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Iran

Plan Organization
Karaj Agricultural College
Ministry of Agriculture
Pahlavi University (Shiraz)
Tabriz University
Ghazvin Development Project
KWPA/Dez Irrigation Project

United States

U.S. Department of Agriculture
Agricultural Research Service

U.S. Agency for International
Development

TABLE OF CONTENTS

	Page
Introduction	1
Varietal Improvement	3
Soil and Crop Management	63
Plant Pathology	71
Entomology	97

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Varietal Improvement Tables

			Page
Table	1.	Lentils - Advanced Yield Test, Karaj, Iran	8
Table	2.	Lentils - Uniform Yield Test, Pahlavi University, Shiraz, Iran	9
Table	3.	Lentils - Uniform Yield Test, Karaj, Iran	9
Table	4.	Lentils - Uniform Advanced Yield Test 2, Ghazvin, Iran	10
Table	5.	Lentils - Uniform Advanced Yield Test 2, Ministry of Agriculture, Meshed, Iran	10
Table	6.	Lentils - Uniform Advanced Yield Test 2, Ministry of Agriculture, Rezaieh, Iran	11
Table	7.	Lentils - Uniform Advanced Yield Test 2, Pahlavi University, Shiraz,Iran	11
Table	8.	Lentils - Uniform Advanced Yield Test 2, University of Tabriz, Tabriz, Iran	12
Table	9.	Lentils - Uniform Advanced Yield Test 2, Karaj, Iran	12
Table	10.	Lentils - Uniform Advanced Yield Test 1, Ghazvin, Iran	13
Table	11.	Lentils - Uniform Advanced Yield Test 1, Ministry of Agriculture, Meshed, Iran	13
Table	12.	Lentils - Uniform Advanced Yield Test 1, Ministry of Agriculture, Rezaieh, Iran	14
Table	13.	Lentils - Uniform Advanced Yield Test 1, Pahlavi University, Shiraz, Iran	14
Table	14.	Lentils - Uniform Advanced Yield Test 1, University of Tabriz, Tabriz, Iran.....	15
Table	15.	Lentils - Dryland Uniform Advanced Yield Test 1, University of Tabriz, Tabriz, Iran	15
Table	16.	Lentils - Uniform Advanced Yield Test 1, Karaj, Iran	16
Table	17.	Black Chickpeas - Preliminary Yield Test, Karaj, Iran	18
Table	18.	White Chickpeas - Preliminary Yield Test, Karaj, Iran	19
Table	19.	Black Chickpeas - Uniform Yield Test 2, Ministry of Agriculture, Meshed, Iran	20
Table	20.	Black Chickpeas - Dryland Uniform Yield Test 2, Ministry of Agriculture, Meshed, Iran	20
Table	21.	Black Chickpeas - Uniform Yield Test 2, Ministry of Agriculture, Rezaieh, Iran	21

Page

Table 22. Black Chickpeas - Uniform Yield Test 2, Ministry of Agriculture, Varamin, Iran 21
Table 23. Black Chickpeas - Uniform Yield Test 2, University of Tabriz, Tabriz, Iran 22
Table 24. Black Chickpeas - Uniform Yield Test 2, Karaj, Iran 22
Table 25. Black Chickpeas - Uniform Yield Test 1, Dezful, Iran 23
Table 26. Black Chickpeas - Uniform Yield Test 1, Ghazvin Development Project, Ghazvin, Iran 23
Table 27. Black Chickpeas - Uniform Yield Test 1, Ministry of Agriculture, Gorgan, Iran 24
Table 28. Black Chickpeas - Uniform Yield Test 1, Ministry of Agriculture, Meshed, Iran 24
Table 29. Black Chickpeas - Dryland Uniform Yield Test 1, Ministry of Agriculture, Meshed, Iran 25
Table 30. Black Chickpeas - Uniform Yield Test 1, Ministry of Agriculture, Rezaieh, Iran 25
Table 31. Black Chickpeas - Uniform Yield Test 1, Ministry of Agriculture, Varamin, Iran 26
Table 32. Black Chickpeas - Uniform Yield Test 1, Pahlavi University, Shiraz, Iran 26
Table 33. Black Chickpeas - Uniform Yield Test 1, University of Tabriz, Tabriz, Iran 27
Table 34. Black Chickpeas - Dryland Uniform Yield Test 1, University of Tabriz, Tabriz, Iran 27
Table 35. Black Chickpeas - Uniform Yield Test 1, Karaj, Iran 28
Table 36. White Chickpeas - Uniform Yield Test 2, Dezful, Iran 28
Table 37. White Chickpeas - Uniform Yield Test 2, Ghazvin Development Project, Ghazvin, Iran 29
Table 38. White Chickpeas - Uniform Yield Test 2, Ministry of Agriculture, Gorgan, Iran 29
Table 39. White Chickpeas - Uniform Yield Test 2, Ministry of Agriculture, Isfahan, Iran 30
Table 40. White Chickpeas - Uniform Yield Test 2, Ministry of Agriculture, Meshed, Iran 30
Table 41. White Chickpeas - Dryland Uniform Yield Test 2, Ministry of Agriculture, Meshed, Iran 31
Table 42. White Chickpeas - Uniform Yield Test 2, Ministry of Agriculture, Rezaieh, Iran 31

