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SURVEY OF MID-EAST FAR EAST COUNTRIES  
FOR LOCATION OF GRAIN LEGUME RESEARCH CENTERS

A SUMMARY REPORT

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FOR LOCATION OF GRAIN LEGUME RESEARCH CENTERS

A SUMMARY REPORT

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SURVEY OF MID-EAST FAR EAST COUNTRIES  
FOR LOCATION OF GRAIN LEGUME RESEARCH CENTERS

A SUMMARY REPORT

A survey was made of seven Mid-East Far East countries to determine the most logical location for two grain legume research centers as provided for in the Participating Agency Service Agreement between the Agency for International Development and the Agricultural Research Service, USDA, entitled "The Improvement of Grain Legumes Production in the Near East South Asia and Far East Regions, by Development of Superior Varieties and Production Practices." The survey was conducted during the period September 19 to November 16, 1963, by Drs. Martin G. Weiss and Peter van Schaik of the Agricultural Research Service. The countries surveyed were Turkey, Egypt (UAR), Jordan, Iran, Pakistan, India, and Thailand.

A detailed report of the survey has been prepared. This report documents personnel conferred with, stations and facilities visited, sources of grain legume germ plasm collections, information on insect and disease incidence, and other detail that will be of value to the prospective research scientists. It is not anticipated that this report will be of general interest. Limited copies are available for review upon request.

At the initiation of the survey a list of requisites and desirable features was developed. Each country was evaluated for these major features. The summary for each country, therefore, presents comments on these major features in the following order:

1. Research location relative to areas of grain legume production
2. Availability of training facilities
3. Availability of research facilities
  - a. Plotland and irrigation water
  - b. Research laboratories
  - c. Staff housing
4. Attitude of country government
5. Attitude of country AID Mission
6. Potentialities of cooperation
  - a. Country research personnel
  - b. U. S. contracting universities
  - c. Other organizations
7. Synopsis and Conclusions

The survey indicated the desirability of one center being located in the Mid East, where many grain legumes are grown on high plateaus and rainfall occurs almost exclusively in the winter, and the second in the monsoon belt, where rainfall occurs almost exclusively in the summer. As a consequence, a summary of Mid-East countries has been prepared and another summary for the South Asia-Far East countries is included. The Mid-East countries include Turkey, Egypt, Jordan, and Iran, whereas the South Asia and Far East countries include Pakistan, India, and Thailand.

## SUMMARY OF SURVEY OF TURKEY

### Research Location Relative to Areas of Grain Legume Production

In the central high plateau of Turkey, which includes both Ankara and Eskisehir, pulse production is extremely limited. It is largely a dryland wheat growing area. This area resembles our northern Great Plains, possibly in eastern Montana, Wyoming, and eastern Colorado. It is extremely undulating reminding one of the Palouse country, although the soil is alluvial rather than loessal in origin. A few chickpeas are grown in low areas, but acreage is extremely low. Dry beans are grown on the transition areas on all sides of this large central plateau. Most bush dry beans are grown as dryland crops and a few pole beans are grown in low areas without irrigation. Most pole beans are irrigated. Lentil production is confined entirely to the southeastern part of Turkey, beyond the last range of mountains. This is the relatively flat area through which the Tigris River flows. On the western coast of Turkey location of a center at Ismir might seem logical. This is the location where FAO will initiate a new plant introduction station, which will be of regional nature for the Near East. Ismir is of Mediterranean climate. We were assured by specialists that neither chickpeas nor lentils could be grown in that area because of the incidence of fusarium. Both are highly susceptible to fusarium and other diseases.

In the judgment of Turkish scientists, by far the best location from the standpoint of ecological factors was in the high plains in the southeast of Turkey in the vicinity of Diyarbakir. This is the center of lentil production, chickpeas are grown sporadically, broadbeans are grown throughout this area, and dry beans are grown within a short distance in the transitional area between the plains and the mountains. The Diyarbakir area is thought to be representative of large areas of grain legume production in Syria, Iraq, Iran and certain parts of other Near East countries.

### Availability of Training Facilities

Turkey as a whole will not furnish good training for nationals. No formal course work is given beyond the Bachelor's degree and undergraduate course are taught in Turkish. As a consequence, training for advanced degrees would consist merely of practical training with a professor and submission of a suitable thesis problem. With regard to training, the Ankara location would be favored. The University of Ankara has some good scientists and has conducted exploration, introduction, classification, and screening of some of the grain legumes. There are no training facilities in the way of colleges or universities at either Eskisehir or Diyarbakir. There is an Agricultural University at Ismir. Incidentally, there is a Middle East University which has recently been established at Ankara where courses are taught in English. However, at present they have no college of agriculture. The new Ataturk University, which University of Nebraska personnel are assisting, is at Erzurum, 700 miles east of Ankara, and is completely out of the grain legume growing area.

### Availability of Research Facilities

Plotland and irrigation water. Lands of the Research Institute at Ankara are extremely undulating and heterogeneous. They would not be suitable for small plotland. Furthermore, irrigation facilities are virtually nonexistent. At Eskisehir good land is available for plot work, but it is fully occupied at present. There are only 250 acres available and no other land seems forthcoming. According to reports by Turkish scientists, the lands at Diyarbakir are suitable for plot work for a broad variety of grain legumes. (This was later corroborated by a survey made by University of Nebraska and GOT personnel.)

Research laboratories. Laboratory facilities of the Agricultural Research Institute at Ankara are acutely limited. At Eskisehir they are still more limited. For the most part, laboratory facilities consist of greenhouse space for a pathologist, wheat quality labs for determining protein, milling, and baking properties of wheat, and, at Ankara, a seed technology laboratory which is largely of a regulatory nature. At Diyarbakir no buildings have been built but it is contemplated that an administration building at least will be constructed during 1964.

Staff housing. Staff housing at Ankara would be entirely adequate as a large amount of new building is in progress and many apartments and houses are available. At Eskisehir we were told staff housing would be adequate and we were told it also would be adequate at Diyarbakir. (Later confirmed.)

### Attitude of Country Government

The reaction of the Turkish Government was extremely good. From the Director General of Agriculture down through the Section Head of Vegetable Crops, as well as Directors of the Eskisehir Station and Research Institute at Ankara, we were encouraged strongly to locate a center within this country. Their attitude was particularly surprising as they had not been given adequate background prior to our arrival. We were highly impressed with the caliber of the people we conferred with and we feel they would be excellent people to cooperate with us.

### Attitude of Country AID Mission

The U. S. AID Mission in Turkey was cool to the project. Most of this coolness was due to misunderstanding and, after extensive consultation with them, we feel we could cooperate with the Mission. During our visit it became clear that the Mission was particularly shorthanded due to home leave, end of terms of service, and the like.

### Potentialities of Cooperation

Country research personnel. The research program in Turkey on grain legumes is quite limited. Dr. Tosun of the University of Ankara has conducted a considerable amount of collection, classification, and screening of grain legumes. He has on hand sizeable stocks of grain legume varieties and types. This germ plasm would be invaluable to our project. At Eskisehir very little work is being done now. One Turkish participant is presently at Michigan State College and when he returns it is hoped he will work principally on dry beans and possibly to a limited degree on chickpeas.

