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PROGRESS REPORT

Jan. - July 1965

REGIONAL PULSE IMPROVEMENT PROJECT

US. DEPARTMENT OF AGRICULTURE, ARS

US. AGENCY FOR INTERNATIONAL DEVELOPMENT



COOPERATING:

- KARAJ AGRICULTURAL COLLEGE
- MINISTRY OF AGRICULTURE, IRAN
- PLAN ORGANIZATION, IRAN.

PROGRESS REPORT

No. 2

JANUARY - JULY, 1965

REGIONAL PULSE IMPROVEMENT PROJECT

~~US DEPARTMENT OF AGRICULTURE, AGRICULTURAL RESEARCH SERVICE,~~

US AGENCY FOR INTERNATIONAL DEVELOPMENT,

KARAJ AGRICULTURAL COLLEGE, KARAJ, IRAN,

GOVERNMENT OF IRAN, MINISTRY OF AGRICULTURE,

GOVERNMENT OF IRAN, PLAN ORGANIZATION.

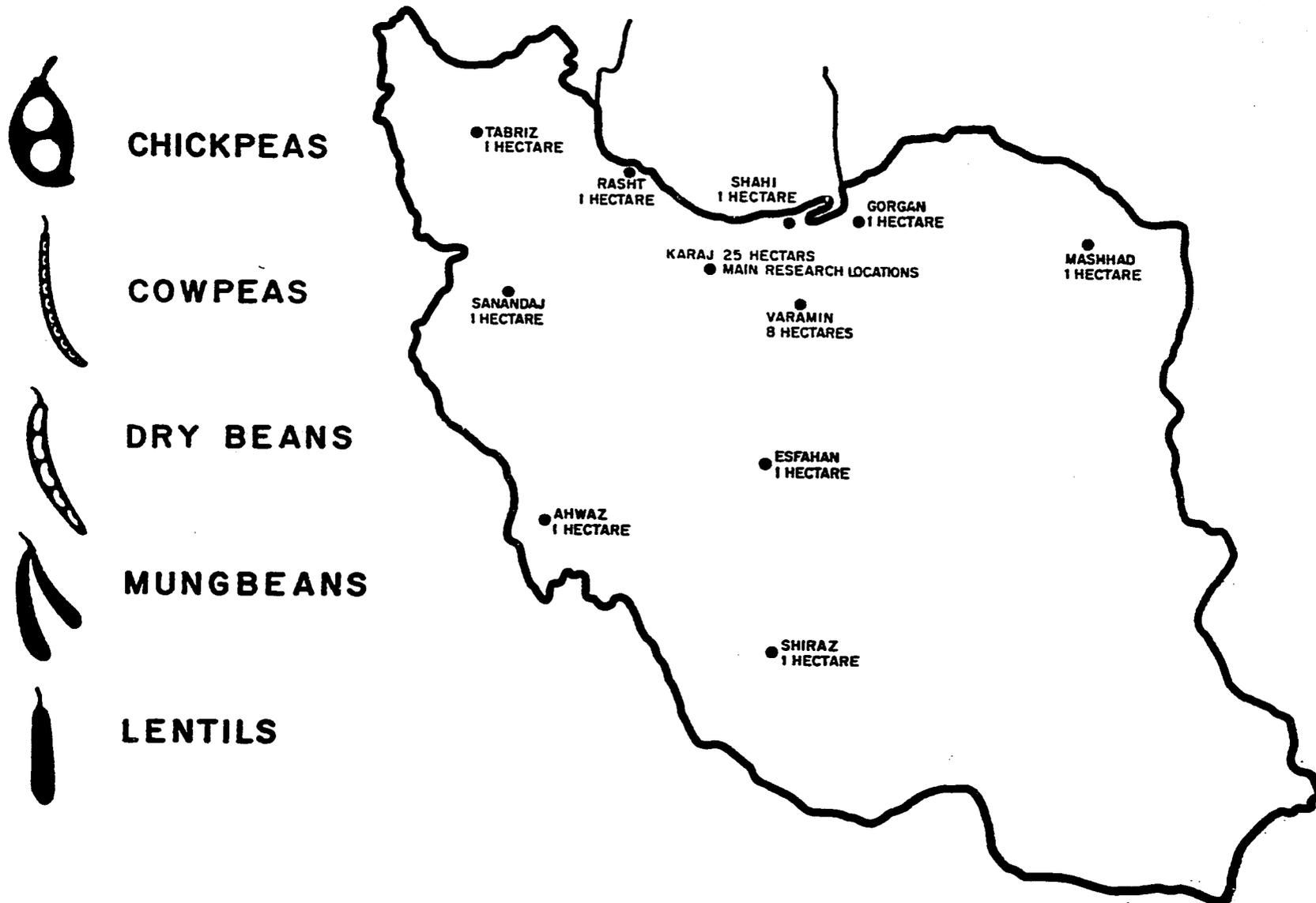
P. H. van Schaik

Agronomist-in-Charge

Copies of this report have been filed with:

