Counterpart Officials	Seed production
		Cultivation
		Soil and fertilizer
		Pathology and insects
		Farm machinery
		Irrigation
		Extension
		Agricultural co-operatives
		Farm management
3.	Clerical and service employees	
4.	Labourers	

Annex V

List of Land and Buildings

1. Land

(1)	Land for the Center	about 16 ha
(2)	Seed production fields	about 160 ha (in the third year)
(3)	Demonstration fields	about 104 ha (total area for the eight key extension bases)

2. Buildings in the Center

(1) Office

(2) Garage

(3) Guest house

(4) Classrooms

(5) Laboratory

(6) Fuel storage

(7) Storage for farming materials

(8) Shed for agricultural machinery

(9) Workshop

(10) Seed drying station

(11) Seed processing station

(12) Seed storage

(13) Dormitory

Annex VI

Composition of the Joint Committee

Chairman Under-Secretary of State, MOAC

	Japanese Side		Thai Side
1.	Team Leader	1.	Director-Generals of CPD, DA and DAE
2.	Expert(s) designated by the team leader	2.	Project Manager
3.	Coordinator	3.	Coordinator from Foreign Relations Div, MOAC.
4.	Representative of JICA	4.	Representatives of DTEC, Budget Bureau and NESDB.

Notes:

(1) An official of the Embassy of Japan may attend the meeting of the Joint Committee as an observer.

(2) MOAC : Ministry of Agriculture and Cooperatives

(3) CPD : Cooperatives Promotion Department

(4) DA : Department of Agriculture

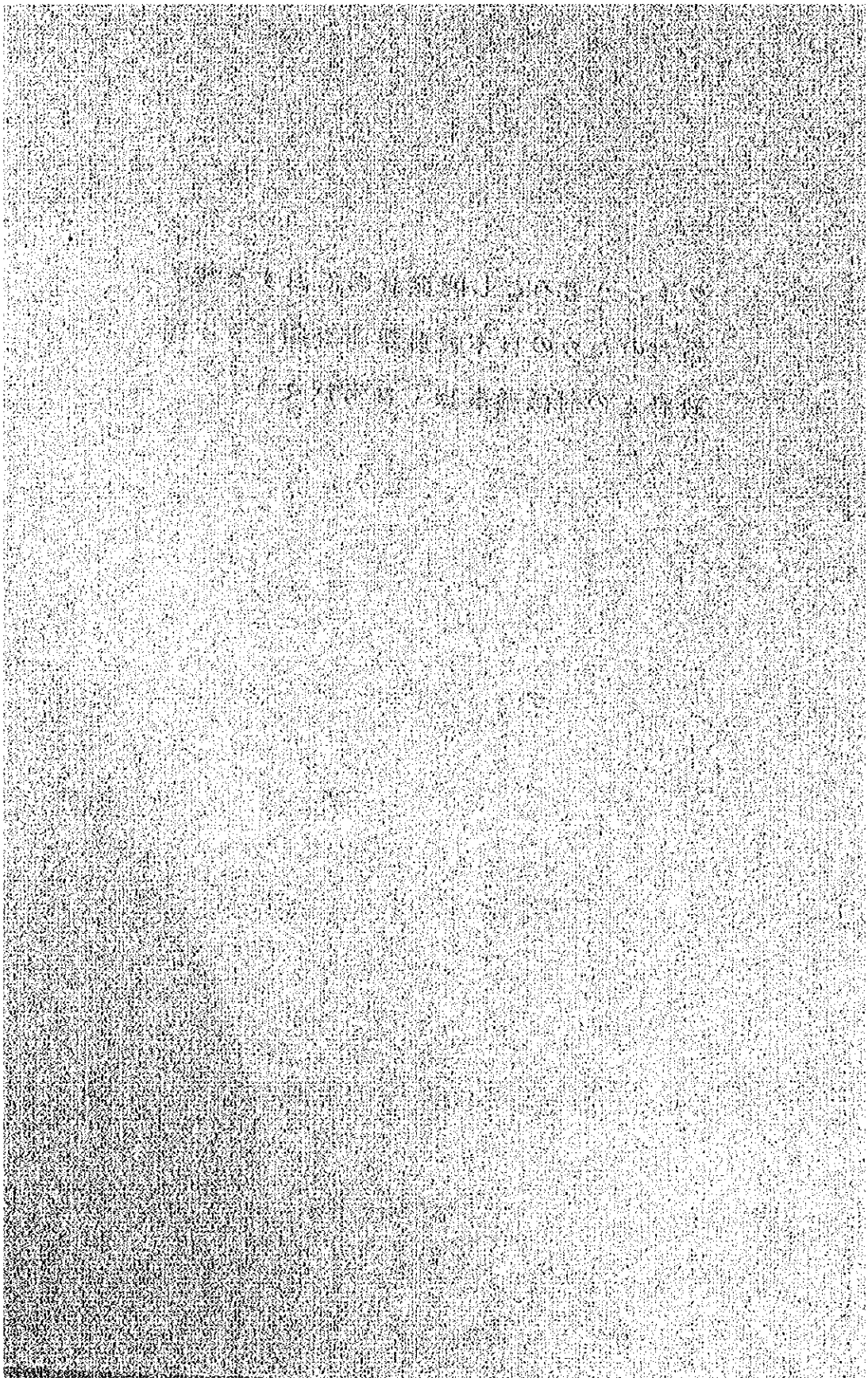
(5) DAE : Department of the Agricultural Extension

(6) DTEC : Department of Technical and Economic Cooperation

(7) NESDB: National Economic and Social Development Board

(8) JICA : Japan International Co-operation Agency

2、タイとうもろこし開発計画に対する技術協力のための日本国農業調査団とタイ国政府との討議議事録（参考訳文）



タイとうもろこし開発計画に対する技術協力のための日本国農業調査団とタイ国政府との討議議事録

国際協力事業団によって編成された大戸元長氏を団長とする日本国農業調査団は、協同組合展示センターを中心として実施するとうもろこし開発プロジェクトの具体的協力計画を策定する計画をもって1976年8月31日から9月17日までタイ国を訪問した。

同調査団はタイ国滞在中、同国政府関係者ととうもろこしプロジェクトを成功させるため、両当事者により実施されるべき諸事項につき、意見を交換するとともにプロジェクトのための実施設計を行った。

同調査団による調査及び両当事者間の協議の結果を両当事者は各々の政府に対して、別添討議議事録中にある事項につき勧告することにつき合意に達した。

1976年9月17日

（署　名）
大　戸　元　長
調査団団長　JICA

（署　名）
スリン・チョシブラサート
農業協同組合省協同組合促進局局長

立　会　人
（署　名）
ワンチャイ・シリラタナ
DTEC　次長

討　議　議　事　録

第1.　(1)　両国政府は農業協同組合展示センターを中心として、とうもろこしの品質改善生産技術の改良を行い、その生産性の向上を推進するとともに併せて農業協同組合の育成及び農業の近代化に貢献することを目的として、とうもろこし開発技術協力プロジェクト（以下「プロジェクト」と呼ぶ）を相互に協力して実施する。

(2)　プロジェクトは付表1に定める基本計画に基づき実施される。なおプロジェクトは日・タイ農協間のとうもろこし開発事業と緊密に連携を保ちつつ実施される。

(3)　プロジェクトは第Ⅵ表にいう「合同委員会」が毎年作成する年次事業計画に従って実施される。作成された年次事業計画は両政府の関係当局によって承認されるものとする。

第2.　(1)　日本国政府関係当局は、日本国において施行されている法令に従い、付表Ⅱに掲げる日本人専門家の役務をコロンボ計画技術協力計画に基づく通常の手続きによって、自己の負担において供与するための必要な措置をとる。

(2)　(1)の日本人専門家とその家族は、タイ国において他の国のコロンボプラン専門家に与えられていると同等の特権、免除及び便宜を与えられる。

第3.　(1)　日本国政府関係当局は、日本国において施行されている法令に従いプロジェクトの実施に必要な設備、機械、器具、車輌、工具、予備部品及びその他の資材を、コロンボ計画技術協力計画に基づく通常の手続きによって、自己の負担において供与するため必要な措置をとる。