U. S. contracting universities. The University of Nebraska is cooperating with the new Ataturk University at Erzurum. Erzurum is located in the mountainous area 700 miles east of Ankara at an elevation of approximately 6,000 feet. The season is very short and it is out of the area of pulse production. As a consequence there would be limited opportunity to cooperate with the University.

Other organizations. The only outside organization that will conduct activities within Turkey is the FAO which contemplates a new plant introduction center at Ismir. Although it would not seem advisable to locate a grain legume research center at Ismir, we would hope to cooperate closely with this center in exchanging plant materials.

### Synopsis and Conclusions

The most logical location for a research center in Turkey is in the southeastern high plains on the new research station at Diyarbakir. This location, nearly 600 miles by road from Ankara, would impose a severe strain on communications both with Ministry and U. S. personnel at Ankara and with other countries.

Training facilities must be considered poor. The nearest universities with agricultural training are at Ankara or Erzurum, a considerable distance. Further, undergraduate courses are taught in Turkish, and no formal graduate courses are given.

Availability of plotland and irrigation water at Diyarbakir is adequate. No buildings exist on the station and laboratories could probably not be available until late 1965. Staff housing in Diyarbakir is adequate.

Attitude of the Turkish Government officials and research scientists is excellent. The AID Mission was not enthusiastic toward the project.

Potentialities of cooperation with country scientists are very limited as little research on grain legumes is in progress. Interchange of germ plasm with the contemplated new center of FAO could be effected whether the center were in or out of the country.

## SUMMARY OF SURVEY OF EGYPT

### Research Location Relative to Areas of Grain Legume Production

Egypt grows approximately 600,000 acres of pulses. Broadbeans are the most important and are generally grown throughout Egypt. Fenugreek and lentils are second in importance, and are grown in the valley approximately 50 to 100 kilometers north of the Aswan Dam. Chickpeas are not grown extensively but are more scattered in their production. All of the above crops are grown as a winter crop and all are irrigated as rainfall in Egypt is negligible. A limited acreage of cowpeas is grown, but it is grown as a summer crop. We were advised by Ministry officials that ecologically Egypt might be considered similar to southern Iraq. It is dissimilar to the major producing areas in southeastern Turkey, northern Syria, northern Iraq, Jordan, and Iran.

Within Egypt the most logical location of a research center would be at the Giza Research Station near Cairo. The only pulse grown abundantly in the area is the broadbean, with limited acreages of chickpea and cowpea.

### Availability of Training Facilities

Good training facilities are located near the Giza Station. The University of Cairo has a College of Agriculture exceeding 5,000 students. Undergraduate courses are taught in arabic. Formal courses, taught in English, are given for the MS and Ph.D. candidates. Advanced degrees are given in all disciplines of primary concern to the project. The Dean of Agriculture stated U. S. personnel could become associate members of the University faculty in conjunction with leading the research work of graduate student trainees.

### Availability of Research Facilities

Plotland and irrigation water. Plotland at the Giza Station is inadequate. Only four or five acres could be provided. Tracts of land are owned by the Ministry of Agriculture within 20 minutes to an hour's travel time from Cairo and it is possible some of these tracts might be suitable and might be assigned to the project. Irrigation facilities are a requisite for all agricultural land in Egypt. However, water is plentiful and is acceptable in quality.

Research laboratories. Several new laboratory buildings are under construction at the Giza Station and we were assured by the Ministry that adequate laboratory facilities could be provided for the professional staff.

Staff housing. Staff housing within Cairo is short, but not acute. The quality of available housing is adequate.

#### Attitude of Country Government

The attitude of the Egyptian Government is excellent. They are making every effort to induce us to locate a center within this country. We believe that cooperation with the Government would be excellent so far as the Ministry of Agriculture is concerned. Bearing in mind Egypt is a policed state, there would undoubtedly be greater difficulty in clearing personnel and materials into and out of the country than in most other countries. The expressed attitude of the Ministry of Agriculture is that personnel of any of the Far East and Near East countries with whom we are contemplating cooperation would be acceptable as employees in this center.

#### Attitude of Country AID Mission

The attitude of the U. S. AID Mission also is excellent. They cooperate in every way to make our trip complete and successful and stand willing to negotiate with the Ministry any memoranda or documents that will be required, whether we locate a center within the country or not.

#### Potentialities of Cooperation

Country research personnel. The potentialities of cooperation with the research personnel in Egypt are particularly good. The caliber of scientists in disciplines and fields that are allied to the grain legume research is very high. Excellent support in such fields as rhizobia studies, soil classification, seed germination, and others would be available and was offered to the project. The Ministry already has established a system of regional testing of varieties and cultural methods. Experiments are designed, seed is packeted, and details are furnished to the branch stations where junior scientists conduct the experiments and collect data. Plot techniques at the branch stations seem highly adequate. Summarization of results at the Giza Station also is very good. Ministry research leaders have pledged full cooperation with the grain legume research project, whether or not the center is located within Egypt.

U. S. contracting universities. There are no potentialities of cooperation with U. S. contracting universities as there are none located in Egypt.

Other organizations. The only outside agency known of is the Regional Nematode Research Center conducted by FAO and located in conjunction with the University of Cairo. Although extensive collaboration with this unit would not be planned, this unit has provided the precedence for the establishment of regional centers and the hiring of nationals of other countries within Egypt.

#### Synopsis and Conclusions

Although grain legumes are important in Egypt, the species are widely dispersed in area of production and it would be difficult to work with other than broadbeans at Giza, the logical location of a research center. The dry, tropical climate of Egypt requires that virtually all grain legumes be grown under irrigated conditions. Ecological conditions similar to the high plateau areas of the Mid-East where many rain-fed grain legumes are grown are not available in Egypt.

Training facilities for nationals, available at the University of Cairo, are unexcelled in the Mid-East. Formal courses in English are offered for the MS and Ph.D. degrees.

In research facilities, a major problem at Giza is the scarcity of plot-land. Possibly land could be found within commuting distance. Laboratory space is available at the Giza Research Station. Modern equipment, in general, is scarce. Staff housing in Cairo is short, but not a problem.

The cooperative attitude of the UAR Ministry of Agriculture is unexcelled. Excellent cooperation would be assured. The attitude of the AID/USAR Mission also is excellent, indicating great interest and desire to cooperate.

Potentialities to cooperate with UAR research personnel are excellent, both those working with grain legumes and in allied fields. An excellent system of regional testing within the country has been initiated.

There are no U. S. contracting universities in Egypt to cooperate with. An FAO Regional Nematode Research Center would provide possibilities for limited cooperation.

## SUMMARY OF SURVEY OF JORDAN

## Research Location Relative to Areas of Grain Legume Production

Within the area of Jordan a considerable variety of pulses are grown. Considering the choices of climate that can be encountered from the dry-farming uplands to the irrigated Jordan Valley within an hour's drive, Jordan must be considered favorably from the standpoint of environment for research on a wide variety of pulses.