1. US Department of Agriculture, Agricultural Research Service, Crops Research Division, Vegetables and Ornamentals Research Branch, Beltsville, Maryland. (Also for distribution to other Divisions).
2. US Agency for International Development, Washington, D. C., Dr. David White, Office of Technical Cooperation and Research and Mr. Monroe McCown, Chief, NCSA, Agriculture Branch. (Also for distribution to other Missions in the NESR Region.)
3. US Agency for International Development, Tehran, Iran, Mr. Reed H. Lewis, Acting Chief, Agriculture Division.
4. Plan Organization, Government of Iran. Tehran, Iran.
5. Ministry of Agriculture, Tehran, Iran.
6. Karaj Agricultural College, Karaj, Iran.

**FIG. 1—MAP OF IRAN. SHOWING 1965 PLANTING LOCATIONS.
USDA, ARS/USAID, REGIONAL PULSE IMPROVEMENT PROJECT**



INTRODUCTION

This report covers the period January to July 1965 and follows Progress Report No. 1, July through December 1964.

During this period considerable progress has been made in the establishment of the Regional Pulse Improvement Project in Asia.

As expected, activities during the first year of Project operations have been almost totally confined to Iran, although contact was established with Turkey and Pakistan from which countries seed was obtained for the 1965 introduction and observations nurseries. It is anticipated that on the basis of data obtained during this crop season suggestions for possible yield trials in other countries of the region may be made.

The project staff was considerably enlarged with the arrival of Mr. Kenneth Gibson, entomologist, Dr. Glenn Horner, soil agronomist, and the addition of several Iranians as junior associates.

To be filled at post are the position of senior U.S. plant pathologist, and a newly requested position for a U.S. food chemist. The former position awaits the arrival at post of Dr. Walter Kaiser; recruitment for the latter position depends on approval of the budget request for fiscal year 1966.

Progress was also made towards construction of the greenhouse-headhouse to be financed by the Government of Iran, Plan Organization. Funds have been appropriated, construction site and basic plans have been approved and detailed blue-prints are in preparation.

STAFFING

As of July 1, 1965, the staff in Iran consists of the following American scientists:

Dr. P. H. van Schaik, Project Leader and Research Agronomist

Mr. K. E. Gibson, Research Entomologist

Dr. G. M. Horner, Research Soil Scientist.

and the following Iranians:

Mr. Ahmad Sarafi - Plant Breeding

Mr. Jamshid Jafari - Plant Breeding

Mr. Mehdi Khosroshahin - Plant Breeding

Mr. Ali Ellini - Plant Breeding

Mr. Behzad Mansuri - Soils

Mr. Karim Kamaly - Entomology

Mr. Dariush Danesh - Plant Pathology.

Four of these, Mr. Sarafi, Mr. Jafari, Mr. Khosroshahin, and Mr. Danesh are employed by the Plan Organization under the terms of the Memorandum of Understanding. The others are employed by Karaj College on a reimbursable basis under the terms of the Cooperative Agreement for the Project.

It is unfortunate that Iranian government regulations do not permit Iranian project personnel to obtain and accrue civil service seniority and permanency of employment. A provision for this was written into the Cooperative Agreement (C-2, page 3) to insure continuation

of the work beyond the period of U.S. participation. The agreement was signed by the appropriate Iranian Government authorities apparently without sufficient study of the conditions as set forth therein.

It is hoped that some time in the future an arrangement can be made to assign career employees of the Ministry of Agriculture on a full-time basis to the project.

The seven Iranian employees listed are junior associates to the American Scientists. They are all recent graduates (1963 and 64); four from Karaj Agricultural College, and three from American Institutions, i.e. Khosroshahin, Utah State University; Ellini, Brigham Young University; Mansuri, Idaho State University. Mr. Mansuri is doing research for his MSA degree under an agreement with Idaho State University whereby he will do his thesis research in Iran and then return to Idaho for his course requirements.