(2)　(1)にいう物品は、陸揚港においてc.i.f.建てでタイ国政府関係当局に引き渡されたときに、タイ国政府財産となり、かつこれらの物品は、日本人プロジェクトリーダーと協議の上、プロジェクト実施のためにの

み使用される。

第4. (1) 日本国政府関係当局は、日本国において施行されている法令に従いプロジェクトに携わるタイ国人を、コロンボ計画技術協力計画に基づく通常の手続きによって日本国に受入れ訓練又は視察旅行を行うために必要な措置をとる。

(2) タイ国政府は、(1)のタイ国人が日本国における技術訓練により得た知識及び経験がプロジェクトの実施のために効果的に利用されることを確保するために必要な措置をとる。

第5. タイ国政府は、自己の負担において次のものを確保するために必要な措置をとる。

(1) 付表Ⅳに掲げるタイ側職員

(2) 付表Ⅴに掲げる土地及び建物、並びに付帯施設

(3) 普及すべき優良品種の原種子

(4) プロジェクトの実施のために必要な設備、機械、器具、車輌、工具、予備部品及びその他の資材（第3の(1)に基づき日本国政府によって供与されるものを除く。）

(5) 日本人専門家及びその家族のための適当な家具付宿舎

(6) タイ国内の日本人専門家の公用旅行のための便宜及び旅費

第6. タイ国政府は次のものを負担するため必要な措置をとる。

(1) 第3の(1)にいう物品のタイ国内における輸送並びにこれらの物品の据付け、操作及び維持に必要な経費

(2) プロジェクトの実施に必要なすべての運営費

(3) 第3の(1)にいう物品につきタイ国内で課せられることのある関税、内国税及びその他の課徴金等

第7. タイ国政府はプロジェクトの運営及び実施について責任を負い、日本人専門家はプロジェクトの実施のために必要な技術上の指導及び助言を与える。

第8.　タイ国政府は、プロジェクトに携わる日本人専門家のタイ国における職務の遂行に起因し、その遂行中に発生し、又はその他その遂行に関連し、日本人専門家に対する請求が生じた場合には、その請求に関する責任を負う。

ただし、日本人専門家の故意又は重大な過失から生ずる責任については、この限りではない。

第9.　プロジェクトを円滑に推進し、効果的に実施させるために、日本人専門家及びタイ国政府関係者は緊密に協議するものとし、付表Ⅵに掲げる構成による合同委員会を設置する。

委員会は少くとも年1回は開催されるものとする。

第10.　プロジェクトの実施を成功させるため、両国政府は必要に応じ、相互に協議を行う。

第11.　この討議議事録による日本国の技術協力期間は署名の日より3ヶ年とする。その後の技術協力に関しては、協力期間中に両国政府間において相互に協議する。

付　表　1

プロジェクトの基本計画

A　プロジェクトの構成

1. 試験圃、実習圃、採種圃及び展示圃を含む協同組合展示センター（以下センターという）をロツブリ県チャイバダン郡に設置する。

センターにおいては、とうもろこしの栽培改良技術に関する実用試験、訓練教育及び普及展示等の事業を実施する。

2. 技術協力の効果的普及を図るため下記の5県の地域内に普及拠点を設ける。

1. ロッブリ県　　4. ピッサヌローク県
2. サラブリ県　　5. スコタイ県
3. ペチャブーン県

(1) 下記の6農協、及び合同委員会によって定められる上記A2、5農家集団が普及拠点となる。

1. チャイバダン農協　　4. プロンピラム農協
2. プラプダバード農協　　5. ノントン農協
3. ペチャブーン農協　　6. サワンカローク農協

(2) 普及拠点の中、ペチャブーン農協、ノントン農協、サワンカローク開拓農協を除く8拠点に付き、各々約13 ha の展示圃を設置する。

3. 普及種子の円滑な供給を確保するため、センター内及びその周辺の適切な場所に採種圃を設置する。採種圃は各々第1年次100 ha、第2年次140 ha、第3年次160 ha を必要とする。

B　プロジェクトの事業内容

1. 基礎技術組立実用試験

農業試験研究機関で開発された基礎研究をもとに個別技術の実証、組立実用化、及び地域適応性の確認等を行うため次の試験をセンターで行う。

基礎技術組立実用試験

品種適応試験

施肥試験

水管理試験

病虫害試験

作付体系試験

2. 種子増殖事業

農業普及局との連携のもとに農業技術局から供給される原種子を採種圃において増殖し、普及用種子を生産する。生産された普及用種子は農協及び農家集団等を通してA(2)に示された5県内管轄下のとうもろこし栽培農家に配布される。

3. 病虫害防除事業

農業普及局で実施するとうもろこし病虫害防除事業に協力する。

4. 普及展示

A(2)において設置された展示圃において、センターで開発された栽培改良技術を展示し、併せてその普及奨点への効果的普及を促進するため、専門家による巡回指導を行う。

5. 採種及び栽培改良技術の訓練

A(3)の採種圃に係る農家及びとうもろこし栽培農家等を対象にセンターにおいて普及用種子の採種及び栽培改良技術の訓練を行う。

6. 農業機械化体系事業

とうもろこし栽培の機械化体系の確立、及びその普及促進のため、センターにおいて農業機械化体系組立実用試験及び農業機械操作補修訓練を行うとともに、センター内及びA(2)の展示圃において農業機械化体系の展示を行う。

7. 農業管理指導事業

農協及び農家集団の育成、強化を目的として、センターにおいて農協等職

員の訓練、教育を行い、普及拠点の6農協、5農家集団に対し専門家による巡回指導を行う。

付　表　II

日本人専門家

専門家の職別	分　野
(1) プロジェクトリーダー	
(2) 専門家	採　種
	栽　培
	農業機械
	農協及び普及
(3) 調整員	

註：必要に応じ短期専門家を派遣する事ができる。

付　表　Ⅲ

供　与　機　材

1. とうもろこし生産のための、器械、機械、器具、スペアパーツ、肥料
2. 種子調整貯蔵のための機器材及びスペアパーツ
3. 病虫害防除のための機器材及び化学薬品
4. センター用機器材修理用機材
5. 試験研究事業のための資機材
6. 車　　輌
7. 訓練指導事業のための視聴覚機材
8. その他必要資機材

付　表　Ⅳ

タイ人専門家及びその他の職員

職員の種別	分野
(1) 所長	
(2) 技術者	採種
	栽培
	土壌肥料
	病理昆虫
	農業機械
	灌漑
	普及
	農協
	農業経営
(3) 事務職員及び業務員	
(4) 労働者	

付　表　V

土　地・建　物

1. 土　地

(1) センター用地	約16 ha
(2) 採　種　圃	約160 ha （第3年次）
(3) 展　示　圃	約104 ha 8普及拠点地区

2. センター内建物

(1) 事　務　所	(8) 農　機　具　庫
(2) 車　　庫	(9) 農機具整備場
(3) ゲストハウス	(10) 種子乾燥場
(4) 教　　室	(11) 種子調整作業場
(5) 実　験　室	(12) 種子格納庫
(6) 燃　料　庫	(13) 研修員宿舎
(7) 資　材　庫	

付　表　Ⅵ

合同委員会の構成

議　長　　農業協同組合省次官

日　本　側	タ　イ　側
1. チームリーダー	1. 協同組合促進局，農業局及び農業普及局の局長
2. 専門家代表	2. プロジェクト・アネージャー
3. 調　整　員	3. 農業協同組合省海外部コーディネイター
4. ＪＩＣＡ代表	4. 技術経済協力局，予算局及び国家経済社会開発庁の代表

（注）日本国大使館館員はオブザーバーとして合同委員会に出席することができる。

3. THE REPORT OF JAPANESE SURVEY TEAM (DEC. 1976) FOR MAIZE PRODUCTION DEVELOPMENT IN THAILAND

Aug., 1976

Japan International Cooperation Agency

PREFACE

Our survey team, which visited Thailand in December, 1975 to prepare the framework of the maize development co-operation project, prepared a report of the survey after its return to Japan and submitted it to the Japanese Government. On the basis of this outcome, the Japanese Government plans to send to Thailand another team, possibly in the latter part of August, 1976, in order to prepare a concrete plan of the Project and to sign the Record of Discussions.