## Availability of Training Facilities

Jordan must be rated very low with respect to training facilities. The only formal agricultural education in the country is given at a junior agricultural college which is located on the immediate boundary with Israel on the west side of the Jordan River. Some years ago U.S. AID helped construct buildings at that site. Courses are given entirely in arabic. Within the vicinity of Amman no suitable training for undergraduate or postgraduate students exists. A new university is planned immediately adjacent to the Jubeiha Agricultural Research Center. At the present time the only progress that has been made is that a junior agricultural high school has been taken over and it is hoped these buildings will constitute a nucleus for the new university. Bearing in mind the difficulties the Agricultural Research Center is experiencing in holding good personnel because of salary differentials, it would seem this university would not be available for graduate training for at least ten years.

## Availability of Research Facilities

Plotland and irrigation water. Facilities for plotland are not available immediately adjacent to the center. Several suitable sites within 10 to 20 minutes drive of the center have been acquired by the Ministry for other purposes. Each has adequate irrigation water. It is assumed the Ministry could acquire similar sites for the grain legume project if a center were located here.

Research laboratories. As to research laboratory facilities, the Jubeiha Research Center has a potential of becoming one of the best equipped laboratories in the Mid-East. AID-purchased equipment is being installed at the present time. The laboratory facilities would be adequate for a center such as is anticipated in the grain legume research project.

Staff housing. Staff housing in Amman should be adequate.

### Attitude of Country Government

The attitude of the Government of Jordan is excellent. From the Minister of Agriculture on down, all officials seem highly in favor of having the center located within the country. We were impressed by the quality of personnel, both at the administrative and research levels. Unfortunately, few agricultural professional personnel have been retained in the country. It would be a pleasure to associate with the personnel we met.

### Attitude of Country AID Mission

AID/Jordan personnel are highly enthusiastic and gave every indication of helpful cooperation.

### Potentialities of Cooperation

Country research personnel. Research on pulses is extremely limited and little cooperative work with country personnel outside of the project could be expected. Further, meager support from allied fields of research could be expected.

U. S. contracting universities. No U. S. contracting universities are available.

Other organizations. No outside organizations are known with whom cooperation could be expected.

### Synopsis and Conclusions

The ecological variations in Jordan, as conditioned by altitude and rainfall differences, would permit research on a wide spectrum of grain legumes. Production areas of a number of species are located within relatively short distances of Amman, the logical location for a research center.

Training facilities are virtually non-existent. Excellent laboratory facilities are available. Plotland with irrigation is not currently available but is obtainable within a reasonable distance. Staff housing is available in Amman.

The attitude of the Government of Jordan Ministry of Agriculture is excellent and every indication of cooperation was extended. Personnel of the AID/Jordan Mission were equally enthusiastic and full cooperation could be anticipated.

The potentialities of cooperation with Jordan research scientists are limited. Not only are existing research programs with pulses meager, but programs in allied fields also are weak. It has not been possible to retain adequate scientists within the country.

No U. S. contracting or outside organizations or foundations have programs in Jordan that would permit cooperation with a proposed grain legume research center.

## SUMMARY OF SURVEY OF IRAN

## Research Location Relative to Areas of Grain Legume Production

In the high plains in western Iran chickpeas and dry beans are grown to a considerable extent. They are mostly grown as a rain-fed summer crop and are particularly concentrated in northwest Iran in East and West Azarbaijan. Some lentils also are grown. Broadbeans are grown largely as an irrigated crop in the lower areas such as the south Caspian Sea coast. Karaj, the most logical location of a research center, is located in the high plains, temperate climate area and the heaviest concentration of chickpeas and dry beans can be reached 200 miles to the northwest. Tropical, irrigated areas are available approximately 100 miles to the north on the Caspian Sea coast. Diverse ecological conditions are, therefore, available within reasonable distances.

## Availability of Training Facilities

The Karaj College affords excellent training facilities for undergraduate students. Courses, however, are taught in Persian (Farsi) which limits their usefulness to trainees of the Iran and Afghanistan nationalities. Teaching facilities at Karaj are far above the average observed in the Mid-East and quality of teaching is good. Close cooperation between the Agricultural Research Institute of the Ministry of Agriculture and the College will permit employees of the Ministry to be stationed at the College and participate in training of students.

## Availability of Research Facilities

Plotland and irrigation water. Large areas of lands suitable for plotland are owned by the College. Further, the Agricultural Research Institute is adjacent with good plotland also available. Irrigation water of good quality is available. Basic farm implements for preparation of lands and considerable small-plot equipment is available at the College farm. A U. S. trained superintendent of the farm would be available for cooperation in tending experiments.

Research laboratories. Research laboratories are unexcelled. New buildings have been constructed and the new Biology Building has research lab-office combinations that would be ideal.

Staff housing. Staff housing is available for rental in Tehran, 25 miles to the east. Housing on the College campus would be available for only the officer in charge, but priority was promised in building additional staff houses for the other research scientists.

### Attitude of Country Government

The attitude of officials of the Ministry of Agriculture and of the Karaj College administration was excellent. They evidenced great interest and excellent cooperation could be expected. It would be possible for our counterparts to be Ministry employees even though they are stationed at and working with us at Karaj College.

### Attitude of Country AID Mission

The attitude of the U.S. AID Mission could not be better. The Mission Director, as well as the Food and Agriculture Officer, are highly in accord with this project. Also the Utah State Contract Team is very enthusiastic and feels this project is one of the best that AID has launched. Dr. J. Clark Ballard, Utah State Contract Supervisor, took such an interest in this project that upon receipt of the first AID airgrams last May he made plantings of the various pulses at Karaj for our observation. He also travelled 2,000 kilometers to survey the areas in which pulse crops are being produced so that he could be informed on this subject. We have not experienced this degree of interest by U. S. personnel in any of the other countries surveyed.

### Potentialities of Cooperation

Country research personnel. Virtually no grain legume research was conducted in Iran prior to the past summer. A date of planting experiment was initiated this past season at Veramin and was probably stimulated by the airgrams sent to Iran last May. Also, as mentioned above, observation plantings were made at Karaj College. In other words, there is virtually no research program in grain legumes conducted at present. There are, however, excellent research personnel working with other crops in plant breeding, entomology and plant pathology. An association with these people would undoubtedly be welcomed and would be desirable. There is no work being conducted on rhizobia at the present time. Dean M. H. Mahdavi, however, indicated an interest in initiating work along this line. A new food and nutrition laboratory is being planned and will be staffed shortly.

U. S. contracting universities. The Utah State Contracting University is phasing out as of July 1964. Personnel have been reduced from a maximum of eight to four professionals at the present time. Dr. Madson is an animal husbandryman and Mr. Ashton is a fruit specialist. Dr. J. Clark Ballard is a vegetable man and Mr. Van Epps, who is normally the superintendent of a dryland experiment station for Utah State, is an agronomist with leanings towards soils work. There is a possibility that Dr. Ballard and/or Mr. Van Epps would fit into our plans in the establishment of a center here. We were informed the families of both prefer to return to the United States. Further, it is questionable if they would leave the employ of Utah State and become ARS employees. However, the possibilities to use their services.

even if temporarily, should be taken under advisement and explored. As a bare minimum, it might be possible to request the extension of Dr. Ballard's tour of duty for several months, or even up to a year, to overlap with our team should this country be selected as a site for one of the research centers.