In addition to the above technical staff the Project employs one secretary, four drivers, six field laborers, and eight students for summer employment. These employees, with the exception of the secretary, are all employed by Karaj College on a reimbursable basis under the terms of the Cooperative Agreement.

The Ministry of Agriculture, under the terms of the same Cooperative Agreement has supplied laborers and other personnel required for a total of 17 hectares of experimental plantings at 10 Ministry stations throughout Iran.

FINANCIAL

A complete financial report of dollar expenditures for U.S. salaries, equipment purchases, and other expenses for this project will be submitted by the Crops Research Division, USDA, ARS, to USAID/Washington, as part of the overall administrative report of USAID supported activities.

In the absence of a completed report of expenditures for fiscal year 1965 (July 1, 1964 to June 30, 1965) following is a budget estimate for that period. These expected expenditures included those to be made for the Project center in India. Since this has not materialized as yet actual expenditures will be much lower.

FISCAL YEAR 1965 Estimate

	<u>Man. Years</u>	<u>Amount</u>
Personnel compensation:		
FC-5 Agronomist	3.0	\$ 35,193
FC-5 Entomologist	2.0	23,462
FC-5 Pathologist	2.0	23,462
FC-5 Plant Breeder	2.0	23,462
FC-7 Agronomist	1.0	8,362
FC-7 Administrative Officer	1.0	8,362
Total, Permanent	<u>11.0</u>	<u>\$122,303</u>
Deduct Lapse	6.2	69,363
Net, Permanent	<u>4.8</u>	<u>52,940</u>
Additional pay for service abroad		6,050
Regular pay in excess 52-week base		210
Net, Personnel Services		<u>\$ 59,200</u>
Personnel benefits:		\$ 10,800
Transportation of persons and travel		\$ 30,000
Transportation of things		45,000
Rents, communications and utilities		5,000
Other services		50,000
Supplies and materials		20,000
Equipment		100,000
Subtotal		<u>320,000</u>
Administration and Management		56,500
Total		<u>\$376,500</u>

A summary of local expenditures for F.Y. 1965 under the terms of the Cooperative Agreement between USDA/ARS, Karaj Agricultural College, and the Ministry of Agriculture follows:

- A. Paid to Karaj College as reimbursement for wages for technical staff, drivers, laborers, and student summer help from July 1, 1964 to June 21, 1965 (10 Tir, 1343 - 31 Tir 1344) 399,873 Rials (\$5,198)
- B. Paid to Ministry of Agriculture, Seed and Plant Improvement Institute as reimbursement for personnel at Branch Station locations, 340,000 Rials (4,530).

These payments were made by US.AID/Iran and Advice of Charge notices sent monthly to AID/Washington against the PIO/T (FY 64) and Cooperative Agreement Contract Number.

The only other payments made by USAID/Iran on behalf of the Project were local allowances to U.S. personnel. These were also charged against the FY'64 PIO/T.

All other operating expenses were charged to and handled directly through the U.S. Department of Agriculture, Agricultural Research Service Finance Office.

For Fiscal Year 1966, it is anticipated that a much improved system of financial management can be used through a split PIO/T whereby funds for all local expenditures are authorized to the US.AID Mission

As the number of people employed by the Project under the terms of the Cooperative Agreement with Karaj College increases, it becomes more and more difficult for the College to meet the payroll requirements from its own financial resources. As of July 1, 1965 the payroll consists of 22 employees at a cost of about 150,000 Rials (\$2000) per month and this will become greater as the work expands. According to the terms of the Cooperative Agreement Karaj College must pay salaries, employee benefits, and travel and be reimbursed by USDA/ARS upon presentation of proper vouchers.

Karaj College is investigating possible sources of finances from which to meet these obligations. However if this fails, a change in the Cooperative Agreement will be proposed to allow payment to the college to be made before pay-day of the employees or to allow a revolving fund to be set up from which the College can meet the Project's employee obligations.

PROGRESS IN RESEARCH, 1964 CROP SEASON

Progress Report 1 gave a summary of plantings made in 1964 of the various crops. Table 1 shows the number of lines of the different crops which were evaluated.

