

9300028 (3)
FD-225-196-C1 ~~Done~~ *ntf*
File
This is interesting to you + ep

Project Title: Improvement of Grain Legume Production in the Near East-South Asia, East Asia and Africa Regions

Project Number: 931-17-130-028

Nature of Project: Research

Bedma
undig

I. Descriptive Information

A. Contractor: USDA/ARS
Washington, D.C.

Principal Contractor Representative:

Jack P. Meiners, Assistant Director,
Crop Research Division
USDA/ARS

B. Contract Number:

PASA - RA(AJ) 3-00

C. Personnel Financed by Project:

Coordinator: Peter H. van Schaik - New Delhi

(1) New Delhi Center, India

K. H. Evans, Plant Breeder (transferred from Tehran to New Delhi, summer 1968)

R. J. Davis, Soil Scientist

F. J. Williams, Plant Pathologist

K. E. Gibson, Entomologist 1/

W. E. Lansing, Administrative Officer

(2) Tehran Center, Iran

G. M. Horner, Soil Scientist, Leader for Iran

K. H. Evans, Plant Breeder (transferred to New Delhi, summer 1968)

1/ Will leave India by September 28, 1969 as a result of BALPA.

6-3-69

facilities and institutional support and the willingness of national governments to host such regional research activities were important factors considered in reaching these decisions.

The human diets in these regions are generally deficient in protein either because the traditional protein foods (animal products and fish) are scarce and expensive or are proscribed by religious beliefs. Pulses, being high in protein, can supplement protein deficient diets, partly because they are widely grown by villagers and farmers, and partly because their unit costs are far lower than animal proteins. An increase in productivity of pulses should have an immediate benefit on the quality of the human diet.

Although not specifically stated in the original project plan, it is now recognized that information on total protein content of pulses should be supplemented with information on those amino acid components of protein that are nutritionally essential for human growth and maintenance. Moreover, the desired ratio of these amino acids in human diets - 3 parts lysine to 3 parts methionine, to 2 parts threonine and 1 part tryptophan, should be recognized. The cereals and other starchy foods are not only deficient in total protein, but are typically poorly balanced in the ratios of essential amino acids. There is now a recognition that pulse improvement should not only undertake to produce economically higher yields, but also should recognize the opportunity to improve the quality of the protein produced.

G. Description of Project:

1. Problem and Study Objective

Grain legumes (pulses) are a major source of protein available for human food in most countries of the Near East, South Asia, and the Far East. Unfortunately, indigenous varieties in these countries produce low yields both because of inherent characteristics and poor cultural practices. The problem has not been solved by the simple transfer of U.S. varieties and cultural practices because they are seldom adapted to foreign environments. Therefore, the objective of this project is to increase the economic yields and enhance the quality of pulses through: (a) breeding and selection of varieties suitable for the environments of the regions, (b) development of appropriate pest control measures, and (c) improvement of cultural and management practices. The research is performed in Iran and India by teams of USDA scientists in

Storage
Harvesting
Marketing
People eating preference

collaboration with scientists of the host countries. In addition, provisions have been made to extend the results to other countries of the regions particularly.

2. Scope of Work

World-wide collections of seed lots for each of a dozen different species of pulses have been assembled to provide the germ plasm reservoir for evaluation of existing types and as breeding material. A systematic field evaluation of these seed lots (totalling about 15,000 for all species) has been undertaken at the two research centers to determine environmental adaptation, yielding ability, plant and seed type, maturity period, insect and disease susceptibility and resistance, seed characteristics, and responsiveness to improved cultural practices and soil fertility. Since most seed lots were mixture of strains, the isolation and multiplication of individual strains has been a first requirement in the improvement program.

The program has included three major types of activity -- breeding and selection of superior strains, study of important pests and development of control measures, and cultural practices (time of planting, seed treatments, plant populations, soil management and use of fertilizers, use of pesticides, etc.). Seeds of promising strains have been multiplied for further tests and for distribution to other countries on request.