Other organizations. No other organizations with whom cooperation would be desirable are known to be located within Iran.

### Synopsis and Conclusions

Grain legumes are adapted in the area where Karaj is located and could be worked on effectively at this location. Diverse ecological conditions, varying from high-plains temperate climate to sea-level irrigated tropics, are within reasonable distances. The diverse conditions would permit experimentation with a wide range of species.

Training facilities and staff at Karaj College are excellent, but only undergraduate courses are taught and these only in the Persian language.

Research facilities for both laboratory and field research are ideal in every respect. Staff housing is available at a distance of 25 miles at Tehran. ||

Interest, enthusiasm and cooperation of Ministry of Agriculture and Karaj College officials, as well as members of the AID/Iran Mission, are of the highest level.

Limited research projects in grain legumes will minimize country projects that scientists of the center can cooperate with. Scientists in the same disciplines working with other crops are available and cooperation in allied fields could be expected. The only contracting U. S. university, Utah State, is phasing out but has established an excellent background for a cooperative research effort. No other organizations are available for cooperation.

A SUMMARY OF THE NEAR AND MID-EAST COUNTRIES WITH RESPECT  
TO POTENTIALITIES OF LOCATION OF A RESEARCH CENTER

The countries included in this survey are Turkey, Egypt, Jordan and Iran. The grain legume production areas of these countries have in common a climate in which most rainfall occurs throughout the winter months and the summers are virtually without precipitation. High plains, in which the climate is temperate, and tropical areas are present in all countries except Egypt, where, except for a narrow strip along the Mediterranean, the climate is entirely tropical and rainfall is negligible.

Research Location Relative to Areas of Grain Legume Production

With respect to area of production of grain legumes, Jordan and Iran must be rated above the other two countries. The central plains of Jordan and Iran are suitable for production of the rainfed grain legumes produced throughout the winter or summer seasons. In Jordan, within one hour's drive the irrigated and low-lying Jordan Valley may be reached where tropical conditions exist. Similar areas are available in Iran up on the Caspian Sea coast, but they require approximately four hours of mountain driving. In Turkey, suitable areas for grain legume production are found principally in southeastern Turkey, some 580 miles of difficult road from Ankara. This region would be quite remote and difficult to work in. Egypt must be rated last as, because of almost complete absence of rainfall, it has entirely an irrigated agriculture. Further, due to low altitudes, all agricultural regions are tropical. It would not be possible to conduct experimental trials on grain legumes under rainfed or temperate climate conditions.

Availability of Training Facilities

With respect to training facilities, Egypt should be rated number one. The University of Cairo has a large agricultural university and conducts graduate training for both the MS and Ph.D. degrees in the English language. In Turkey, Bachelor's degrees are given, but courses are taught in Turkish. No formal coursework is required for the Master's and Ph.D. degrees, as requirements are based entirely upon research. In Iran, only Bachelor's degrees are given and course work is taught in the Persian or Farsi language. Jordan only has a junior agricultural college and it is located on the extreme west boundary, where location of a center would be undesirable.

### Availability of Research Facilities

Plotland and irrigation water. Plotland and farm equipment facilities were by far superior in Iran to other countries. Both University and the Agricultural Research Institute have large land holdings. The University particularly has excellent land far in excess of their needs. They also are well stocked with modern land-preparation equipment, which is currently under operation. They also have a western-trained and oriented farm superintendent. In Jordan, no plotland is available presently near the Research Institute where the center would have to be located. There are valleys within striking distance, however, where land probably could be acquired. No farming equipment is available and irrigation facilities also would have to be sought. In the Jordan Valley to the west there are several branch stations where land and facilities could be made available for outlying tests under irrigated conditions. Egypt has a system of outlying research stations scattered at intervals along the Nile and land requirements, as well as irrigation water, seem readily available. It should be borne in mind, however, that only irrigated land would be available at these stations. At the central location at Giza, plotland is not immediately available. Within an hour's drive, however, we were assured that adequate plotlands with irrigation facilities would be made available by the government. Turkey must be rated lowest with respect to availability of plotland. It would be necessary to establish a center in southeast Turkey at a new branch station, the land for which was only recently acquired. The quality of this plotland and irrigation facilities seem adequate as determined by a survey of University of Nebraska and GOT personnel. Certainly no equipment is available at that station at the present time.

Research laboratories. Laboratory facilities are by far the most available in Iran. A large, new biology building included excellent laboratories, both for teaching purposes and small research labs. Excellent combinations of offices and labs for research scientists are available. In Jordan, a small laboratory building will be available immediately west of Amman. This is in the process of installing laboratory benches and equipment and it will be an excellent small laboratory, much of which would be available for our use. Laboratories in Egypt, in general, are much more antiquated and out-of-date. Existing space is quite well occupied, but probably adequate space could be available for our personnel. Considerable rejuvenation would be necessary to assure effective laboratories. Some new buildings, however, are being constructed. In Turkey, the requirement of establishing the center in southeast Turkey where there are currently no buildings, makes it necessary to rate this country lowest with respect to laboratory facilities.

Staff housing. In Turkey, Egypt, and Jordan, if the research center is located near Ankara, Cairo, or Amman, adequate staff housing seems available for rental by U. S. scientists. In Turkey, if the research center is located at Diyarbakir, we were told adequate housing exists in that town, but we did not have occasion to inspect such housing. In Iran, housing is very short at Karaj, where we would hope to locate the center. We were guaranteed only a house for the project leader. Other personnel would have to be located in Tehran where adequate housing is available for rental. The Ministry, however, promised to give the construction of staff housing for our personnel a high priority.

#### Attitude of Country Government

The attitude of the governments of each of the four countries was highly favorable toward establishment of a research center in the respective countries. Each promised good cooperation. The close cooperation between the Agricultural Research Institute of the Ministry of Agriculture and the College in Iran is considered particularly commendable and conducive to close cooperation between research and training. In Egypt relations between the Giza Research Institute and the University of Cairo also seem very good.

#### Attitude of Country AID Mission

The attitudes of the AID Missions varied to some degree. In Iran, not only the AID Mission, but the contracting university, showed particular interest and willingness to cooperate to the degree that trial plantings had been established for our observation. The strongest support of AID missions encountered would be anticipated from the Mission in Iran, based upon the preparatory work they had done with the Ministry. In both Jordan and Egypt the AID missions were highly receptive to assisting the center in any way possible. In Turkey interest seemed to be much less intense and the Mission's effectiveness in dealing with the Ministry seemed somewhat lower.

#### Potentialities of Cooperation

Country research personnel. With respect to national scientists with whom we could cooperate, Egypt should be rated number one. They not only have scientists who appear to have competence in the disciplines of our anticipated U. S. scientists, but they also have indications of good supporting scientific fields such as rhizobia and seed testing and germination work. Iran also has a number of scientists with whom excellent cooperation and help could be expected. The degree of supporting fields is somewhat less than that of Egypt. In Turkey, there are two scientists who have considerable experience in this field. Probably other than consultation and advice,

we could not expect too much help. Scientists in allied, supporting fields are not available. In Jordan, the scientific staff is being rapidly depleted due to low salaries. Unless this problem can be corrected significant help or cooperation from Jordanese scientists could not be anticipated.