USDA/USAID, REGIONAL PULSE IMPROVEMENT PROJECT

Table 1. Observation Nursery, Karaj, Iran, 1964

<u>Crop</u>	<u>Number of Single Rows</u>
Lentils	20
Chickpeas	130
Mungbeans	200
Dry beans	60
Cowpeas	350

Because of the lack of facilities, personnel, and properly replicated yield trials, no dependable yield determinations and comparisons could be made.

Considerable information however was obtained regarding plant types, flowering and fruiting habits, maturity, and disease susceptibility. Also many outstanding plants in the various populations were selected for testing in 1965.

From the data obtained several strains were selected for inclusion in a series of yield evaluation tests in 1965.

The detailed notes taken in 1964 are in the Project files and can be made available upon request.

RESEARCH PROGRAM, 1965 CROP SEASON

VARIETAL IMPROVEMENT

P. H. van Schaik

Observation Nurseries consisting of single row, non-replicated plots, 10 feet long have been planted in Karaj.

Table 2 A lists the number of single rows, each representing a different strain, plant selection, or new introduction of the various crops.

All material planted in 1964 was again included in 1965 for further observation and screening. In addition the 1965 nurseries contain new introductions made through the New Crops Research Branch USDA,ARS, through FAO and directly from Turkey and Pakistan. They also contain a large number of single plant progenies obtained from local Iranian populations of the various crops in 1964 by personnel of the Ministry of Agriculture, Seed and Plant Improvement Institute.

Appendix 1 lists a more detailed break-down and identification of the material planted in these nurseries.

Detailed notes are taken on emergence, plant vigor, flowering date, flower color, fruiting period, pod size and shape, seeds per pod, seed characteristics such as size and color, susceptibility to insects and diseases. All seed will be harvested for further use in subsequent years. Superior plants will be harvested separately as selections for further progeny testing.

It is planned to compile a summary of all the information obtained and make it available to interested parties in all countries of the region.

USDA/USAID, REGIONAL PULSE IMPROVEMENT PROJECT

Table 2. Observation Nurseries, 1965, Iran.

A. KARAJ

<u>Crop</u>	<u>Number of Single Rows.</u>
Lentils	1311
Chickpeas	3154
Mungbeans	950
Dry beans	1793
Gowpeas	875

B. OTHER LOCATIONS

Varamin, Isfahan, Shiraz, Ahwaz, Sanandaj,
Tabriz, Rasht, Gorgan, Sari, Meshed.

Smaller single row observation nurseries have also been planted at 9 Ministry Stations throughout Iran. The stations are listed in table 2 B and the locations shown in figure 1. These nurseries are under the complete supervision of Ministry of Agriculture personnel. The Regional Pulse Improvement Project cooperates with the Ministry and encourages this work by financing, under the terms of the Cooperative Agreement, the costs of personnel necessary to carry it on.

Yield Tests. From the 1964 plantings a number of strains with desirable characteristics were chosen for inclusion in a number of replicated yield trials.

Table 3 shows the crops, locations and number of strains included at each location. The locations and cooperating agencies are:

Karaj - Karaj Agricultural College

Varamin - Ministry of Agriculture, Seed and Plant Improvement Institute

Shiraz - Pahlavi University

Dezful - Khuzestan Water and Power Authority.

The tests are all arranged in randomized block statistical designs with five replications. Plot size is three rows, about five meters in length. The actual length of plots and field lay out varies at the different locations.

Completed results and data will be included in subsequent reports.

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<u>Table 3.</u> <u>Crop</u>	<u>Yield Trials, 1965, Iran</u> <u>Location</u>			
	<u>Karaj</u>	<u>Varamin</u>	<u>Shiraz</u>	<u>Dez</u>
Chickpeas	25	26	14	14
Mungbeans	40	35	30	33
Dry beans	35	35	29	33
Cowpeas	44	44	39	42

ENTOMOLOGY RESEARCH

Kenneth E. Gibson

Experimental plots of lentils, dry peas, chickpeas, cowpeas, dry beans and mungbeans were planted on the Karaj College experimental farm by Project personnel in the spring of 1965 and have been closely watched since emergence for the appearance of both noxious and beneficial insects.

One of the first noxious insects noticed was the pea aphid (Macrosiphum pisi Harris) which appeared in small numbers on the dry peas about 7 May, 1965, about 3 days before the first blooms were noticed. Samples of 50 leaves from each of the 15 varieties of dry peas have been collected at weekly intervals since 13 May, 1965 and the number of pea aphids counted in each sample. Records to date show the populations built up to a very moderate peak of slightly less than 1 per leaf on some varieties on 20 May and declined to very low levels thereafter. There has been some evidence of possible varietal differences in attractiveness to the aphids, although this is not yet conclusive.