Field research began in FY 1965 in Iran and in FY 1966 in India. In each country counterpart scientists have been assigned to work with the U.S. team.

It had become apparent by 1968 that each of the major pulse species must be handled as an entity, if progress is to be made. Each species has its own unique characteristics and there is a wide diversity of germ plasm for each. Each pulse species is as highly specialized as each species of the cereals (maize, wheat, sorghum, rice, millets). It appears necessary therefore for each team of researchers to concentrate on one or two species at the most, in order that there be enough concentration of effort to produce results in a reasonable period. To deal effectively with each pulse species, there may be a need eventually for a series of world research centers for basic research, supplemented by regional centers for the applied research and development, and individual national programs to devise and implement the production and utilization of the pulses most important to the country's welfare.

3. Places of Work

The headquarters for the Regional Pulse Improvement Program (RPIP) is located at New Delhi. The principal center for research on pulses for the monsoon ecological region is also at New Delhi. Research is located at the Indian Agricultural Research Institute. This is also the headquarters for the newly organized All India Pulse Improvement Program.

The second regional center, serving the ecological zone of cool winter (having nearly all rainfall in winter and early spring) is located at Tehran, Iran. Research and field activities are centered at Karaj Agricultural College near Tehran and at the Agricultural College in Shiraz in southern Iran. Both colleges have organized teams of young scientists who are working in close cooperation with the U.S. team members. Allocation of facilities and supporting services to the U.S. effort has been generous and the outlook for continued support appears excellent.

4. Present Status

There appears to be no urgent need to retain the Regional Center at New Delhi. Because of the unique situation whereby available local currency (Trust Funds) can be used to support only Indian programs, the New Delhi program has become virtually an Indian activity and the regional aspects have become limited largely to honoring requests for seed and the sponsorship of regional conferences. The scarce laboratory and greenhouse facilities, the limited research fields, and supporting labor and services provided by GOI are actually insufficient to meet the needs of the All India Pulse Improvement Program alone. Long range plans to improve support for RPIP have not materialized and the U.S. staff must share the limited resources with the Indian project. Although personal relations remain cordial, the U.S. accomplishments have been less than hoped for. Moreover, the Indian scientists feel fully capable of running the country program without assistance from the regional project.

The situation in the Tehran Center is more favorable for achieving the regional project objectives. Allocations of facilities and services by the Government of Iran have been adequate. Cooperative efforts with the two agricultural colleges have resulted in assignment of capable younger staffs at both places. The financial support and the interest of the government has increased greatly.

Handwritten notes:
 1. ...
 2. ...
 3. ...
 4. ...
 5. ...
 6. ...
 7. ...
 8. ...
 9. ...
 10. ...

Additions were made to the existing germ plasm collection of chickpeas. Seed lots of chickpeas, lentils, beans and cowpeas were sent on request, to Turkey and Puerto Rico. Breeding work with these pulses continued at the research stations at Karaj and Shiraz, supplemented by tests at 10 other sites. Specific studies on use of scarce irrigation water indicated that it is possible to reduce total water use by 1/2 while reducing yields by only 1/4. In Iran, virus diseases are more important than fungal and bacterial diseases, on chickpeas, lentils, beans and cowpeas. However, chickpeas suffer severely from blight.

*very low yield
so samples been
checked
to see if mostly*

2. India. Research land, laboratories, support and services have continued to be in very short supply in 1968, with no marked improvement in sight. This has greatly hampered activities of the U.S. team. However, the All India Coordinated Pulse Project (AICPP) has made progress. All staff positions have been filled and a coordinator appointed. Several agricultural Universities have undertaken pulse research efforts that will augment the All India program. The U.S. team has helped to mobilize these national efforts.

In April 1968, the second Annual Workshop of AICPP was held and plans were formulated for the research efforts for 1968-69. Substantial progress in improving yields was reported. These included adequate plant populations, use of fertilizers, land management to reduce waterlogging in wet weather, and the effects of temperature on plant development, thus determining optimum planting dates. Genetic resistance to several diseases was reported; and the resistant lines will serve as parental stocks by hybridizing programs.