The present report in English is an excerpt from the full report written in Japanese with the purpose of smoothening the negotiations between the Government Agencies of Thailand and the proposed team to be sent to Thailand in forth coming August.

We should be very happy if this report would satisfactorily fulfill the above-mentioned objective and be of any use in promoting the maize development cooperation project.

July, 1976

MOTONAGA OHTO
Head of Survey Team for
Maize Production Development

C O N T E N T S

I Introduction and Summary

1. Background

The Ministry of Agriculture and Cooperatives of Thailand (hereinafter referred to as "Ministry of Agriculture"), being desirous of receiving technical cooperation from Japan for increasing production and improving marketing of Maize, presented in August 1973 several project plans for consideration by the Japanese Government. These plans were the "Maize and Sorghum Increased Production Plan" of the Department of Agriculture, "Mobile Agricultural Extension Plan" of the Department of Agricultural Extension" and the "Cooperative Demonstration Plan" of the Department Cooperatives Promotion. Beside these plans of the Departments of the Ministry of Agriculture, a plan for the improvement of transportation of maize was presented by the Ministry of Transportation.

All these plans were aimed in common at contributing to the production increase and marketing improvement of maizes, but they were prepared separately by respective Departments without considering the cooperation among the plans.

In order to study these plans and discuss with the Departments of the Ministry of Agriculture, a preliminary survey team was sent to Thailand in March 1975. The Preliminary survery team concluded that, although each of these plans fell in the category of technical cooperation of the Japanese Government, they sould be combined into a joint or coordinated project of the three Departments.

However, since it was foreseen that it would take a long time to coordinate these three plans, it was considered proper that priority should given to any one of the three plans so that cooperation could be launched immediately. In that case, it was considered that priority should be given to the plan requested by the Department of Cooperatives Promotion which had been officially cleared by DTEC which was the Thai Agency in charge of International cooperation.

2. Summary of Conclusion of the Present Survey Team

The present survey team visited Thailand in December 1975 to formulate jointly with the Departments concerned of the Ministry of Agriculture a basic framework of the project in line with the recommendations of the preliminary survey team.

The basic thought of the present team was that the Japanese technical cooperation be extended to the "Cooperative Demonstration Project", on the assumption that, although the project had been planned by the Department of Cooperative Promotion and Administratively come under the jurisdiction of that Department, participation and cooperation of other two Departments are possible.

During the stay in Thailand, the team made field trips to the proposed project area and also had discussion with the three Departments both jointly and individualy. And as the result of the field study and discussions, the team concluded that the technical cooperation along with the above basic thought would be possible. The main points of the plan agreed upon with the three Departments are as follows:

(1) Object of Cooperation

The object of the Project lies in improving the maize productivity in Thailand by employing modern agricultural methods and intensifying cooperative activities; and as a method of executing this plan, "Cooperative Demonstration Center (provisional name)" is planned to be established in Chaibadan in the Province of Lopburi.

(2) Functions of the Center

The major functions of the Center will be the demonstration and training of cultivation techniques and the operation, maintenance and repair of agricultural machinery, production and distribution of maize seeds, and education and guidance concerning the management of cooperatives.

(3) Project Area

The area of the Project is the major maize production area which covers five provinces including six cooperative districts, and it is planned that the area will cover a maize planted area of 193,000 rai and about 9,000 farm households.

(4) Other Matters

The Japanese technical cooperation will be planned on the basis of three years period, but extension thereof may be considered if necessary.

In order to assist in formulating concrete plans for this cooperation, services of short term experts and designing team may be provided if required.

The composition and the itinerary of the survey team are shown in Appendixes 1 and 3.

II Discussions with Departments Concerned

1. First joint meeting with three Departments

The first joint meeting with the three Departments of the Ministry of Agriculture was held at the conference room of the Ministry on 8th December, 1975. Dr. Prakob, Director-General of the Department of Agriculture was in the chair. The name and titles of attendants are shown in Appendix 2.

After giving an opening address, Dr. Prakob, the chairman, asked the head of the survey team an explanation on the contents of the summary report of the preliminary survey which was carried out in March, 1975.

Mr. Ohto. head of the survery team, replied on the whole to the following effects: The preliminary survey of March, 1975 was carried out on the basis of three requests made by the three separate Departments of the Ministry of Agriculture. At that time, it was considered desirable that the requests from the three Departments would be unified, but as a result of examination in Japan, it was considered more practical to place priority on one of the three and proceed with the implementation thereof with due regards to other two plans. If this procedure was adopted, the plan made by the Department of Cooperatives Promotion would be implemented which had been cleared by DTEC. At the demonstration center of this plan, it was considered possible to form a cooperation system which includes such functions as the production and distribution of superior seeds and locust control. On the other hand, it was suggested that the "Inter-Cooperative Cooperation" between the

Japanese Federation of Agricultural Cooperatives and Thai Federation and also the use of the BAAC funds might possibly linked with the project. Mr. Ohto also touched upon one of the reasons why his survey team visited Thailand early December, 1975, and explained that efforts were made to match the timing of visit of the survey team with the budgeting time in Thailand (that is, the data to be obtained by the survey team had to be prepared and submitted prior to 15th January, 1976).

Mr. Ohto then explained that the survey team was desirous of taking up the plan by the Department of Cooperatives Promotion out of the requests by the three Departments, and asked whether or not the two other Departments would give their cooperation to this plan and, in case of affirmative, what would be the forms of their cooperation to this plan. As a reply to these questions, it was decided that the Ministry of Agriculture would have disccussions among its three Departments concerned to formulate a coordinated plan of the three Departments and show it to the survey team at an earlier date of the stay of the survey team in Thailand. An officer of the Department of Agricultural Extension expressed his desire that the effect of the cooperation would not only cover the cooperative-member farmers but also be extended to members of other kinds of farmers organizations. Mr. Ohto replied that it was possible to extend the cooperation to the members of Farmer's Group Associations.

It was decided to allot about one week for preparing the unified plan of the three Departments on the Thai side and for the field survey by the survey team

and to have another joint meeting again on 16th December, 1975.

2. Courtesy Call and Consultation at DTEC

The leader and some members of the team made a courtesy call at DTEC on 8th December, 1975 and met Mr. Wanchari, deputy director of DTEC, and Mr. Krai, chief of the Colombo Plan Section. The team informed the DTEC of the schedule and the object of the visit by the team, and also explained the results of the pervious preliminary survey. The basic idea of the team was to lay first priority on the plan by the Department of Cooperatives Promotion and to consult with the three Departments about whether or not the remaining two Departments would participate to the Project.

The DTEC side asked a question of the survey team about whether it would be necessary for DTEC to send an official request for cooperation again to the Japanese Government, if the plan by the Department of Cooperatives Promotion would become the central object of the cooperation and other two Departments would participate in and cooperate with such a plan. The survey team gave its views that there would be no need of sending such an official request anew to the Japanese Government, because the official request made by DTEC in 1973 was still valid as far as the Japanese Government is concerned.

3. Individual Consultations with three Departments of Ministry of Agriculture

The three Departments of the Ministry of Agriculture prepared a project plan centering around the plan by the

Department of Cooperatives Promotion (as per attached sheet), and on the basis of the project plan, the survey team had individual consultations with the three Departments. The following is the gist of such consultation:

(1) Basic Idea of the Project

The Project is centered around the "Cooperatives Demonstration and Training Center (provisional name)" to be established at Chaibadan in the Province of Lopburi and is aimed at achieving the following 5 points in mutual correlation: ① demonstration and training concerning maize cultivation techniques, ② production and distribution of superior seeds, ③ prevention and eradication of disease and insects harmful to maize, ④ strengthening and promotion of agricultural cooperatives and ⑤ mechanization of maize production and processing. These basic points have been agreed upon by all the three Departments. For concrete measures to execute the above-mentioned basic points the survey team had discussions with the respective Departments on the following points.