In the process of making aphid counts on leaves of the dry peas, it was noticed that almost all of the leaves showed injury from larval feeding of a leaf miner. At first this was thought to be the spinach leaf miner, Pegomyia myoscyami Panzer, since the larval traits and

and feeding patterns were characteristic of this insect. However, it was noticed that the larvae were pupating within the leaves of the host plants, which is not characteristic of the spinach leaf miner, the larvae of which, typically emerge from the leaf and drop to the soil when fully ^{grown} to and ready for pupation. Obviously this is another species or perhaps another genus. An attempt will be made to rear or obtain some adults for positive identification. Injury from this insect has been noticed on none of the other pulse crops to date.

Pea aphids were seen in large numbers on all crops mentioned at the beginning of this report except lentils, when they first emerged about the soil surface. Most of those first observed were alates and close observation indicated that only in relatively few instances were the leaves colonized, except in the case of dry peas. Even on the dry peas the populations never built above a level that the plants could apparently support without damage. (The above statement applies only to damage from direct feeding. Evidence of virus transmission may develop, and if so, will be dealt with later).

Adult pea weevils (Bruchus pisorum) were swept from dry peas on 21 May, 1965. Insecticides were not obtained soon enough this first season for effective control of this insect. An application of malathion was made as an emulsion spray on 5 June, 1965, but examination of some of the developing peas in pods showed the adults has already laid many eggs. Plans will be made to spray earlier next season, for effective control.

On 1 June, 1965, eggs and newly hatched larvae of the beet armyworm (Spodoptera or Laphygma exiqua Hubner) were noted on the foliage of some of the pulse crops and weeds in experimental plots. This insect is potentially dangerous and much feared here as a destroyer of foliage of a wide range of crops. On 3 June considerable damage was noticed on the foliage of dry beans and cowpeas in experimental plots and populations of about 2 larvae per plant on chickpeas. Spraying was started on this date using 3 insecticides, whose efficiency is to be compared for control of the beet army worm on chickpeas, drypeas, cowpeas and drybeans, as well as the lentils and mungbeans if infestations extend to these latter crops. The 3 insecticides being tested are (1) a combination of DDT and lindane, (2) malathion, and (3) carbaryl (Union Carbids's Sevin). These are being applied at the rate of 1 pound of actual of each per acre. Observations have indicated that cowpeas are the most susceptible to attack by this insect of all the crops grown to date.

Seed pods have been found on the chickpeas grown in one set of plots about 20 miles southeast of Tehran and it has been noticed that some of the pods have been attacked by lepidopterous larvae, and in every instance noted, all the seeds were eaten from within the pods. The pest insect is thought to be Heliothis zea (corn ear worm, tomato fruit worm, or cotton bollworm). Some experimental work is planned to determine the extent of damage if no control measures are attempted, and also to determine the value of some insecticide applications.

Mites will probably be a problem later in the summer, but to date have not appeared on any of the pulse crops being experimentally grown in this Project work.

SOIL AND CROP MANAGEMENT

Glenn M. Horner

Field trials were established to obtain preliminary information on the response of pulse crops to fertilization and rhizobium inoculation. In addition, the variety yield and single-row tests were observed in order to detect nutrient deficiency symptoms and growth characteristics that might be associated with soil characteristics. This information, together with results from previous studies conducted in Iran, will be used in preparing plans for future investigations.

Rhizobium inoculation trials were established for chickpeas, cowpeas, drybeans, and mungbeans at Karaj and for all except chickpeas at Varamin. The rhizobial cultures were supplied by the U.S. Soil Laboratory at Beltsville, Maryland.

Inoculation had no significant effect on the number and size of nodules at the pre-bloom stage of growth (table 4). Inoculated and noninoculated plants both appeared to be effectively nodulated. Most of the nodules contained reddish pigment, indicating the presence of efficient strains of rhizobia in the soil at the Karaj and Varamin sites. Additional studies will be conducted to determine the distribution of efficient strains of rhizobia under different soil and climatic conditions. Most of this work will be conducted by greenhouse tests.