U. S. contracting universities. The only U. S. university located at a prospective research center location is Utah State and this contract is terminating in July, 1964.

Other organizations. The only outside organization with which extensive cooperation is anticipated is the new FAO germ plasm center at Ismir, Turkey. Cooperation could be effective regardless of country in which the center would be located.

#### Synopsis and Conclusions

When considering all aspects of the survey, we conclude that Iran is the most suitable country in which to locate a grain legume research center. Such center should be located at Karaj, approximately 40 kilometers west of Tehran. Egypt must be considered a close second when considering all aspects. The fact, however, that no rainfed experimentation could be conducted in Egypt and that temperate climate is not available, makes it necessary to rate this country somewhat lower in being representative of the Mid-East and in permitting research on a considerable number of grain legume species. Jordan is a third choice for location of a center, with its greatest weakness in lack of cooperating scientists and in training facilities. Turkey must be rated fourth because of the necessary remoteness of the area where most of the grain legumes are grown and which is considered representative of the Mid-East grain legume production areas.

## SUMMARY OF SURVEY OF PAKISTAN

## Research Location Relative to Areas of Grain Legume Production

Pakistan seems to have adequate production of grain legumes to consider location of a center in this country. The important grain legumes are chickpeas, with urd and mungbeans in that order of production. Lentils are also of importance. The main center of grain legume production lies to the southeast of Peshawar and to the north of Lyallpur in the vicinity of Campbellpur. Grain legumes, however, could be grown particularly in the Lyallpur area and to a considerable degree in the Peshawar area.

## Availability of Training Facilities

Training facilities are available both at the University of Peshawar and the West Pakistan Agricultural University. Both give five year agriculture courses for the Bachelor's degree. The University of Peshawar has plans before the higher education council for education curricula for the Master's degree. These plans have not been approved, but approval is expected momentarily and they hope to have 22 MS students in training shortly. The Agricultural University at Lyallpur has a program for both the MS and Ph.D. degrees in agriculture and is considerably more advanced in postgraduate training. All courses are taught in English. At Lyallpur an international house is being planned that will permit students from other countries to bring their wives while taking graduate work. Pakistani students will not be permitted to be accompanied by wives.

## Availability of Research Facilities

Plotland and irrigation water. Facilities with respect to plotland are not immediately available at Peshawar. The Agricultural Research Institute at Tarnab is located on a relatively small area of land and most of this land is in fruit trees. The University has very little plotland at the present time. They have acquired 327 acres to the west and are hopeful of acquiring another 500 acres. Much of this land, however, would not be suitable for plotland and it is questionable if any of it would be ideal. We were told the Ministry owns some 400 acres approximately 15 miles to the northeast across a river. This land is slightly more sandy than that at Tarnab and was described as being more suitable for grain legume production. However, it is not readily accessible to Peshawar as we were told it might take some three hours to reach the tract, American personnel who had seen the land were not impressed that it was suitable for plotland.

Land facilities at Lyallpur are much better. The Ayub Agricultural Research Institute is located on a 1100 acre tract, much of which seems to be good plotland. Certain border effects were notable next to the

irrigation bunds, but with adequate borders these effects could be overcome. The experimental farm at the University is less suitable for plot-work. The land seems less fertile and seems fully occupied. Growth of plants was much poorer and there was some discussion about lack of availability of water. Severe border effects, such as lines of trees, were noted in some of the farms. The University is hopeful of acquiring additional lands. Irrigation facilities are adequate at the Institute but there is some question at the University.

Research laboratories. Laboratories and office space at the University of Peshawar and at Tarnab seem to be adequate. At each location additional equipment would have to be purchased to supplement existing equipment. At Lyallpur, laboratories at both the University and at the Institute currently in use are extremely crowded, antiquated and entirely inadequate. It would not be possible to locate a center until further construction is completed. A sizeable building program at the Institute was in evidence as a number of large buildings were partially constructed. The University has a ten-year building program planned and has funds to implement nearly half of it within the next few years.

Staff housing. At both Peshawar and Lyallpur staff housing would constitute a problem. At each location, however, it was thought that houses could be constructed or rented on the basis of the housing allowances which U. S. personnel would receive.

#### Attitude of Country Government

The attitude of the Ministry of Agriculture was highly favorable toward locating a grain legume research center within Pakistan. The Universities at Lyallpur and Peshawar also were much in favor of establishing a center with the respective universities. At each location there was evidence of some friction or ill feeling between the Institutes under the Ministry of Agriculture and the Universities, which are an autonomous group under the Ministry of Education in the Government. This feeling was particularly acute at Lyallpur where the Institute and College were separated only a little more than a year ago. At Lyallpur, Institute personnel seemed willing to concede that a center could work harmoniously both with the Institute and the University. University personnel, on the other hand, stated flatly that we must decide which we wished to be associated with. With the present state of feeling between these bodies, we feel it would be particularly difficult to work harmoniously with both bodies.

### Attitude of Country AID Mission

The attitude of the US/AID Mission of West Pakistan at Lahore seems favorable to the location of a center in Pakistan. Mr. Gene Whitman is attempting to arrange a meeting between Education and Ministry officials in the interests of formulating a cooperative arrangement. In case such cooperation is agreed upon, he will let us know.

### Potentialities of Cooperation

Country research personnel. The potentiality of cooperation with Pakistanian scientists seems highest at the Ayub Agricultural Research Institute. The Plant Breeder in charge of cereal pulses is particularly able and is conducting an excellent program. Assistance would also be available in entomology and cytogenetics. In supporting fields, such as rhizobia or chemistry research, we did not find scientists of competence. At the University, however, the supporting fields are also not in evidence. At Peshawar we felt personnel of both University and Institute were not as strong as those at Lyallpur.

U. S. contracting universities. The U. S. contract university at Peshawar is the Colorado State University, but it is phasing out and only has three men stationed there. We do not believe they could be of great assistance to us in organizing a center at Peshawar. At Lyallpur, the Washington State University has a staff of twelve people at the West Pakistan Agriculture University. They have made great strides in organizing adequate curricula, both for undergraduate and graduate study and, when adequate facilities become available, this should be an excellent training center. At the present time research in progress, particularly in grain legumes, is considerably inferior to that of the Agricultural Research Institute, although entirely duplicatory with respect to objectives. Unfortunately the Washington State personnel have aligned themselves with the University and are not helping to diminish the friction between the Institute and the University. In view of their attitude, it does not appear the Washington State personnel would be helpful in permitting the Research Center to work harmoniously with both Institute and University.

Other organizations. No other programs by foundations, FAO, or other countries were found that might be of value for the development of cooperative work.

### Conclusions

Grain legumes, notably chickpeas grown during the rabi season and urd-beans and mungbeans grown during the kharif season, are produced abundantly in West Pakistan. A research center located at either Lyallpur or Peshawar, the locations of Agricultural Universities and Agricultural

Research Institutes, could conduct plot research on these species in the immediate vicinity or within reasonable distances.

Training facilities are available at both the University of Peshawar and the West Pakistan Agricultural University. At Peshawar, BS degrees are given and plans have been made to give MS training. At Lyallpur undergraduate and graduate training up to the Ph.D. is given. The latter appears to be the stronger training center at the present time. All courses are universally taught in English.