(2) Arrangement for cooperation of the three Departments

The implementation of the above-mentioned programs cannot be attained by the functions of the Department of Cooperatives Promotion alone, but absolutely requires the participation and cooperation of the other two Departments. For instance, foundation seeds necessary for producing extension seeds which are to be distributed among farmers have to be supplied by the Department of Agriculture.

Also extension seeds which are produced by this Project have to pass through the processes of cleaning, inspection and certification which are under the jurisdiction of the Department of Agricultural Extension. This Project also includes the activities of batanga control by means of mobile units conducted by the Department of Agricultural Extension. Further, the demonstration and training which are carried out by the Center requires the assistance of the technical staff of the Department of Agriculture and the extension staff of the Department of Agricultural Extension. Consequently, although the Department of Cooperatives Promotion is administratively responsible for the Project and, hence, the Project Manager will be appointed from the staff of the Department, the other two Departments will participate in and cooperate with this Project in their respective fields as will be mentioned later.

(3) Project Area

The project area planned by the Department of Cooperative Promotion consisted of four provinces, i.e., Lopburi, Petchaboon, Pisanuloke and Sukhothai, including five agricultural cooperatives. To this area, the team suggested to add Saraburi Province in view of the fact that Saraburi is an important maize producing area and also that the Prabuthabad Agricultural Experiment Station, on which the Project will depend for the supply of foundation seed and technical information, situates in this province. The Department of Cooperative Promotion accepted this suggestion. And as the result, the

project area covers five provinces and six agricultural cooperatives. The maize cultivation area and number of maize growing farms are estimated at 193,000 Lai and 9,000 farms.

Also in connection with the Project area, the Department of Agricultural Extension had a plan to establish ten mobile unit bases, but since four places out of ten were located outside the Project area, the Department agreed that the four places would be excluded from the Project.

(4) Preparatory Plan by the Thai Side

It was explained by the Thai side that they would make the following arrangements to promote the Project:

① Acquisition of land necessary for establishing the Center
② Construction of necessary buildings, dormitories, etc.
③ Provision of necessary operation costs
④ Provision of necessary equipment and materials other than those to be supplied by the Japanese side
⑤ Preparation of counterparts to Japanese experts

To meet the above-mentioned expenditures, the Department of Cooperatives Promotion will make a budgeting request for the costs of purchasing land of about 100 rai (16 ha), costs of building construction and other necessary expenses.

Beside the Department of Cooperative Promotion, the other two Departments showed positive intensions

to participate in the Center, by making budgetary demands for the processing plant necessary for cleaning and inspecting the seeds in case of the Department of Agricultural Extension, and for providing the testing farm necessary for the adaptability tests required for supplying foundation seeds in case of the Department of Agriculture.

(5) Cooperation Plan by the Japanese Side

The team explained to the three Departments the outline of cooperation by the Japanese side as mentioned below:

Japanese cooperation consists of the following three components:

① Assignment of Japanese experts to Thailand for the purpose of technical advice
② Supply of experimental equipment directly necessary for demonstration, education, training, seed production and supplying foundation seeds and supply of equipment necessary for mobile units which are aimed at prevention of damage by harmful insects
③ Training of Thai Government officials in Japan

Regarding Item 1 above, the fields to be taken up by various Japanese experts will be determined depending upon the plan by the Department of Cooperatives Promotion and the possibility of sending experts from Japan.

Regarding Item 2 above, the equipment to be supplied by the Japanese side will be determined, after further detailed examination is made on the basis of equipment and materials shown in the plan

by the Thai side as per attached sheets.

Regarding Item 3 above, individual requests were made by the Departments, but it was decided, according to the basic principle held by the survey team, that consideration would be given to four fields, that is, cooperatives, agricultural machinery, grain production and agricultural extension.

Since the Thai side desired that Japanese experts would be sent to Thailand to give assistance to the preparation of concrete plans for the Project, the Japanese side acceded to the request and decided to expedite the procedual formalities of sending such experts for project planning.

The term of Japanese cooperation would be three years after signing R/D, but it was explained that the term would be extended when necessary depending upon the agreement by the two governments.

In the course of discussions on the Japanese cooperation plan mentioned above, the Department of Agriculture expressed its desire that training of Thai technical staff in Japan would not be restricted to maize alone but would cover grain crops in general. The Department of Agricultural Extension expressed its intension of cooperating with the Project in the training for desease and insect control and in the activities of mobile units, even if no experts in this field were sent from Japan and explained that it would be desirable that the control of five mobile units included in the Project would be placed under the responsibility

of the Department. The Department further stated that even if batanga experts are not available from Japan, Japanese cooperation in the fields of entomology and toxicology were desired.

4. Budget Plan on the Thai Side

The budgetary system of Thailand, according to the explanation given by the Department of Cooperatives Promotion, is as follows: The budgetary year begins in October and ends in September of the following year. Ordinarily the budgetary demand accompanied with necessary materials is submitted to the Budgetary Bureau in January; the draft budget is unofficially made known in September and is deliberated at the Diet in October and the budget becomes ready for execution in December. Then building construction will start and be completed in about 6 months.

The layout of the Center including the disign of the experimental farm should be executed at a timing matched with that of budget approval, but no conclusion was drawn as to what would be the most suitable timing of sending the design team from Japan.

5. Final Joint Meeting

After individual consultations between the survey team and the three Departments of the Ministry of Agriculture and on the basis of the outcome of the field survey, a joint meeting between the survey team and the three Departments of the Ministry of Agriculture and DTEC was held at the conference room of the Ministry of Agriculture on 16th, December, 1976. Since the Project is to be implemented on the basis of the plan by the

Department of Cooperatives Promotion, Mr. Surin. Director-General of the Department chaired the meeting.

After an official of the Department of Cooperatives Promotion described the outline of the draft request by the three Departments of the Ministry of Agriculture, Mr. Ohto, head of the survey team, explained the draft plan prepared by the survey team which was based on the draft request, as follows: The principal object of the draft plan lay in increasing the maize production in Thailand; and as a method to achieve this object, the mode of operation of the Center would be that the Department of Cooperatives Promotion was to play a central role on the administrative side and the other two Departments would cooperate with the Department of Cooperatives Promotion on the technical side.

The Thai side indicated the detailed figures of their request for experts to be sent, equipment and materials to be supplied and training to be given by the Japanese side. These figures were thought by the survey team to be very helpful in implementing the Project, but the survey team explained that due to budgetary consideration, the draft plan by the survey team mentioned only the fields of experts, etc. to be considered and gave no figures with respect to the number of experts, trainees and the amount of expenditures for providing equipment and material.

The survey team also informed the three Departments that the Japanese side considered it desirable to have R/D signed by October, 1976 at the latest, taking into consideration the budget of the Thai Government and, if necessary, the Japanese cooperation in sending to

Thailand a design survey team for planning the layout of the Center could be materialized if the budget submitted by the Japanese Government to the Japanese Diet for this purpose was approved.

After fully understanding these explanations, the Thai side expressed their desire to know the substance of the unofficial announcement of the draft budget concerned by the Japanese Government by some means or other and also to have the fact that the Japanese Government made the budgetary request to the Diet for the purpose of this cooperation incorporated into the report to be produced by the survey team.

Regarding the signing of R/D, the Japanese side stated as follows: In the draft plan of the survey team, it was stated that R/D might be signed as early as by March, 1976 and, at the latest, by October, 1976, but this timing should be determined by fully taking into consideration the progress of the budgeting procedure on the Thai side as well; and depending upon the degrees of progress in budgetary procedures both in Thailand and in Japan, early signing of R/D might not always be very advantageous to both countries.