Page

Table 43. White Chickpeas - Uniform Yield Test 2, Ministry of Agriculture, Varamin, Iran 32
Table 44. White Chickpeas - Uniform Yield Test 2, Pahlavi University, Shiraz, Iran 32
Table 45. White Chickpeas, Uniform Yield Test 2, University of Tabriz, Tabriz, Iran 33
Table 46. White Chickpeas - Uniform Yield Test 2, Karaj, Iran 33
Table 47. White Chickpeas - Uniform Yield Test 1, Dezful, Iran 34
Table 48. White Chickpeas - Uniform Yield Test 1, Ghazvin Development Project, Ghazvin, Iran 34
Table 49. White Chickpeas - Uniform Yield Test 1, Ministry of Agriculture, Gorgan, Iran 35
Table 50. White Chickpeas - Uniform Yield Test 1, Ministry of Agriculture, Meshed, Iran 35
Table 51. White Chickpeas - Dryland Uniform Yield Test 1, Ministry of Agriculture, Meshed, Iran 36
Table 52. White Chickpeas - Uniform Yield Test 1, Ministry of Agriculture, Rezaieh, Iran 36
Table 53. White Chickpeas - Uniform Yield Test 1, Ministry of Agriculture, Varamin, Iran 37
Table 54. White Chickpeas - Uniform Yield Test 1, Pahlavi University, Shiraz, Iran 37
Table 55. White Chickpeas - Dryland Uniform Yield Test 1, University of Tabriz, Tabriz, Iran 38
Table 56. White Chickpeas - Uniform Yield Test 1, University of Tabriz, Tabriz, Iran 38
Table 57. White Chickpeas - Uniform Yield Test 1, Karaj, Iran 39
Table 58. Red Beans - Preliminary Yield Test, Karaj, Iran ... 41
Table 59. White Beans- Preliminary Yield Test, Karaj, Iran .. 42
Table 60. Pinto Beans - Advanced Yield Test, Karaj, Iran 43
Table 61. Red Beans - Advanced Yield Test, Pahlavi University, Shiraz, Iran 43
Table 62. Red Beans - Advanced Yield Test, Karaj, Iran 44
Table 63. White Beans - Advanced Yield Test, Pahlavi University, Shiraz, Iran 44
Table 64. White Beans - Advanced Yield Test, Karaj, Iran 45
Table 65. Pinto Beans - Uniform Advanced Yield Test, Ministry of Agriculture, Gorgan, Iran 45
Table 66. Pinto Beans - Uniform Advanced Yield Test, Pahlavi University, Shiraz, Iran 46