TABLE 4 NODULATION AS INFLUENCED BY RHIZOBIUM INOCULATION

Location and crop	Number of nodules per plant			
	Inoculated		Uninoculated	
	< 2 mm.	> 2 mm.	< 2 mm.	> 2 mm.
<u>Karaj:</u>				
Chickpeas	17.9	8.1	15.8	11.0
Cowpeas	17.6	17.0	14.4	19.7
Dry beans	3.3	7.3	4.3	12.2
Mungbeans	4.8	14.9	4.7	7.9
<u>Varamin:</u>				
Cowpeas	5.6	12.6	4.7	13.3
Dry beans	7.7	6.8	5.3	7.8
Mungbeans	3.2	18.2	2.3	16.9

Previous fertilizer investigations indicate that phosphorus is generally deficient in Iranian soils. However, additional information is needed to determine the relationship between soil test values and the response of different pulse crops to phosphorus fertilization. This would form the basis for a more efficient fertilizer program.

Fertilizer trials were established for cowpeas, dry beans, and mungbeans at the Karaj and Varamin Stations. Treble superphosphate was side dressed at rates of 0, 25, 50, and 100 kg. P per hectare . Four replications were used. Ammonium nitrate (100 kg. N/ha.) was applied to all plots. Another trial, except in only two replications each for dry beans and mungbeans, was established on a privately - owned farm. This soil has not been fertilized previously with phosphorus, while the soil at Karaj and Varamin received phosphorus for several preceding crops.

At bloom stage, there was no visual response to fertilization. Two factors may account for this condition, first, previous fertilization, and second, occurrence of disease. The disease problem was more serious at Karaj, resulting in stunted growth. Seed stocks were limited, and those selected apparently were not disease resistant. Soil from these plots will be analyzed and the nutrient levels correlated with crop yield data.

Discoloration of some leaves was observed at early stages of growth. It was uncertain as to whether this indicated the presence of disease or a nutrient deficiency. Foliar applications of zinc, magnesium, manganese, and iron were made to portions of each crop. However, there was no apparent response to this treatment.

APPENDIX I

1965 Observation nurseries, Karaj, Iran

LENTILS.

<u>Row Number</u>	<u>Identification and Source</u>
1 - 69	Progenies of local populations, 1964 Karaj.
70 - 185	USDA Introductions, 1965.
186 - 187	West Pakistan introductions, 1965
188 - 195	Selection progenies, 1964 Karaj population
196 - 1270	Ministry of Agriculture, single plant samples from local populations:
196 - 235	Population 186
236 - 273	" 187
274 - 330	" 188
331 - 366	" 189
367 - 412	" 190
413 - 463	" 192
464 - 504	" 191
505 - 532	" 193
533 - 564	" 194
565 - 591	" 195
592 - 619	" 196
620 - 624	" 197
625 - 644	" 202
645 - 679	" 197
680 - 699	" 198
700 - 740	" 199
741 - 771	" 200
772 - 819	" 201
820 - 861	" 203
862 - 888	" 204
889 - 958	" 205
959 - 1030	" 206
1031 - 1069	" 207
1070 - 1146	" 208
1147 - 1198	" 209
1199 - 1238	" 210
1239 - 1270	" 212
1271 - 1310	Population progenies.
1311 -	Local population, Tehran

II

CHICKPEAS

Row Number

Identification and Source

1 - 288
289 - 3100

Progenies of selections, Karaj 1964
Ministry of Agriculture, single plant samples from local populations.

289 - 353	Population 129, Isfahan
354 - 453	" 241, Ghochan
454 - 518	" 220, Isfahan
519 - 576	" 241, Ghochan
579 - 661	" 106, Fars
662 - 690	" 232, Darehgaz
691 - 720	" 207, Mazandaran
721 - 858	" 230, Nishabur
859 - 947	" 182, Shiraz
948 - 987	" 230, Nishabur
988 - 1067	" 170, Ardabil
1068 - 1273	" 169, Ardabil
1274 - 1364	" 194, Kermanshah
1365 - 1457	" 111, Varamin
1458 - 1555	" 168, Mamaghan
1556 - 1633	" 161, Mamaghan
1634 - 1702	" 152, Karaj
1703 - 1792	" 153, Karaj
1793 - 1881	" 162, Shapour
1882 - 1974	" 205, Jiroft
1975 - 2092	" 217, Hasanabad Torbat
2093 - 2122	" 139, Cyprus
2123 - 2152	" 217, Shadmehre Torbat
2153 - 2171	" 220, Isfahan
2172 - 2183	" 232, Darehgaz
2184 - 2269	" 221, Isfahan
2270 - 2345	" 193, Kermanshah
2346 - 2478	" 172, Ardabil
2479 - 2677	" 173, Ardabil
2678 - 2752	" 175, Gharye gole
2753 - 2925	" 174, Ahar
2926 - 3014	" 164, Mamaghan
3015 - 3100	" 154, Garye gole
3101 - 3119	Population progenies
3120 - 3133	" Progenies of Selections from local popula.
3134 - 3137	" West Pakistan introductions, 1965
3138 - 3141	" Local population Rezaieh
3142 - 3153	" FAO introductions, 1965
3154 -	" Local population, Tehran.