Finally it was decided that the draft plan of the survey team would be submitted to Mr. Xujati, Director-General of DTEC under a covering letter signed by the head of the survey team through the Embassy of Japan in Thailand; and a copy each of the draft plan would be distributed among the Departments concerned on the day prior to the departure of the survey team from Bankok.

III Detail of the Components of the Project

1. Demonstration and Training of Maize Production Techniques

The research and experiments conducted by the Thai Government for the past several years under the Corn and Sogham Program have been aiming at increasing yields by selecting varieties in main reference to resistance to downy mildew and response to fertilizer, by fertilizing in high planting density, and by weeding and other cultivation practices.

The demonstration and training program of the project, conforming to the above line, will be carried out for demonstration and the training of staffs and member farmers of agricultural cooperatives and farmers organizations, on the techniques concerning the rationalization of planting density, fertilization quantities and methods, utilization of flowing water, avoidance of damage from disease and insects by cultivation season, treatment of seeds by chemicals, etc. In addition, this plan includes the demonstration of machine cultivation, and the technical training on the operations, maintenance and repairs of machines.

The demonstration and training activities will be performed both inside and outside the center. Activities in the center comprise the demonstration in the demonstration farm and various training courses given in the center. The activities outside the center comprise the demonstration in the demonstration farms provided by agricultural cooperatives and member farmers on contract with the Center, and local group lectures on-the-spot guidances. The size of a demonstration farm outside the Center shall be approximately 1.6 hectare each.

For the techniques to be demonstrated and trained and the varieties to be introduced, assistance must be provided by the experiment stations of the Dept. of Agriculture. However, the center, too, must be provided with experiment plot in it, since it must experiment regional adaptability, actual proof, and compositions of basic techniques for practical application.

2. Seed Multiplication and Distribution

The seed multiplication and distribution in this project refers to the production of extension seeds from foundation seeds supplied from the experiment stations of the Dept. of Agriculture, and the distribution of them through agricultural cooperatives and other farmers organisations to their member farmers.

The scale of this undertaking is determined by the quantity of foundation seeds capable of being supplied from the Dept. of Agriculture, and the area of seed producing farms capable of being secured under this project. According to the discussion between the survey team and the Dept. of Agriculture, it is estimated that about 2.5 tons of foundation seeds could be supplied annually at the beginning of this project.

Extension seeds are produced in the seed farm in the center and also by agricultural cooperatives and member farmers based on contract. The extension seeds produced are inspected and certified by the Dept. of Agricultural Extension.

It will be necessary for the center to guide and supervise the farmers to whom it entrusts the production of extension seeds, and to lend necessary agricultural

implements on lease. As for fertilizers and agricultural chemicals, too, it must be considered to distribute them in kind of the same standards to respective seed growers.

Furthermore, it is necessary to evaluate and confirm the after effects of the seeds distributed by the center, on genetic purity of varieties, resistance to disease and insects, growing conditions, yields, etc.

As it is very important for seed multiplication program of the Project to receive from the Department of Agriculture the sufficient and steady supply of foundation seed of varieties suitable to the project area, the Japanese technical cooperation may well be extended, as a part of the project, to the Department of Agriculture for experiments on and production of such foundation seeds by way of, for example, provision or lending necessary implements and/or the training of research personnel in Japan.

3. Mechanization of Maize Production

At present, many large tractors are used for maize production in Thailand. However, these tractors are used mostly for ploughing and shelling and occasionally for transportation in combination with trailers and farm road levelling. The large tractors are seldam owned by farmers, but mostly provided on contract service.

In the field of mechanization, the project has two duties. One is to promote that cooperatives own tractors to be rented or serve on contract at reasonable charges. For this purpose, mechanization training shall be provided in the center as a part of its training program. The other is to develop a mechanisation of cultivation

operations, such as weeding and spraying, to increase the yield.

(1) Training on agricultural machines

Machines requiring high level of techniques allow to improve the efficiency of work but at the same time involve the risk of accidents due to unskilled operation techniques. Therefore, the largest aim of training should be to train operation techniques for securing safety and improving efficiency of work, thereby contributing to the promotion of sound mechanization of agriculture. On this standpoint, the training should be executed as follows.

(i) Persons to be trained

Machine control managers, operators and repairmen of agricultural cooperatives, operators of member farmers, operators and repairmen to work in the Center, and operators from farmer groups.

(a) Procedure of training

For training, the contents shall be classified into 3 steps. Relatively easy mechanical operation techniques shall be mastered by all the persons to be trained, and they all or partly shall be trained on relatively high techniques of overhaul. For mechanization and economic calculation, etc of higher level, it is desirable to train only a limited number of persons at specialised institute in Thailand or in Japan.

(ii) Contents of training

As for the contents of training, the relatively easy technical course in the above mentioned procedure of training shall cover the training on the techniques required for basic work and safety security such as the everyday's starting check, periodical inspection, and maintenance of the implements to be combined with tractors, tilling, ground making, etc. The next course shall cover the training of the techniques concerning the integrated work system of fertilization, seeding, cultivation management and harvesting, repairs with simple exchanges of parts, periodical check and maintenance, engine overhaul, welding work, etc.

(iii) Relation with other training institutes

Trainings with contents similar to this project are provided already by the Dept. of Agriculture and dealers and qualifications are provided to those who have completed the courses. For the training under this project, it is necessary to take some measures in association with these training institutes to arrange the contents of training, qualification, etc.

(2) Development of Cultivation

Another important task of hte center for mechanization is to promote the mechanization for increasing the yield of maize.

The mechanization of ploughing on commission by large tractors now widely employed contributed

greatly to the increase of maize output in Thailand through the expansion of maize cultivation area and the enlargement of unit farm size covered by one farm. However, the yield per unit area remains low, and it is considered to be caused by lack of cultivation management and of prevention and extermination of disease and insects.

The present mechanized cultivation system in maize production areas is as shown in Fig. 1 and owes to manpower to a large extent. Some methods must be found to increase yield by mechanizing the works not done at present or done manually. The center is going to experiment such new mechanized systems in light of techniques and economy and to recommend to farmers according to the results. For this purpose, the center shall have an experiment farm and also conduct experiments in the farms of agricultural cooperatives and farmers.

A conceivable mechanized maize cultivation system arranged by the center is shown in Fig. 2.

There are 4 methods for mechanized harvesting of maize as shown in Fig. 3, but in Thailand, the method of 2 seems to be the most suitable harvesting method, because at present manual harvesting and manual husking are employed instead of the corn picker.