Page

Table 67. Pinto Beans - Uniform Advanced Yield Test, Karaj, Iran 46
Table 68. Red Beans - Uniform Advanced Yield Test, Ministry of Agriculture, Rezaieh, Iran 47
Table 69. Red Beans - Uniform Advanced Yield Test, Pahlavi University, Shiraz, Iran 47
Table 70. Red Beans - Uniform Advanced Yield Test, University of Tabriz, Tabriz, Iran 48
Table 71. Red Beans - Uniform Advanced Yield Test, Karaj, Iran 48
Table 72. White Beans - Uniform Advanced Yield Test, Ministry of Agriculture, Gorgan, Iran 49
Table 73. White Beans - Uniform Advanced Yield Test, Ministry of Agriculture, Rezaieh, Iran 49
Table 74. White Beans - Uniform Advanced Yield Test, Pahlavi University, Shiraz, Iran 50
Table 75. White Beans - Uniform Advanced Yield Test, University of Tabriz, Tabriz, Iran 50
Table 76. White Beans - Uniform Advanced Yield Test, Karaj, Iran 51
Table 77. Cowpeas - Preliminary Yield Test, Ministry of Agriculture, Gorgan, Iran 53
Table 78. Cowpeas - Preliminary Yield Test, Ministry of Agriculture, Varamin, Iran 53
Table 79. Cowpeas - Preliminary Yield Test, Karaj, Iran 54
Table 80. Cowpeas - Uniform Advanced Yield Test, Ministry of Agriculture, Ahwaz, Iran 54
Table 81. Cowpeas - Uniform Advanced Yield Test, Ministry of Agriculture, Gorgan, Iran 55
Table 82. Cowpeas - Uniform Advanced Yield Test, Ministry of Agriculture, Rezaieh, Iran 55
Table 83. Cowpeas - Uniform Advanced Yield Test, Ministry of Agriculture, Varamin, Iran 56
Table 84. Cowpeas - Uniform Advanced Yield Test, Pahlavi University, Shiraz, Iran 56
Table 85. Cowpeas - Uniform Advanced Yield Test, University of Tabriz, Tabriz, Iran 57
Table 86. Cowpeas - Uniform Advanced Yield Test,Karaj,Iran .. 57
Table 87. Mungbeans - Preliminary Yield Test, Karaj, Iran ... 59
Table 88. Mungbeans - Advanced Yield Test, Ministry of Agriculture, Varamin, Iran 60
Table 89. Mungbeans - Advanced Yield Test, Karaj, Iran 60

Page

Table 90. Mungbeans - Uniform Advanced Yield Test, Ministry of Agriculture, Meshed, Iran 61
Table 91. Mungbeans - Uniform Advanced Yield Test, Ministry of Agriculture, Varamin, Iran 61
Table 92. Mungbeans - Uniform Advanced Yield Test, Karaj, Iran 62

Soil and Crop Management Tables

Table 93. Influence of spacing of rows and plants within the row on grain yields of pulse crops. Karaj, 1970 67
Table 94. Effect of zinc and phosphorus fertilization on phosphorus content of leaves and grain yield of dry beans, Karaj, 1970 68
Table 95. Effect of irrigation frequency on grain yields (tons/ha) of different varieties of dry beans, Karaj, 1970 69
Table 96. Effect of frequency of irrigation and the quantity of water applied at each irrigation on yield of dry beans, Karaj, 1970 70

Plant Pathology Tables

Table 97. Occurrence of bean common mosaic virus in seed purchased in bazzars from various Provinces of Iran 76
Table 98. Host range of two isolates of bean common mosaic virus from Iran 77
Table 99. Transmission of two isolates of bean common mosaic virus in seed of Bountiful bean 78
Table 100. Effect of inoculation on yield of two bean varieties in field trials at Karaj, Iran with two isolates of bean common mosaic virus 79
Table 101. Effect of inoculation of Bountiful bean in greenhouse tests with two isolates of bean common mosaic virus 80
Table 102. Reaction of white and black-seeded chickpea lines to infection by the foliar plant pathogen *Ascochyta rabiei*..... 81

Page

Entomology Tables

Table 103. Effect of date of planting and soil temperatures on seed corn maggot, Hylemia cilicrura, damage on dry beans, Karaj, Iran, 1970 99
Table 104. Effect of soil treatment with insecticides on damage to dry beans by seed corn maggot Hylemia cilicrura, Karaj, Iran, 1970 100
Table 105. Effect of insecticides on damage by leaf miner (Liriomyza congesta) to chickpeas, 1970 101
Table 106. Effect of insecticides on damage by bollworm (Heliothis armigera) to chickpeas, 1970 102
Table 107. Effect of TEPA chemosterliant on beet army worm Spodoptera exigua 103
Table 108. Effect of time of application to soil of Mocap nematocide on root-knot nematodes, Karaj, Iran, 1970 106
Table 109. Effect of rate of application of Mocap nematocide on root-knot nematodes, Varamin, Iran, 1970 107
Table 110. Effect of nematocides on root-knot nematodes, Varamin, Iran, 1970 108