Suitable plotland and irrigation water are available at the Ayub Agricultural Research Institute, Lyallpur. Plotlands at the adjacent University have poorer soil and inadequate irrigation. At Peshawar neither the Agricultural Research Institute nor the University have suitable plotland for grain legumes. Plotland was reported to be available some distance to the northeast.

At Peshawar laboratory facilities would be available at either the University or the Institute. At Lyallpur neither University nor Institute has laboratories available, but extensive laboratory construction is underway at the Institute. The University has plans for a large ten-year building program. Staff housing constitutes a problem at either Peshawar or Lyallpur, but we were assured the problem was not unsurmountable.

The attitude of the West Pakistan Ministry of Agriculture was excellent, as was that of personnel of the Agricultural Research Institutes which fall under the Ministry. The Universities also showed an intense interest. Antagonism between the Universities and the Agricultural Research Institutes was particularly acute at Lyallpur and the University gave no hopes of our working both with the Research Institute and the University.

The attitude of the West Pakistan AID Mission was favorable. They are attempting to promote cooperation between the Ministries of Agriculture and Education.

The potentiality of cooperating with country scientists is particularly good at the Ayub Agricultural Research Institute. This Institute has the best research scientists, as well as the best plotland and concrete evidence of laboratories under construction. The University inferred that cooperation with the Institute would preclude cooperation with their personnel. As the U. S. contracting university has aligned themselves with the West Pakistan Agricultural University, it seems unlikely they could be of any assistance to us in establishing a center or in promoting a reasonable degree of cooperation. No outside organizations within Pakistan were noted with whom cooperation would be beneficial.

Although facilities and cooperating scientists are available at the Ayub Agricultural Research Institute, cooperation with this Institute will preclude harmonious relations with the University. The University is a requisite for the training of nationals of Pakistan and other cooperating countries. The acute animosities displayed, particularly by the University against the Institute, renders Lyallpur an untenable location for a research center. Although the animosities are somewhat less at Peshawar, plotland and both University and Institute staffs are inferior to those at Lyallpur at this time and would not seem adequate for the establishment of a center.

Postscript. On January 8, 1964, following completion of the above summary of the Pakistan survey, a message was received from AID/Pakistan stating that agreement has been reached by the Vice Chancellor of the West Pakistan Agricultural University and the Secretary for the West Pakistan Ministry of Agriculture that cooperation between the Ayub Agricultural Research Institute and the University will be initiated and maintained under the leadership of a joint committee comprised of personnel of both organizations. This welcome message would indicate that the potentiality of cooperation of the grain legume research program with Pakistan will be increased significantly.

## SUMMARY OF SURVEY OF INDIA

## Research Location Relative to Areas of Grain Legume Production

The four locations visited, Delhi, Ludhiana, Hissar, and Pantnagar, are within the area of pulse production. Of the locations, we would have to rate Hissar as lowest. This location is in the center of heavy chickpea (gram) production. However, the soil is more alkaline than any of the other areas and we are convinced that difficulties would be encountered in attempting plotwork at this location. Ludhiana is located between the heavy gram production to the south and lentil and urdbean production to the north. This area would seem suitable as a center to do research on the above legumes as well as mung. At Pantnagar gram production is heavy but also there is more pigeonpea production. Delhi, however, is in the region of adaptation of pigeonpea, chickpea, urd, mung and lentil production, and we feel this would be a good location so far as growing of pulses is concerned.

## Availability of Training Facilities

Training facilities are best at Delhi, where a graduate college for MS and Ph.D. degrees is incorporated with IARI. There are no undergraduate facilities here. At both Ludhiana and Pantnagar, training facilities for Bachelor's and Master's are available which seem entirely adequate. In addition, Ludhiana has candidates for the Ph.D. at this time.

## Availability of Research Facilities

Plotland and irrigation water. Plotland and irrigation water seem adequate and were assured us at the Ludhiana and Pantnagar locations. Plotland at Hissar has not been developed and alkalinity would seem to pose a serious problem. Plotland is short at IARI. New lands, however, are being levelled and brought into cultivation and in cooperation with IARI adequate lands were thought by the Director to be available. Drainage, however, would probably be necessary on some of these lands to overcome the high water table-alkalinity problem.

Research laboratories. At Ludhiana and at Pantnagar adequate laboratory facilities are or shortly will be available. At Hissar construction of facilities for the Agriculture College is merely in the planning stage and it is presently housed in buildings of the Veterinary College. No laboratories would be available for some time. At IARI it would be necessary to construct a new laboratory as present laboratories, upon inspection, were determined to be overcrowded in every respect.

Staff housing. Staff housing would constitute a seriously limiting factor at Ludhiana, Pantnagar, and Hissar. There are no large towns in the vicinity in which suitable housing occurs. Additional housing is badly needed for current staff. Housing would be available in New Delhi, as a sizeable building program is in progress.

#### Attitude of Country Government

The general attitude of the Government of India, although disappointing to us at first, seems to be favorable toward establishment of a center in this country. Final decision as to the attitude of the Government must be delayed until we obtain a decision from the Ministry of Finance with respect to allotting adequate joint-use rupees to initiate and support a center.

#### Attitude of Country AID Mission

Attitude of AID/India is good. After thorough study, the Mission seems to be convinced that this project is directly in line with their objectives and they are in accord with all phases of it. They recommend location of the center at Delhi rather than at either of the University locations. Original coolness of the Indian US/AID Mission seemed to be due to the manner in which this project was developed. Most projects are developed in cooperation with the local AID Mission and as a consequence of their stimulation, usually at the request of the Government of India. This project, because it was originated in Washington, seems to have been of concern to them at the beginning. This concern seems to have disappeared. Mr. Ray Johnson recommended that if India is selected as the location of one of the research centers it would be advisable to send an ARS representative who will be directly concerned with the program to India during the negotiation stages with the Government of India. It was also suggested that an administrative man of rather high level might be very helpful.

#### Potentialities of Cooperation

Country research personnel. There are excellent potentialities of cooperation in India. The number of Indian research personnel that are working with pulses is quite limited. No one was found who is devoting full time to this subject. However, a limited amount of work and interest was found in a number of the departments.

U. S. contracting universities. Cooperation with U. S. contracting universities would be possible at both Ludhiana and Pantnagar. Also the three developing agricultural universities in southern India have indicated a distinct interest. Even though the center might be located at

Delhi, it would definitely be planned to establish branch research stations at each of these agricultural university centers where contracting universities are presently located.

Other organizations. One of the major cooperating organizations would be the Rockefeller Foundation, headquartered at Delhi. Their personnel are participating in the cooperative maize scheme and regional research projects on sorghum and pearl millet. These projects are well advanced and it would be highly advantageous to locate a research center along side of the coordinating centers of these active projects. Sharing of equipment, exchange of ideas and stimulation would be mutually beneficial. At every location visited we were assured that the maize cooperative scheme is unique in India in that it is the only truly national research project that is truly cooperative and encompasses both State and Central personnel. It would seem well to pattern the grain legume project after this successful scheme.