Fig. 1. Maize cultivation system in Thailand

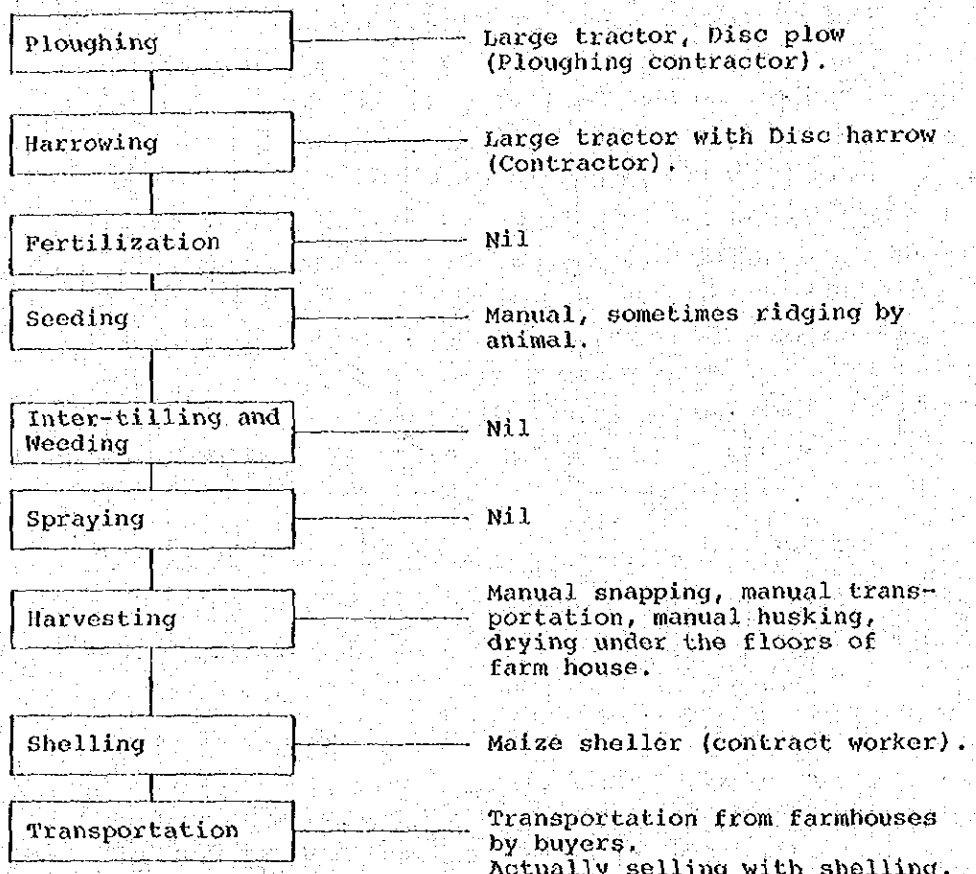


Fig. 2. Mechanized work system

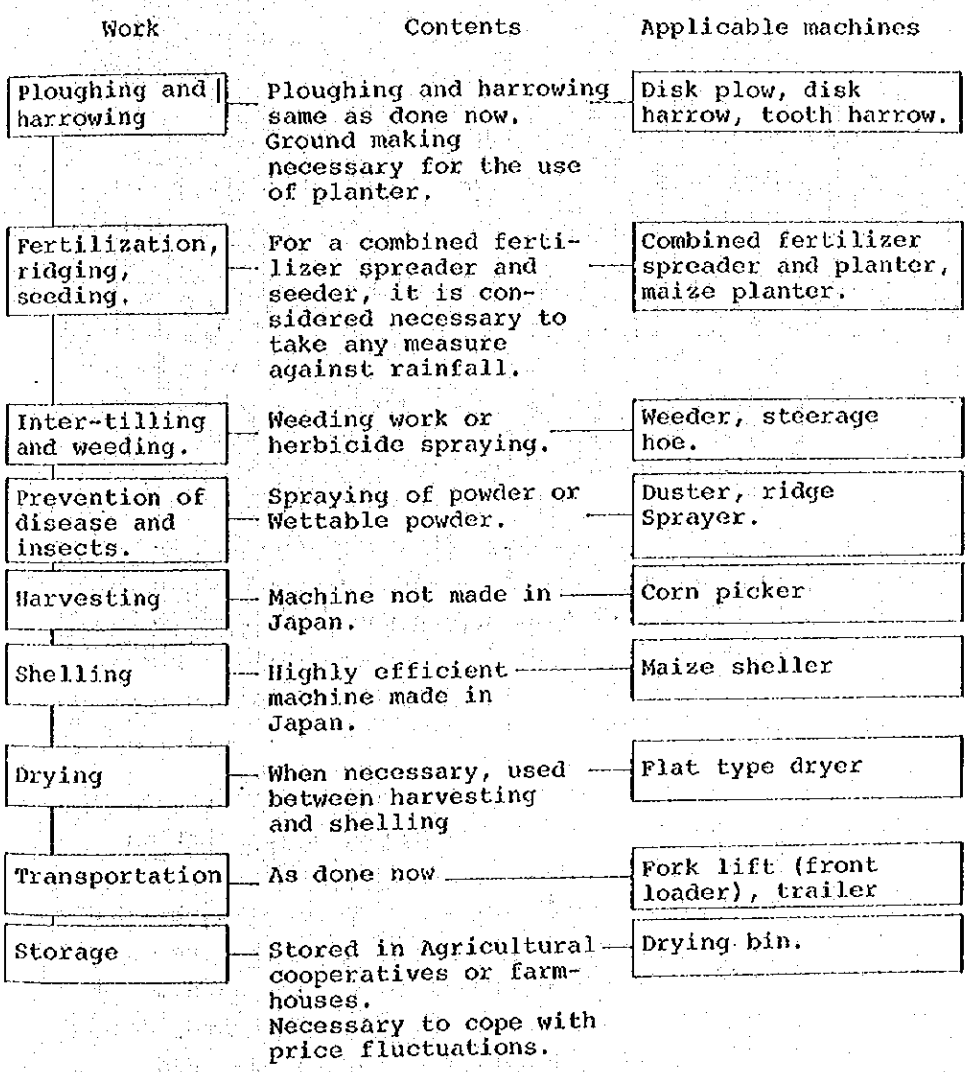
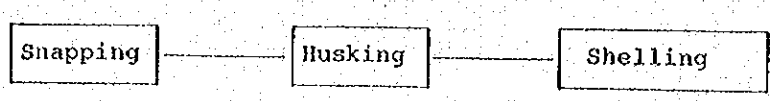


Fig. 3



1. Corn snapper ——— Corn husker ——— Maize sheller
2. Corn picker ——————————— Maize sheller
3. Picker-sheller ——————————————→
4. Combine (with corn attachment) ——————————→

4. Promotion of Agricultural Cooperatives

The agricultural cooperatives who handle maize in the Project area are Prabuthabad Reclamation Agricultural Cooperative and Chaibadan Agricultural Cooperative in Lohuri Pref., Phetchabun Agricultural Cooperative in Phetchabun Pref., Nongtom Agricultural Cooperative and Phrom Phiram Agricultural Cooperative in Phitsanulok Pref., and the outlines of these agricultural cooperatives are as follows.

(1) Prabuthabad Reclamation Agricultural Cooperative is a new cooperative established in 1971 under the guidance of the Dept. of Cooperatives Promotion. The members have sharply increased to about 1,200 persons at present in 5 years from 137 persons at the time of establishment. The main business is sales and credit, and of the items handled, corn shares most of the turnover, with 1,500 tons scheduled to be sold to ACFT this fiscal year. This cooperative has 2 tractors bought under the assistance of F. R. Germany under the aid program

of F. R. Germany executed since 1967, and use them for contract ploughing, shelling and transportation by the farmers.

(2) Chaibadan Agricultural Cooperative has the members of 377 persons (17 groups) (as of end of November, 1975), organizing about 5% of the farmers in the territory. Main business is the sales of corn, and the ACFT allocation of this fiscal year is about 4,000 tons.

(3) In the territory of Phetchabun, flatland is used for rice planting and farmland, for corn and others. It is a large agricultural cooperative with ACFT corn allocation of more than 1,000 tons. The members are 1,026 persons at present, and an office is now being built. This province has the Provincial Federation of Agricultural Cooperatives which has 12 member agricultural cooperatives. It has a rice mills with the capacity of 40 tons per day, and a warehouse of 1,000 tons.

(4) Also in the territory of Nongtom Agricultural Cooperative flatland (lowland) is used for rice, and uplands (highland) mainly for corn and partially for mangbean, black mappe and soybean as second crops. Collected corn amounts to more than 1,000 tons every year, like the Phetchabun Agricultural Cooperative, and is a model agricultural cooperative. At present, it has members of 721 persons (11 groups), and members are increasing year after year. Together with the start of the project between Japanese and Thai agricultural cooperative this year, members will increase furthermore.

(5) Phrom Phiram Agricultural Cooperative is originally a credit agricultural cooperative, and therefore has low turnovers from 1,600 tons to 1,700 tons for rice and corn respectively. However, the members are 1,456 persons (28 groups), and the loan amounts to 4.6 million bahts (3,000 bahts per one house per year). They also buy fertilizer and agricultural machines, though on a small scale. In the territory of the agricultural cooperative, an irrigation project is established based on the Second Croping Promotion Plan of the Dept. of Cooperatives Promotion and Dept. of Agricultural Extension of the Ministry of Agriculture. Water has been already supplied by a 120 HP pump to about 3,000 lai land since 1973.