Figures

Plant Pathology Figures

Figure 1. Mosaic symptoms in feenugreek (Trigonella foenum-graceum) infected with bean common mosaic virus ... 83
Figure 2. Mottling, leaf deformation, and stunting are symptoms commonly observed in Bountiful bean infected with Iranian isolates of bean common mosaic virus (left); healthy plants, right 84
Figure 3. Foliar symptoms in Bountiful bean infected with a bean isolate (top row) and mungbean isolate (bottom row) of bean common mosaic virus 85
Figure 4. Chlorotic local lesions which have developed on a primary leaf of bean 'Pinto U.I. 111' inoculated with a mungbean isolate of bean common mosaic virus 86

Page

Figure 5. Reddish-brown local lesions which have formed on the primary leaf of mungbean 'Oklahoma 12' inoculated with mungbean isolate of bean common mosaic virus 87

Figure 6. An electron micrograph of a leaf dip preparation of bean infected with a mungbean isolate of bean common mosaic virus showing virus particles which are flexuous rods about 750 mu in length 88

Figure 7. Growth of an Iranian isolate of Ascochyta rabiei on various agar media for 16 days at 20°C in the dark. Left to right: Chickpea seed meal agar, 8%; potato-dextrose agar (made with local potatoes); mycological agar; bean pod agar; and potato-dextrose agar (Difco) 89

Figure 8. Effect of alternating 12-hr light - 12-hr dark (left) and continuous dark (right) on growth of an Iranian isolate of Ascochyta rabiei after 18 days at 20°C on potato-dextrose agar. Zonation occurred in alternating dark and light periods 90

Figure 9. Black pycnidia of Ascochyta rabiei. Pycnidia contain spores (conidia) of the fungus 91

Figure 10. Infection of the stem and foliage of a germinating chickpea seed which had been infected with Ascochyta rabiei 92

Figure 11. Survival of Ascochyta rabiei in naturally infected chickpea tissue at different temperatures, relative humidities, and in soil 93

Figure 12. Inoculation chamber equipped with a humidifier to maintain a high humidity which was used to screen chickpea lines against isolates of Ascochyta rabiei. 94

Figure 13. Reaction of different chickpea lines inoculated at the same time to infection by Ascochyta rabiei. Plants varied in their reaction from highly resistant (Extreme right) to very susceptible (Extreme left) 95

Figure 14. Variation in colony appearance and growth rate of Iranian isolates of Ascochyta rabiei grown on potato-dextrose agar for 18 days at 20°C in the dark 96

Entomology Figures

Figure 15. The effects of TEPA on the ovaries and oocytes of the beet army worm. TEPA caused atrophy of the oocytes and hypertrophy of the nutritive cells 104

Figure 16. The normal condition of the ovaries and oocytes in the beet army worm not treated with TEPA 105

Introduction

Participation by United States scientists in the program to improve pulses (grain legumes) in the Middle East and South Asia has been centered in Iran since the termination of activities by the American team in India in June, 1970. At this time, restoration of the fourth position on the American team in Iran was authorized.

American personnel changes for the project in Iran included the reassignment of Dr. Kenneth H. Evans, Geneticist, from India to Iran in June, 1970. Thus, the American Plant Breeding position on the Iranian team was filled after being vacant for two years. Mr. Shannon W. Wilson, Entomologist, departed from Iran in May, 1970, upon completion of his tour of duty. His replacement, Dr. James M. Schalk arrived at post in early 1971.

Iran continued to support the program. An allotment of 12,500,000 Rials ($164,000) from the Plan Organization financed most of the costs for local personnel, equipment, and supplies. There was increased participation in the technical phases of the program by personnel of cooperating agencies and institutions. Included in these expanded activities were biochemical analyses at Karaj College and field plot testing at Tabriz University.

The evaluation of the germplasm collections for adaptation, vigor, disease and insect resistance, and other characteristics has identified several lines for use in the breeding program. This effort to develop improved varieties by crossing has been intensified and will be given increased emphasis in the future.

Regional activities have been expanded through exchange of seed and consultations concerning cooperative research work in other countries, particularly Pakistan, Turkey, and Afghanistan.

VARIETAL IMPROVEMENT

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M. Fazle	Ghazvin Development Project

SUMMARY

The varietal improvement was carried on by the staff of the cooperating Iranian institutions under the leadership of Dr. M. C. Amirshahi. The American plant breeder returned in late June to assist with the breeding program.