III

MUNGBEANS

<u>Row Number</u>	<u>Identification and Source</u>
1 - 174	Progenies of 1964 Karaj grown populations
175 - 183	Ministry of Agriculture Populations
184 - 185	West Pakistan introductions
186	Local population Rezaieh
187 - 920	Ministry of Agriculture, Single plant samples from local populations.
187 - 248	Population 217
249 - 322	" 216
323 - 395	" 214
396 - 465	" 213
466 - 537	" 219
538 - 602	" 221
603 - 666	" 223
667 - 723	" 222
724 - 778	" 226
779 - 824	" 224
825 - 852	" 218
853 - 920	" 215
921 - 950	Ministry of Agriculture, local populations.

IV

BEANS

Row Number

Identification and Source

1 - 67		Progenies of 1964 Karaj grown populations
68 - 1513		Ministry of Agriculture, Single plant samples from local populations.
68 - 154	Population 149	Karaj
155 - 224	"	196 Chamchaleh Kermanshah
225 - 313	"	178 Shiraz
314 - 393	"	131 Lobnan
394 - 476	"	120
477 - 572	"	110 Esfahan
573 - 580	"	121 Egypt
581 - 625	"	165
626 - 694	"	196 Kermanshah
695 - 784	"	159
785 - 806	"	153
807 - 877	"	160
878 - 887	"	60
880 - 955	"	150
956 - 1009	"	162
1010 - 1038	"	163
1039 - 1094	"	158
1095 - 1135	"	146
1136 - 1180	"	147
1181 - 1216	"	151
1217 - 1274	"	149
1275 - 1298	"	166
1299 - 1334	"	155
1335 - 1357	"	156
1358 - 1412	"	157
1413 - 1427	"	154
1428 - 1465	"	161
1466 - 1473	"	152
1474 - 1489	"	161
1490 - 1513	"	164
1514 - 1533	-	USDA introductions ((Idaho, Michigan, Washington)
1534 - 1554	-	Bulk progenies, from local populations
1555 - 1753	-	USDA introductions (foreign countries)
1754 - 1793	-	Bulk progenies local populations.

COWPEASRow NumberIdentification and Source

1 - 345
346 - 827

Progenies of 1964 Karaj grown popula
Ministry of Agriculture, Single plant Samples
from local populations

346 - 364	Population	169
365 - 403	"	185
404 - 418	"	170
419 - 481	"	168
482 - 497	"	182
498 - 529	"	176
530 - 544	"	178
545 - 597	"	175
598 - 673	"	180
674 - 689	"	172
690 - 721	"	177
722 - 747	"	171
748 - 777	"	167
778 - 786	"	173
787 - 804	"	184
805 - 818	"	179
819 - 827	"	183

828 - 852

Bulk progenies of local populations

828	Population	150 Karaj
829	"	102 Fars
830	"	157 Moghan
831	"	118 Moghan
832	"	109 Esfahan
833	"	418 Kashmar
834	"	416 Bojnurd
835	"	417 Bojnurd
836	"	248 Chahbahar
837	"	391 Karevaramin
838	"	362 Kharabad
839	"	366 Denarabad
840	"	365 Bagherabad
841	"	244 Saramol
842	"	173 Shoushtar
843	"	114 Behbahan
844	"	150 Karaj
845	"	157 Semnan
846	"	180 Shiraz
847	"	207 Kafshgarkolah
848	"	227 Rouhbad
849	"	226 Esfahan
850	"	233 Golnazdaragan
851	"	115 Dezful
852	"	109 Esfahan

853 - 873

Introductions, FAO, 1965.