An additional advantage of locating the center at Delhi is that of communication. Communication and liaison would pose a considerable problem if the center were located at any point away from Delhi.

#### Synopsis and Conclusions

Locations surveyed, including Ludhiana, Pantnagar, Hissar and Delhi, all fall within the area of pulse production. Hissar must be rated lowest as only chickpeas are adapted. At Ludhiana urdbeans, mungbeans, and lentils also could be worked on within reasonable distances. Pantnagar is in the area of pigeonpea production as well as the above-named crops. At Delhi all of the above crops could be worked with.

Graduate training staff and facilities at IARI, Delhi, where both MS and Ph.D. degrees are granted, must be considered superior to the other locations at this time. At Ludhiana both degrees are given and at Pantnagar the MS curricula is newly established. Undergraduate courses are available at both of the latter, but not at Delhi. Hissar gives only undergraduate work. Courses are universally taught in English.

Certain research facility deficiencies occur at each location. Hissar, with no current buildings and new, alkaline lands, has the poorest potential. At Ludhiana and Pantnagar laboratories and plotlands are available, but staff housing poses an acute limitation. At Delhi no laboratories are available and would have to be constructed. Plotlands are scarce but probably available. Adequate staff housing is available in New Delhi. Irrigation water is available at all locations.

During the course of the survey and conferences, the Ministry of Agriculture of the Government of India and the U.S./AID Mission developed considerable interest and enthusiasm. Both concurred with the survey team that Delhi is the most logical location in India for a center.

When the Ministry was told a budget for construction of a laboratory building, for drainage of lands, and for annually recurring provisions for cooperating personnel would be essential, they stated this matter would be taken under advisement. Subsequent messages received from AID/India late December 1963, and early January, 1964, indicate that the Ministry has approved the tentative budget and it has been submitted to the Ministry of Finance for final approval.

Excellent potentialities for cooperation with Indian research personnel seem to be available. Although current research programs are limited, interest and anticipated cooperation are excellent. All five U. S. contracting universities are highly in favor of the project and would be a tremendous help in stimulating cooperative effort. Personnel of the Rockefeller Foundation also are fully in accord with the project and are working with similar programs in other crops. Their advice and counsel would be invaluable.

The Delhi location in India seems to have excellent potentialities provided that the Ministry of Finance will approve allotment of adequate joint-use rupees for the needed non-recurring and recurring budget items.

## SUMMARY OF SURVEY OF THAILAND

## Research Location Relative to Areas of Grain Legume Production

Grain legumes are grown only to a limited extent in Thailand and are not an important item in the human diet. Mungbeans are grown to a moderate degree, mostly for export to Japan for use as sprouts. Soybeans are grown in limited acreages also for export to Japan. The areas where grain legumes are grown are in northern and northeastern Thailand. The logical site for a center, if established, would be at Khon Kaen, the location where the Thai Government is contemplating establishment of an agricultural research institute.

## Availability of Training Facilities

Training facilities are available only at the Kasetsart University, which is at a considerable distance from the area in which grain legumes are adapted. Moderately good staff is available at the University, but most teaching facilities are inadequate. A few new teaching laboratory buildings are being constructed.

## Availability of Research Facilities

Plotland and irrigation water. Plotland and irrigation water at Khon Kaen appear to be available and adequate in quantity and quality. Presently the lands are used for feed production to support an existing experimental livestock operation. Lands on outlying stations observed were too variable to permit small-plot research.

Research laboratories. No research laboratories are available at Khon Kaen but will be constructed if an agricultural research institute is established.

Staff housing. Staff housing similarly is not available.

## Attitude of Country Government

After consideration of the facility and program investment that would be required of the Thai Government if a grain legume research center were established in the country, Ministry of Agriculture officials concluded that the crops that will be given major attention are not of adequate importance in Thailand to justify such investment. The Thai officials indicated a desire to participate with a center if one is located in southeast Asia.

### Attitude of Country AID Mission

The AID/Thailand Mission was highly enthusiastic about the project and gave every indication of cooperation even if a center should not be located in Thailand.

### Potentialities of Cooperation

Country research personnel. Limited opportunities presently exist to cooperate with country scientists as virtually no research program is being conducted on grain legumes. Personnel at some outlying locations probably could cooperate by growing regional tests.

U. S. contracting universities. The University of Hawaii is the only contracting university and it is cooperating with Kasetsart University. As this University is out of the area of grain legume production there is little opportunity to cooperate with them. The University, however, is establishing one or more branch stations and this development should be followed with a view toward possible cooperation.

Other organizations. The FAO regional headquarters at Bangkok constitutes an excellent focal point to coordinate cooperation with that organization. Location of a center in Thailand, however, is not requisite to such coordination. The Rockefeller Foundation is cooperating in a maize breeding program and close working relationships might be established. However, no Rockefeller personnel are stationed in Thailand.

### Synopsis and Conclusions

As grain legumes are grown in Thailand to a limited extent and are not of appreciable importance in the human diet, it is concluded, in concurrence with the Thai Ministry of Agriculture, that consideration should not be given to establishment of a center in Thailand. Cooperation of Thai scientists with a center established in southeast Asia is anticipated.

A SUMMARY OF THE SOUTH ASIA AND FAR EAST COUNTRIES  
WITH RESPECT TO POTENTIALITIES OF LOCATION OF A RESEARCH CENTER

The countries included in this survey are Pakistan, India and Thailand. The grain legume production areas of these countries are characterized by heavy monsoon rains during the summer months and long dry periods throughout the winter months. The climate varies from sub-tropical to tropical.

Research Location Relative to Areas of Grain Legume Production

Grain legume production in Thailand is limited to an extent as to make location of a research center in this country undesirable. This premise is concurred in by the Thai Ministry of Agriculture officials. Pakistan is within a major area of chickpea production, and also mungbeans and urdbeans. Some lentils are grown, but pigeonpeas are not grown abundantly. In India large acreages of most types of grain legumes are grown. In northern India locations are available where all major types can be grown effectively. Southern India, with its tropical climate, would provide adequate diversity to conduct experimentation on virtually all types.

Availability of Training Facilities

No training facilities are available in Thailand within striking distances of the areas where grain legume research could be conducted. In Pakistan, training facilities at Lyallpur and Peshawar have good potentialities, and will probably be developed to an adequate degree within the next few years. Of the two, probably Lyallpur will have the best training facilities. Course work is given in English and degrees up to the Ph.D. are offered. In India, training facilities at the IARI seem excellent for postgraduate work. At Ludhiana in Punjab and Pantnagar in Uttar Pradesh, training for the Bachelor's degree in agriculture seems satisfactory at the present time and good progress is being made toward development of postgraduate training programs for the MS and Ph.D. degrees. At the present time IARI at New Delhi is the most advanced in postgraduate training, including both teaching and research facilities.

Availability of Research Facilities

Plotland and irrigation water. In Thailand land at existing stations is extremely heterogeneous and of questionable quality for small plot work. At the contemplated center at Khon Kaen it may be possible to have adequately uniform lands. In Pakistan, adequate plotland seems to be available at both Lyallpur and within striking distance from Peshawar. The

land at Hissar seems too alkaline for plot work involving a number of the grain legumes. In India adequate land facilities seem available at Ludhiana in the Punjab and Pantnagar in Uttar Pradesh. Officially, land is scarce in the vicinity of IARI, but new lands are being levelled and current lands are not fully utilized with plot work. At final discussions with the Ministry the Director of IARI indicated, in conjunction with rotation of lands and development of new lands, plotland could be made available.