Yield trials were conducted at ten stations. Surveys were conducted to determine the acreage and yields of pulse crops in Azerbaijan. Partial collections of the germplasm were grown to increase seed supplies and rejuvenate the seed. Seed increase of eight varieties were grown producing 2 1/2 tons of seed. Seed of lentils, chickpeas, beans, cowpeas, and mungbeans were furnished to several locations in West Pakistan. Fifteen lines of chickpeas were sent to Dr. B. R. Murty, IARI, New Delhi, India. A small plot of pigeon peas were grown at Ghorgan and produced good yields, although no yield records were taken.

A paper entitled "Protein Content of Different Varieties of Five Species of Pulse Crops" by M. C. Amirshahi and M. Tavakoli was presented by Dr. Amirshahi at a symposium on Improving Plant Protein

by Nuclear Techniques in Vienna in 1970. Two papers on chickpea breeding have been submitted for publication by the staff of Pahlavi University, Shiraz, Iran.

Crosses between better lines in cowpeas and chickpeas have been made at Pahlavi. The progenies were grown at Shiraz in 1970. Progenies of crosses between better lines of beans were grown at Karaj in 1970. Some crosses were made in chickpeas.

+ + + + +

Program Plans for 1971

1. Lentils - Crosses are planned to incorporate high yield and disease resistance of the Isfahan lentil types with desirable seed types.

2. Chickpeas - Crosses have been made to blight resistant and bruchid resistant strains of chickpeas. Crosses to incorporate good seed quality, high yield, blight and bruchid resistance are planned. Advanced generations of crosses made at Pahlavi University are to be planted at Shiraz and Karaj in the summer of 1971 and at Dezful in the winter of 1971-72 to obtain two generations a year.

The collection will be planted to obtain seed produced under uniform conditions for protein analysis.

3. Beans - Segregating populations will be grown at Karaj and Shiraz in the summer of 1971 and at Dezful in the fall and winter of 1971.

Additional crosses will be made to incorporate disease resistance, high yield, and good seed types.

4. Cowpeas - Advanced generations of cowpeas will be planted at Shiraz, Dezful, and Karaj in the summer of 1971. Additional crosses are planned to incorporate mosaic resistance in several seed and plant types.

5. Mungbeans - Present strains and varieties under tests have good disease resistance, seed type, and yield. Shattering is a problem for single harvests.

6. Yield trials of pulses are planned for ten stations.

7. New varieties will be increased on 17 hectares in 1971.

8. Preliminary increase of promising material will be made on five hectares.

+ + + + +

Lentils (Lens esculenta)

The Preliminary Yield Test (Table 1) contains some large-seeded selections out of higher yielding material and other medium to large-seeded types. The Uniform Yield Test (Tables 2 and 3) contain root rot and virus resistant strains from southern Iran. Yield Tests 1 and 2 (Tables 4 to 16) consist of large-seeded types with little disease resistance. These could only be of use where disease is no problem.

Chickpeas (Cicer arietinum)

Preliminary Yield Tests were planted at Karaj. The three check varieties in the white Preliminary Yield Test were the highest ranking for yield, but they do not have desirable seed type. In Uniform Yield Tests, Kaka, which has some Ascochyta resistance continues to rank high in yield. Pyrouz which does not have Ascochyta ranks low. I 13 with good Ascochyta resistance has done poorly. It appears to be more susceptable to virus and lack of moisture. I 13 produced no yield in the dryland trial at Meshed.

Beans (Phaseolus vulgaris)

Some germplasm material was grown to increase seed in short supply and renew viability of the seed.

Preliminary Yield Tests were grown at Karaj, Advanced Yield Tests were grown at Pahlavi University and Karaj, Uniform Yield Tests were planted at several locations. Tables are presented for reporting locations.

The three named varieties produced good yields in most of the trials.

Cowpeas (Vigna sinensis)

Yield trials were planted at several locations. Results are presented for reporting locations. Black Eye 7 ranked highest in yield, but is susceptable to virus. Meshed ranked fairly high for yield and has some virus resistance or tolerance. Kamran also produced good yield, but is virus susceptable.

Mungbeans (Phaseolus aureus)

The Indian collection of mungbeans was grown along with some other strains from the collection. The Indian material did very poorly. Some lines produced only a small amount of seed.

The Preliminary Yield Test (Table 87) is composed of material selected for virus resistance, large seed size, erect plant type, and high yield. For the second year, 48-071-10827 has ranked highest for yield in the test.