*Substantial
improvement
in yields*

The present germ plasm collection includes some 10,000 strains of eight species of pulses. Seed lots have been sent on request for specific collections, to several states in India, and to Uganda, Senegal, Thailand, Vietnam and Peru.

Testing of 39 varieties of three cool season species at 35 locations in the rabi season (1967-68) and of 64 varieties of four warm season species in the kharif season (1968), occurred in 1968. Screening of the germ plasm collections continued for chickpeas, lentils, peas, pigeon peas, mung beans, urd beans and cowpeas, to note resistance to diseases and insect pests and observe tolerance to waterlogging and saline soils.

*Can we have a new world
improvement of new strains
of crops around the world?*

Some progress was made in chemical analyses of germ plasm collections, for total protein content. In the multi-location varietal trials, analyses were made that may become useful in determining the effect of variety and of location on protein accumulation. Limited laboratory facilities and labor hampered this work. However, a rather large range of total protein content was observed.

*many weeks
action prog
to see need
research
method of
protein
in
H...*

B. Materials developed

Promising strains of various pulse species have been selected for multiplication and more extensive field trials. None, however, have yet been sufficiently tested to warrant full scale production of seed for distribution to farmers.

*Field trials
considered
to make
material
to national
level*

"Packages" of cultural practices have been formulated in both Iran and India, including crop and soil management and pest control. A full scale extension program will not be warranted until these cultural practices are fully tested with improved varieties. This effort is hampered by being too diffused, over too many species and types of farming systems.

C. Known Use of Results

1. India. At the second annual workshop for the All India Coordinated Pulse Program, more than 75 Indian and foreign specialists attended the three-day meeting in April 1968. A breeders meeting was held in August 1968. A feature story on the workshop was widely used in the Indian press, giving appropriate credit to the U.S. supported pulse research project. In addition, the Communications Media Center, AID/India made a news release on the U.S. project in March 1968. This release will form the basis of an article in the War on Hunger magazine.

Results to date

III. Mission and Host Country Participation and Cooperation

1. India

A. Information may be obtained directly from the Regional Pulse Improvement Project, USAID Mission, New Delhi. The A.I.D. Mission has assisted in arranging rupee funding from P.L. 480 Trust Funds. The Host Country has planned for substantial increases in buildings, facilities, and services but these have not yet become available to the U.S. team. At present, these

... of the ... - ... !

scarce resources are shared with the All India Pulse Improvement Project. Both groups are inadequately supported at the present time.

B. The A.I.D. Mission/India is in position to utilize results of research conducted in India for extension and production activities. There is an inherent conflict between regional and country activities as long as local funding is reserved for country programs. A practical solution would be for the Mission to develop a bilateral program to assist India; and for WOH to establish a regional center under the conditions believed essential for effective operations. Since Indian scientists have reached the stage of confidence in their own capability of dealing with India's pulse program and an Indian organization has been established and adequately staffed, RPIP appears to have fulfilled its initial function for India. This may be a suitable time for WOH to re-evaluate world needs on pulse research and plan accordingly.

Research Report on Pulse
1968 Workshop
India
1968

C. Reporting

The Communications Media/A.I.D.-India, has issued a news story on the 1968 workshop held in India, as well as an excellent five-page summary of the "prospects for pulse production." This was widely quoted in the Indian press and was substantially amplified by reports issued in Indian publications.

Progress reports have been prepared, as evidenced by the attached summary.

2. Iran

A. The secondary center of RPIP in Tehran is serviced directly by the American Embassy, since the A.I.D. Mission has been withdrawn. This arrangement appears to be working smoothly, both within the Embassy and in the relations between the U.S. Pulse team and the GOI agencies.

Requests for information or materials should be directed to the U.S. Pulse Improvement Team, care of the American Embassy, Tehran, Iran.