Research laboratories. Thailand has no laboratory facilities within the areas of grain legume production. Availability of laboratories in Pakistan varies greatly. At Lyallpur the University has no laboratory facilities available at the present time. The Agricultural Research Institute has assured us of space in buildings presently under construction. At Peshawar it would be necessary to become accommodated in existing space, although most of the space is dedicated to teaching laboratories. In India laboratory facilities seem most abundantly available at Ludhiana. At Pantnagar all laboratories visited were of the teaching type, but new building construction might make research laboratories available. At IARI all existing laboratories are overcrowded and none are available. One of the main points in consideration of this station revolves around the question as to whether GOI will construct adequate laboratory facilities at IARI, if this point is chosen as a center.

Staff housing. No staff housing is available at Khon Kaen, the logical location for a center in Thailand. In Pakistan staff housing at both Lyallpur and Peshawar is very limited, but could probably be made available if necessary. In India staff housing is available at New Delhi on the basis of individual house rentals. There is no staff housing available at present at either Ludhiana or Pantnagar. At each location there is a considerable group of staff members that do not have suitable housing and, although a construction program is in progress, it would require a considerable time before houses could be made available at either location.

#### Attitude of Country Government

With respect to attitude of the governments, there is a great difference among the three countries. The Government of Thailand frankly stated they felt it would be inadvisable to justify the expenditure of Thai funds for furnishing facilities and staff required by a center in view of the low acreage of grain legumes within the country. In Pakistan, there was an obvious antagonism between the Agricultural Research Institutes supported by the Ministry of Agriculture and the Universities. This was particularly acute at Lyallpur, which is the most logical location of a grain legume research center in the country. There was no indication of the Government to resolve these differences and it is feared that personnel of a grain legume research center would find themselves enmeshed in this controversy. They would have to work with the Ayub

Agricultural Research Institute with respect to conduct of experimental work and would also have to train personnel at the West Pakistan Agricultural University. The current antagonisms seem to make the country an untenable position for the location of a research center. (In a message received January 8, 1964, it is indicated that significant progress has been made since the survey to develop cooperative relations between the Ayub Agricultural Research Institute and the West Pakistan Agricultural University at Lyallpur. The cooperation and coordination is to be developed by a joint committee of the two organizations.)

In India, the attitude of the Government was noncommittal until further determinations could be made relative to the establishment of requisite facilities and plotland in the vicinity of IARI. Delhi is considered to be the logical location of a center and this selection is concurred in both by the Ministry and US/AID Mission personnel in India. The Ministry of Agriculture is taking under advisement the inclusion in their budget askings of a tentative budget for both facilities and annually recurring program costs. Further negotiations between program personnel of the US/AID Mission and Ministry of Finance counterparts in regard to the use of joint-use funds for the furnishing of requisite facilities and lands by GOI will determine whether or not a center at IARI is feasible. (During late December 1963 and early January 1964 messages were received from AID/India indicating the Ministry of Agriculture has approved the tentative budget and has submitted it to the Ministry of Finance for final approval.)

#### Attitude of Country AID Mission

The attitude of US/AID in each of the three countries surveyed was favorable to establishment of a center within the respective countries. In Pakistan, unfortunately, the segregation by location of the Central Government U. S. AID Mission versus the provincial Missions seems to have generated confusion and even ill feelings. AID in Thailand obviously was highly in favor of the project when the first information reached this country as it would favor both their projects at Kasetsart University and the prospective project at Khon Kaen. They were obviously disappointed at the reaction of the Ministry, but agreed with the conclusions drawn. In India, although the Mission was originally somewhat lukewarm to the proposal, it was obvious that they generated considerably more enthusiasm and, although they recognized there were serious problems in furnishing requisite facilities and requirements within the country, strong support can be expected in further negotiation with GOI with respect to establishment of a center, in case a favorable response is forthcoming from GOI.

### Potentialities of Cooperation

Country research personnel. With respect to potentialities of cooperation, it appears there are very few research personnel in Thailand with whom we could cooperate on a technical level. In Pakistan, the outstanding research personnel are located with the Ayub Agricultural Research Institute at Lyallpur, notably with Mr. Aziz. In India, the most outstanding individual we met was Mr. Athwal at Ludhiana. On the other hand, a broad supporting staff would be available at IARI.

U. S. contracting universities. U. S. contracting universities would be available for participation in each of the three countries. Probably in Thailand, where the University of Hawaii is cooperating with Kasetsart University, the weakest cooperation could be anticipated, as the Kasetsart University is not in a suitable location for pulse research. Furthermore, no agronomist is assigned to this contract. In Pakistan, the Colorado State University is rapidly phasing out at Peshawar. Unfortunately, at Lyallpur the Washington State University has strongly allied themselves to the Agricultural University in the animosity with the Agricultural Research Institute. Cooperation with Washington State University might add to embarrassment and difficulties encountered with working with both Institute and Agricultural University. In India, both Ohio State University and Illinois University personnel indicated considerable enthusiasm, but no research personnel are presently assigned who would be of specific cooperative value to the project.

Other organizations. The potentialities of cooperation with other institutions and personnel vary greatly by country. In Thailand, although the FAO regional center for Southeast Asia is located at Bangkok, it would not seem particularly advantageous to locate a research center adjacent to it. The personnel are largely in a consultatory and advisory capacity and do not have a program of work under their local jurisdiction. It was obvious they do considerable traveling to other countries and cooperation would be possible even though a center was located within another country. In Pakistan there are no other cooperating agencies that were encountered. In India the prime organization with which cooperation would seem feasible is the Rockefeller Foundation. They have active programs in maize, sorghum and pearl millets and the pattern of regional research they have established both within India and throughout the region would be highly beneficial to personnel of the grain legume research center. Further, an exchange of ideas and contact with these personnel would be highly advantageous in the execution of the research program.

### Synopsis and Conclusions

In summary, the Government of Thailand has eliminated that country from consideration for location of a grain legume research program. The extreme controversy between Central Research Institutes and Universities would see to make Pakistan an untenable location for a center at the present time. Further, the spectrum of grain legumes grown in Pakistan is not as great as that in India. By the process of elimination, India seems to be the logical location for a center. Within India the most advantageous location seems to be at the IARI provided that suitable laboratory facilities and plotlands can be furnished by the GOI. (Note: If the plan which we learned of January 8, 1964, to promote coordination between the Institute and University at Lyallpur is successful, Lyallpur, Pakistan, must be considered a close second choice to Delhi, India.)

With respect to timing of staffing of the research centers in the Mid-East and South Asia-Far East, rate of staffing must be based upon the rapidity with which facilities will be made available within the two regions. Laboratories and plotland are presently available at Karaj College. In the Far East progress of staffing will be determined largely by the decision of the GOI with respect to furnishing the facilities and the expediency with which such facilities will be constructed. Possibly one scientist could advantageously be stationed at Delhi during the construction process.