Ghohar and Partow have performed relatively well in Advanced Yield Trials (Tables 90-92), and have mosaic virus resistance.

Legend For Lentil Agronomic Data Tables 1 to 16.

(1) Numbers assigned to collection maintained by the Regional Pulse Improvement Project.

(2) Source numbers refer to collection numbers assigned by the Iranian Ministry of Agriculture. Six digit numbers are PI numbers from Crops Research Division, ARS, U. S. Department of Agriculture, Beltsville, Maryland, USA.

(3) Source indicates area of origin or area in which the seed was collected.

(4) Plants per meter is an average number of plants per meter of row based on one meter sample per replication.

(5) Rated 1 to 9: 1 = Complete stand 9 = Poor stand

(6) Rated 1 to 9: 1 = Vigorous plants 9 = Weak plants

(7) Days from planting to first opened flower.

(8) Indicates number of days after planting the first pod in plot reached full maturity, ready for harvest.

(9) Indicates number of days after planting the whole plot was ready for harvest.

(10) Disease rated 1 to 9: 1 = Free from disease symptoms
9 = Severe disease symptoms
For diseases present, see pathology section.

(11) Seeds/ten pods indicates the average number of seeds in ten pods.

(12) Br = Brown; G = Green; R = Red; GR =Green and Red; L = Light.

(13) Average weight (grams) of 1000 seeds.

(14) Yield in kilogram per hectare based on 5 or 10 square meter plots.

جدول شماره ۱ : آزمایش مقایسه عملکرد مقدماتی عدس ـ تاریخ کشت ۴۱/۱/۱۲ (دانشکده کشاورزی دانشگاه تهران)

Table 1. Agronomic Data-Lentils-Preliminary Yield Test - Planted April 1, 1970, RPIP Karaj, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Plants /Meter	(5) Stand	(6) Vigor	(7) Pl. to 1st Fl.	(8) Pl. to 1st Mat.	(9) Pl. to Com.Mat.	(10) Disease Rating	(11) Seeds per 10 Pods	(12) Seed Color	(13) 1000 Seeds Wt.	(14) Yield per Hectare
33-071-10496	188-44	Bandar, Fars	34	2	2	56	88	101	2	12	LG	30	2197
33-071-10921	210-25	Jiroft	36	2	1	55	88	101	1	10	LB	38	2149
33-071-10478	186-56	Shostar	36	2	1	55	86	102	1	14	B	31	2099
33-071-10674	198-80	Arasbaran	32	2	2	55	87	100	1	15	LR	27	2095
33-071-10944	65-212-87	Arasbaran	32	2	2	54	87	99	1	14	LB	37	2053
33-071-10879	209-45	Isfahan	36	2	1	54	87	101	1	17	LB	33	2027
33-071-10952	212-27	Arasbaran	32	1	1	54	86	102	1	12	LB	35	1998
33-071-10910	210-55	Jiroft	33	1	2	55	86	101	1	16	LB	27	1937
33-071-10892	209-82	Isfahan	32	2	2	54	86	101	1	14	LB	32	1912
33-071-10483	187-89	Shostar	[illegible]	2	1	56	89	102	1	13	LB	26	1892
33-071-10901	209-63	Isfahan	30	2	1	55	87	103	1	11	LB	34	1851
33-071-10898	209-66	Isfahan	38	2	2	55	86	100	1	16	LB	28	1828
33-071-10500	188-28 Min	Bandar, Fars	30	2	2	55	88	102	1	17	LB	26	1816
33-071-10946	212-77	Arasbaran	34	2	2	55	87	87	1	15	LB	34	1814
33-071-10899	209-65	Isfahan	30	2	2	54	87	101	1	12	B	25	1779
33-071-10905	209-61	Isfahan	36	1	1	54	86	100	2	12	LB	38	1774
33-071-10894	209-80	Isfahan	29	1	2	54	85	99	2	15	LB	33	1768
33-071-10556	189-45	Isfahan	41	2	1	55	88	101	1	12	LB	27	1704
33-071-10166		Gorgan	32	2	2	55	88	102	1	13	LB	26	1701
33-071-10146	391	Khaledabad	35	2	1	54	86	100	2	12	LB	30	1699
33-071-10520	188-72	Bandar, Fars	35	2	2	55	87	100	1	13	LG	27	1681
33-071-10882	209-46	Isfahan	34	2	1	54	86	101	2	14	LB	37	1677
33-071-10504	188-63 Min	Bandar, Fars	34	2	1	54	87	99	2	15	LG	28	1672
33-071-10134	214	Torbat Heidarieh	36	1	1	54	85	99	2	15	B	29	1666
33-071-10864	208-79	Darregaz	46	2	1	56	88	104	1	10	LR	23	1466
[illegible] 5%													194
CV %													[illegible]