Government officials (from the Dept. of Cooperatives Promotion) are stationed in the respective agricultural cooperatives to participate in the management. In the present conditions that members are undereducated and that talents of management are difficult to be obtained, the promotion of agriculture cooperatives led by the Government can be one step, and it is a large duty of this project to develop agricultural cooperatives of farmers themselves.

In order to attain this purpose, as a part of the training program of the center, it shall provide training on the management, accounting, etc. of agricultural cooperatives as well as providing management consultant service, together with the training on production techniques and machines described in the above (1) and (3). However, it will be proper that the training is provided not

as an independent program of the Center, but as a joint undertaking with the Agricultural Cooperatives Federation of Thailand (ACFT) who already has experiences for such training and service and has qualified staff.

The buildup of agricultural cooperatives in maize production areas by this project, however, should not be realized only by the above mentioned training and consultant service. A large significance of this project lies in that the staffs and members of agricultural cooperatives are made to experience the management of the cooperatives, through such actual activities that the cooperatives participate in the production and distribution of extension seeds, own tractors to be provided for members on contract, and execute joint operation of disease and insect control. They should accumulate knowledge and experience by doing by themselves.

IV Scale and Facilities of the Center

1. Division of Land Use

Management	Office building, garage, lodging, compound, etc.	Facilities concerned with office building.	(Land assumed to be 1.5 ha)
Training	Lecture room.		
Operation	Laboratory (experiment, seed inspection).	Buildings for Operation.	
	Material storage (fertilizer, agricultural chemicals, various materials).		
	Fuel storage, Agricultural machines and implements storage. Agricultural machines and implements workshop (used also for agricultural implements service training).		
	Seed drying station. Seed preparing station. Seed storage.		
Roads, etc.		Roads, etc.	
Demonstration farm	6 ha	Farms	
Experiment farm	2		
Training farm	1 ∿ 1.5		
Seed production farm	5 ∿ 5.5		

2. Outline of Facilities.

Building.	Contents of utilization, etc.	Incidental equipment.
Laboratory (annexed to the office building).	Examinations and experiments of farm product physiology, soil, fertilizer, disease and insect, etc necessary for the project. Inspection of seeds.	Plumbing installation, gas piping, air conditioner (because there are many works which do not allow the use of an electric fan, such as treating a slight amount of sample).
Fuel storage.	Storage of fuel, and fats and oils.	Weighers for light oil and gasoline.
Material storage.	Fertilizer, Agr. chemicals, various materials.	Racks.
Agr. machines and implements storage.	Storing Agr. machines and implements for farm operation, education & training.	Car washer.
Agr. machines and implements workshop.	Service of Agr. machines and implements for farms, and service training.	Benches, parts racks, electric hoists, air compressor piping, car washer.
Seed drying station. Predrying station.	Primary drying (before shelling) of raw materials produced in the demonstration center (produced in the seed farm, demonstration farm and experiment farm).	Ventilated drying building with drying frames, or concrete flat floor. Belt conveyer for conveying raw materials from primary drying station to shelling place, and working space (shelling).
Mechanical drying equipment (can be provided in combination with the preparing station).	Finish drying of the raw materials (produced in the seed production farm) demonstration farm and experiment farm). Finish drying of the seeds produced in seed farms on contract.	Heating blast drying equipment. Raw material carring apparatus (belt conveyer, bucket conveyer; for drying after shelling).

Building.	Contents of utilization, etc.	Incidental equipment.
Seed preparing station.	Cleaning, chemicals treatment, weighing and packing of corn destined for seeds, from the products in the demonstration center and contract seed farms. Cleaning of corn destined for grain, from the products in the demonstration center.	Raw material and products carrying apparatus (belt conveyer, bucket conveyer; to cleaning after drying, and delivery after cleaning). Temporary storage (convenient if it is equipped with drying function). Dust collector/ remover (Particularly for chemicals treatment).
Seed storage (insulating construction)	Storing of seeds for propagation produced in the demonstration center and entrusted seed farms until they are distributed, and adjustment storing of some seeds in preparation for a lean year.	Air conditioner, belt conveyer.

3. Outline of Apparatus.

Apparatus	Basic equipment	Remark
Laboratory		
Common apparatus	Laboratory furniture (Experiment stand, sink, wagon, lockers, balance, lighting fittings, etc.).	1 set
	Glasswares.	1 set
	Measuring instruments [Weight... direct reading balance (weighing capacity 160g, reading limit 0.1mg), direct reading balance (upper pan, weighing capacity 1,000g, reading limit 10mg) temperature, pH, water content]	1 set
	Optical instruments (biological microscope, stereo microscope, camera).	Each 1 unit
	Incubator (with refrigerator).	1 unit
	Constant temperature dryer.	1 unit
	Large refrigerator (for storing samples).	1 unit
	Pure water producing equipment	1 unit
	Agr. weather observation apparatus (outdoor).	1 set
Special apperatus	Seed divider (sample partial condenser).	1 set (large, medium & small)
	Seed blower (with air flow fine adjustment throttle and timer).	1 unit

Apparatus	Basic equipment	Remark
Special apparatus	Germination tester (with lighting, refrigerator, and temperature and lighting change-over timers).	1 unit
	Seed sample trier.	1 set
	Test sieves (corn sieves, dodder sieves).	Each 1 set
	High pressure sterilizer.	1 unit
Seed drying station	Blast drying silo for grain (with flow base, blower 10HP, Kerosene heater; body ϕ 2.7m × H4.2m, 15-ton, 2 units).	In the 1st year, 250 tons of seeds for propagation to be produced from 2.5 tons of foundation seed. In the 2nd year, 350 tons to be produced similarly from 3.5 tons of foundation seeds. In the 3rd year, 400 tons to be produced from 4 tons. If these are treated by the dryer given at left, the scales, etc of work from the 1st year to the 3rd year are as follow: 1st year: $\frac{250 \text{ tons}}{1 \text{ unit, } 1 \text{ time, } 15\text{t treatment}}$ = 17 cycles. In the case of 2 units, 8 + 9 cycles. If one cycle from acceptance to drying takes 6 days, the working period is 54 days. 2nd year: $\frac{350 \text{ tons}}{1 \text{ unit, } 1 \text{ time, } 15\text{t treatment}}$ = 24 cycles In the case of 2 units, 12 + 12 cycles.

Apparatus	Basic equipment	Remark
Seed driving station		If one cycle from acceptance to drying takes 6 days, the working period is 72 days. 3rd year: $\frac{400 \text{ tons}}{1 \text{ unit, } 1 \text{ time, } 15\text{t treatment}}$ = 27 cycles. In the case of 2 unit, 13 + 14 cycles. If one cycle from acceptance to drying takes 6 days, the working period is 84 days.
Seed preparing station	Storage bin (1 unit of 15t, or 2 units of 7.5t & 1 unit of 5t).	15t: Before cleaning. 5t: Before weighing.
	Air and screen cleaner (1 unit of cleaner capable of treating 5 tons per day).	1st year: In the case of 250-ton of extension seeds, $\frac{250 \text{ tons}}{1 \text{ day, } 1 \text{ unit, } 5\text{t treatment}}$ = 50 days 2nd year: Similarly $\frac{350 \text{ tons}}{1 \text{ day, } 1 \text{ unit, } 5\text{t treatment}}$ = 70 days 3rd year: Similarly $\frac{400 \text{ tons}}{1 \text{ day, } 1 \text{ unit, } 5\text{t treatment}}$ = 80 days
	Water content measuring instrument (1 unit, for corn).	
	Chemicals treater (1 unit for seeds)	One treater to suit the capacity of the cleaner allows continuous operation.