B. Utilization

Information on pulse research results and available seed stocks of improved varieties may be released directly at appropriate times.

Selected varieties are being reproduced for further testing and possible release to farmers.

C. Reporting

Procedures for reporting on accomplishments achieved in the research on pulses, appear not to have been fully developed by the American Embassy in Iran. However, the Iran Ministry of Agriculture and the two cooperating agricultural colleges have made preliminary reports on several improved varieties of chick-peas, mung beans, cowpeas, and kidney beans. Useful information on crop and soil management is available for reporting.

IV. Project Evaluation and Evaluation of Contractor

The original project concepts are still valid. Pulses constitute an effective and practical means of supplementing protein deficient human diets in those regions where animal proteins are either too costly or not available to the majority of the population. An increase in the productivity of pulses appears feasible, and this should have an immediate benefit on the quality of the diet.

As the project has continued, certain deficiencies and opportunities have become evident.

Location of Centers. The original selection of New Delhi as the primary center and Tehran as the secondary center was valid at the initiation of the program. Subsequent developments in India have been such that consideration should be given to relocating the regional headquarters. Since there is now a clearer realization by A.I.D. that pulses have world significance, reconsideration should be given to the location of research centers that will more fully implement the objectives as currently envisaged.

Multiplicity of Pulse Species

There are eight major pulse species and six minor species that are used for human food. Now that the collections of germ plasm

Handwritten notes:
 1. ...
 2. ...
 3. ...
 4. ...

Handwritten notes:
 1. ...
 2. ...
 3. ...

resources for each species are largely completed and **initial screening has been accomplished to identify promising types and strains**, the research program is entering the stage of examining the physiological behavior and growth habits of each promising type; and undertaking to produce improved strains by hybridization and subsequent selection to acquire new strains that combine the desired traits of both parents.

At this stage, it becomes necessary to treat each botanical species of the pulses as a distinct entity. Each research team must of necessity concentrate its efforts on one or two species if significant progress is to be made in developing improved strains and in learning how to use each. Just as rice, wheat, maize and sorghum research has made progress by having separate teams work on each species, so will it become possible to conduct research in depth on each pulse species (with its own unique characteristics) if efforts are channeled in this direction.

World Significance of Pulses as Human Food

Pulses are a major source of dietary protein throughout the world, particularly in less developed countries. It would be appropriate to expand the pulse improvement program to make research contributions more useful to all LDCs in tropical and sub-tropical regions. Much of the basic research on each species may be carried out in single world centers. The applied and developmental research may be organized on a regional basis (ecological and geographic). The production and utilization research should be the responsibility of country programs that make effective use of materials and knowledge acquired in world centers or regional research stations.

Contractor

The USDA is probably the best qualified existing research organization for undertaking the overall direction of research program on the pulses. However, there is not available the experience and competence in pulses that exists for corn and cereals.

It would probably be desirable for USDA to revise its administrative structure and procedures to better recognize their overseas responsibility. The structure and procedures that govern

7-17-68

1. Increase research
2. Increase research
3. Increase research
4. Increase research
5. Increase research

domestic U.S. programs are generally inadequate when applied to research problems and conditions of operations outside the U.S. countries.

V. Recommendations and Plans for The Future

A. The project should be revised and enlarged to recognize the worldwide significance of the pulses as important sources of food protein. (See preceding sections.) This might require establishment of several major centers and assignment of research responsibilities for specific species to respective centers.

The present stage of development of RPIP is such that a revision of objectives and organization should be made as soon as practicable, so that progress will not be slowed. It is suggested that local aspects of the present program in India be transferred to the A.I.D. Mission in that country. The present center in Iran should be strengthened to serve the Near East. The cooperation of international agencies and foundations serving the Near East could strengthen the Iranian center.

B. At the stage of research achievements when individual strains and packages of cultural practices appear applicable to particular countries, the A.I.D. Missions should undertake programs for extension, production, and ultimate utilization of pulse harvests. The present project is approaching this stage in India and in Iran.