جدول شماره ۲ : آزمایش مقایسه عملکرد عالی یونیفورم عدس ـ تاریخ کشت ۴۹/۱/۹ (شیراز دانشگاه پهلوی)

Table 2 Agronomic Data - Lentils - Uniform Yield Test - Planted March 30, 1970 - Pahlavi University, Shiraz, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(5) Stand	(6) Vigor	(7) Pl. to 1st. Fl.	(11) Seeds per 10 Pods	(13) 1000 Seeds Weight	(14) Yield per Hectare
33-071-11136	217	Isfahan	7	1	63	13	31	713
33-071-10885	209-70	Isfahan	7	1	63	13	30	645
33-071-10444	209-73	Isfahan	7	1	60	12	29	640
33-071-10445	209-97	Isfahan	7	1	61	13	32	615
33-071-10439	210-41	Jiroft	7	1	62	13	32	575
33-071-11139	209-68	Isfahan	7	1	62	12	31	537
33-071-10903	209-97	Isfahan	7	1	63	15	36	522
33-071-11014	2-42-4467	Fars	7	1	59	8	30	491
33-071-10417		Ardabil	7	1	59	14	30	485
33-071-10440	209-25	Isfahan	7	1	63	12	33	470
LSD 5%								567

جدول شماره ۳ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۳ عدس ـ تاریخ کشت ۴۹/۱/۱۲ (دانشکده کشاورزی دانشگاه تهران)

Table 3 Agronomic Data - Lentils - Uniform field Test - Planted April 1, 1970 - RPIP Karaj, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Plants /Meter	(5) Stand	(6) Vigor	(7) Pl. to 1st Fl.	(8) Pl. to 1st Mat.	(9) Pl. to Com.Mat.	(10) Disease Rating	(11) Seeds per 10 Pods	(12) Seed Color	(13) 1000 Seeds Wt.	(14) Yield per Hectare
33-071-11136	217	Isfahan	37	1	1	54	86	103	1	17	LB	34	2199
33-071-10440	209-25	Isfahan	30	1	2	54	87	104	1	22	LB	35	2077
33-071-11139	209-68	Isfahan	31	1	1	55	87	104	1	21	B	35	2062
33-071-10439	210-41	Jiroft	39	1	2	55	87	104	1	20	LB	34	1971
33-071-10445	209-97	Isfahan	42	1	2	54	87	105	1	21	LB	34	1951
33-071-10885	209-70	Isfahan	50	1	1	54	86	104	1	19	B	29	1902
33-071-10444	209-73	Isfahan	38	1	1	54	85	105	2	23	LB	28	1899
33-071-10903	209-97	Isfahan	40	2	1	54	86	103	1	20	LB	26	1753
33-071-10417		Ardebil	38	2	2	55	87	102	2	19	Mixed	31	1695
33-071-11014	2-42-4467	Fars	34	1	2	54	88	105	1	19	LG	30	1512
LSD 5%													352
CV %													14

جدول شماره ٤ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ عدس ـ تاریخ کشت ۴۹/۱/۱۷ (قزوین . سازمان دشت عمران قزوین)

Table 4 Agronomic Data - Lentils - Uniform Advanced Yield Test 2 - Planted April 6, 1970 - Ghazvin, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Plants /Meter	(9) Pl. to Com. Mat.	(14) Yield per Hectare
33-152-10048	178971	Turkey	29	113	1129
33-071-10582	192-48	Karaj	31	113	1119
33-071-10588	192-67	Karaj	27	113	1080
33-032-10253	299224	Chile	29	113	1052
33-032-10202	299164	Chile	25	113	945
33-032-10199	299160	Chile	26	113	888
33-032-10210	299174	Chile	25	113	870
33-071-10430		Tabriz	30	112	863
33-071-10418		Ardebil	27	113	812
33-032-10254	299225	Chile	32	113	716
LSD 5%					285
CV %					18