Apparatus	Basic equipment	Remark
Seed Preparing station	Automatic weigher (hopper scale, 1 unit)	
	Auxiliary platform scale (100kg, 1 unit).	
	Automatic bag mouth sewing machine (1 unit).	
Seed storage	Air conditioner.	If all the cleaned seeds are stored, the storage space of 250t for 1st year and 400t for 3rd year is required. However, since some are delivered as soon as prepared, the storing capacity of half the amount is assumed to be sufficient.
	Thermo-hygrograph (7-day roll, 1 unit).	If 1.6t is piled per $1m^2$, the required area with passages, etc of 30% (minimum) added to the net accumulation space is 1st year ... $101m^2$, 2nd year ... $142m^2$ and 3rd year ... $183m^2$.
		The air conditioner must be able to keep the storage with the above capacity at the temperature of 18°C and relative humidity of less than 60%*
		(* If the relative humidity in the storage is 60%, seeds dried to have the water content of 13% can be stored, without absorbing moisture, with the air and water contents balanced in the storage).
Agr. machines and implements storage	Garage of tractors, and Agr. machines.	The area of tractor garage is to be obtained by multiplying the area of total length 6.5m × width 2.5m for a tractor with an

Apparatus	Basic equipment	Remark
Agr. machine and implements strage		Agr. machine combined, by the number of tractors. As for Agr. machines, total of areas required for respective machines. A shutter entrance shall be provided on one side, with the depth of about 3m for 1 Agr. machine. A place to put small parts of Agr. machines on shall be provided to prevent theft. Water supply and electric installation shall be provided as far as possible. It shall be apart from the fuel storage.
Agr. machine and implements workshop	Workshop facilities equivalent to Grade B of the Japanese Facilities Standard, VIZ. facilities mainly for medium to large machines in which works involving disassembly, repairs, and periodical maintenance are made. Repairs which require large machine tools shall be made by contractors. (See the following Tables 1 and 2, Workshop Facilities Standard of Japan).	As machines and apparatus provided inside, various measuring instruments for engine, chassis, and electric apparatus, tools, and machine tool facilities. As independent facilities, fuel oil storage, arranged parts storage, arranged tools storage, resting room & office, toilet, travelling hoist (about 2-ton), washing pit, drainage gutters, complete car garage.

Reference Table 1 Classification of workshop facilities
(Japanese Standard)

Classification	Contents
Inspection and adjustment facilities. (D)	To allow light work and repair of small machines, and to allow periodical maintenance not involving disassembly, and parts exchange, etc of medium to large machines.
Light workshop facilities. (C)	To allow light work and repair involving partial disassembly, and periodical maintenance of medium to large machines, in addition to the services done in the inspection and adjustment facilities.
General workshop facilities. (B)	Workshop facilities mainly for medium to large machines, to allow work and repair involving disassembly, and periodical maintenance.
Special general workshop facilities. (A)	To allow regeneration service, and service finish inspection, in addition to the services done in the general workshop facilities.

Reference Table 2 Workshop and number of workers necessary for tractor service (Japanese Standard)

Item	D	C	B	A
① Indoor workshop	50m²	100m²	200m²	300m²
② Basic number of workers	2	4	8	12
③ Number of workers per tractor	1	1.5	1.5	2
④ Number of tractors simultaneously worked ② ÷ ③	2	3	5	6
⑤ Working area per tractor worked	25m²	25m²	25m²	25m²
⑥ Tractor service station area ④ × ⑤	50m²	75m²	125m²	150m²
⑦ Disassembled parts service station area a) For machines and apperatus ⑥ × 0.2 b) For thin plate working, smithing, painting ⑥ × 0.2	10m²	15m² 15m²	25m² 25m²	30m² 30m²
⑧ Finish inspection station				80m²

Attached Table 1 Members of the survey team

Name	In charge of	Affiliation
Motonaga Ohto	Head	Special adviser, JICA
Yoshifumi Akai	Cultivation	Nagano National Livestock Breeding Station, Ministry of Agriculture and Forestry
Koichi Nonaka	Propagation	Asia Economy Laboratory
Toshinori Ishikawa	Agricultural machines	Agriculture Mechanization Laboratory
Yuji Hashimoto	Cooperatives	National Federation of Agricultural Cooperative Associations
Teruhide Fujita	Coordinator	JICA
Takakaku Okamoto	Attendant	Overseas Technical Cooperation Division, Agricultural and Forestry Economic Affairs Bureau, Ministry of Agriculture and Forestry

Attached Table 2 Lists of persons concerned in Thailand

(A) First 3-department joint meeting

1. Dr. Prakob Kanchnasoon, Director General of the Department of Agriculture (Chairman)
2. Mr. Ampol Senanarong, Upland Crops Division, the Department of Agriculture
3. Miss. Peerarat Aungurarat, Planning Division, the Cooperatives Promotion Department
4. Mr. Teranom Pecharamuni, Planning Division, the Cooperatives Promotion Department
5. Mr. Narong Minanandana, Plant Protection Service Division the Department of Agricultural Extension.

6. Mr. Pipat Kaewplung, Division of Crops Promotion, the Department of Agricultural Extension

7. Mr. Sa-Nguan Bhananchai, Division of Foreign Agricultural Relations, Office of the Under-Secretary of State

8. Miss. Anusorn Mochang, Division of Foreign Agricultural Relations, Office of the Under-Secretary of State

(Attendants from Japan: Mr. Tsuchiya, Secretary of Japanese Embassy in Thailand, Mr. Iwaguchi, JICA Bankok Office, and the members of the survey team)

(B) Final 3-department joint meeting.

1. Mr. Surin Cholpraserd, Director-General of the Cooperatives Promotion Department (Chairman)

2. Miss. Peerarat Aungurarat, Planning Division, the Cooperatives Promotion Department

3. Mr. Teranom Pecharamuni, Planning Division, the Cooperatives Promotion Department

4. Mr. Ampol Senanarong, Upland Crops Division, the Department of Agriculture

5. Mr. Thomya Bunyaketu, the Department of Agriculture

6. Miss. Anusorn Mochang, Division of Foreign Agricultural Relations, Office of the Under-Secretary of State

7. Mr. Mando Tang-u-Saha, the Department of Technical and Economic Corporation

(Attendants from Japan: Same as the 1st meeting)

Attached Table 3 Itinerary

Day	Week	Remarks
Dec. 1	Mon.	Tokyo - Bankok
Dec. 3	Wed.	1. Discussion with 3 departments (Dept. of Agriculture, Dept. of Agricultural Extension, Dept. of Cooperatives Promotion) of Ministry of Agriculture & Cooperatives. 2. Discussion with Dept. of Cooperatives Promotion
Dec. 8	Mon.	1. Observation at Experiment Station of Dept. of Agricultural Techniques 2. Discussion with DTEC
Dec. 9	Tue.	o Survey of Prabuthabad Agricultural Experiment, Station and Agricultural Cooperative
Dec. 10	Wed.	1. Survey of Lam narai Agricultural Cooperative 2. Survey of planned place of Project Center 3. Discussion with Dept., of Cooperatives Promotion
Dec. 11	Thu.	1. Survey of Phetchabun district and Agricultural Cooperative 2. Discussion with Dept. of Cooperatives Promotion
Dec. 12	Fri.	1. Examination of Seed Processing Plant at Phitsanulok 2. Survey of Phrom Phiram and Nongtom Agricultural Cooperatives
Dec. 15	Mon.	1. Explanation to and discussion with Dept. of Cooperatives Promotion on the draft adjusted by Japan and Thailand

Day	Week	Remarks
Dec. 15	Mon.	2. Explanation to and discussion with Dept. of Agricultural Extension on the draft adjusted by Japan and Thailand 3. Explanation to and discussion with Dept. of Agriculture on the draft adjusted by Japan and Thailand
Dec. 16	Tue.	o 3-department joint meeting at Ministry of Agriculture & Cooperatives
Dec. 17	Wed.	o Individual discussion with Dept. of Cooperatives Promotion
Dec. 18	Thus.	o Individual discussion with Dept. of Cooperatives Promotion
Dec. 19	Fri.	Bangkok - Tokyo

Attached Table 4 Draft Plan of Technical Cooperation for Maize Production Development