جدول شماره ٥ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ عدس ـ تاریخ کشت ۴۹/۱/۲۰ (وزارت کشاورزی . مشهد)

Table 5 Agronomic Data - Lentils - Uniform Advanced Yield Test 2 - Planted April 9, 1970 - Ministry of Agriculture, Meshed, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(5) Stand	(6) Vigor	(7) Pl. to 1st Fl.	(13) 1000 Seeds Weight	(14) Yield per Hectare
33-071-10582	192-48	Karaj	1	1	52	40	1308
33-152-10048	178971	Turkey	1	1	51	40	1226
33-071-10588	192-67	Karaj	1	2	53	30	1200
33-071-10430		Tabriz	1	1	53	44	1168
33-071-10418		Ardebil	1	1	53	40	1162
33-032-10199	299160	Chile	1	1	53	35	1104
33-032-10210	299174	Chile	1	1	55	30	1064
33-032-10202	299164	Chile	1	1	53	30	988
33-032-10253	299224	Chile	1	1	53	30	868
33-032-10254	299225	Chile	1	1	56	40	618
LSD 5%							256
CV %							16

جدول شماره ٦ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ عدس — تاریخ کشت ۴۹/۱/۲۲ (وزارت کشاورزی . رضائیه)

Table 6 Agronomic Data - Lentils - Uniform Advanced Yield Test 2 - Planted April 7, 1970 - Ministry of Agriculture, Rezaiyeh, Iran

(1)	(2)	(3)	(5)	(6)	(7)	(11)	(12)	(13)	(14)
Accession Number	Source Number	SOURCE	Stand	Vigor	Pl. to 1st Fl.	Seeds Per 10 Pods	Seed Color	1000 Seeds Weight	Yield per Hectare
33-032-10199	299160	Chile	1	1	61	15	G	30	1000
33-032-10210	299174	Chile	1	1	52	12			1000
33-071-10582	192-48	Karaj	1	1	58	12	B	20	1000
33-071-10588	192-67	Karaj	1	1	58	14	Y	[illegible]	940
33-032-10253	299224	Chile	1	1	60	16	GY	20	840
33-032-10202	299164	Chile	1	2	63	11	Y	35	820
33-152-10048	178971	Turkey	1	1	61	15	G	25	786
33-071-10430		Tabriz	1	1	61	13	YG	30	750
33-032-10254	299225	Chile	1	2	62	15	GY	20	700
33-071-10418		Ardabil	1	1	60	10	B	20	600

جدول شماره ۷ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ عدس — تاریخ کشت ۹۴/۱/۹ (شیراز . دانشگاه پهلوی)

Table 7 Agronomic Data - Lentils - Uniform Advanced Yield Test 2 - Planted March 30, 1970 - Pahlavi University, Shiraz

(1)	(2)	(3)	(5)	(6)	(7)	(11)	(13)	(14)
Accession Number	Source Number	SOURCE	Stand	Vigor	Pl. to 1st. Fl.	Seeds per 10 Pods	1000 Seeds Weight	Yield per Hectare
33-032-10253	299224	Chile	7	2	61	12	40	1054
33-032-10202	299104	Chile	7	2	62	9	39	954
33-071-10588	192-67	Karaj	7	2	56	12	40	903
33-071-10583	192-48	Karaj	7	2	56	12	38	872
33-071-10430		Tabriz	7	2	56	12	39	804
33-152-10048	178971	Turkey	7	2	57	14	39	754
33-032-10199	299160	Chile	7	2	58	13	40	740
33-071-10418		Ardebil	7	2	61	10	42	667
33-032-10254	299225	Chile	7	2	62	10	40	594
33-032-10210	299174	Chile	7	2	61	10	40	383
LSD 5%								64

جدول شماره ۸ : آزمایش مقایسه‌عملکرد عالی یونیفورم شماره ۲ عدس — تاریخ کشت ۴۹/۲/۶ (تبریز . دانشگاه تبریز)

Table 8 Agronomic Data - Lentils - Uniform Advanced Yield Test 2 - Planted April 26, 1970, Tabriz University, Tabriz, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(5) Plant Height	(6) Plant Width	(7) Stand	(8) Vigor	(9) Fl. to 1st Fl.	(11) Fl. to Com. Mat.	(14) Pods per Plant	(15) Seeds per 10 Pods	(17) 100 Seed Weight	(18) Yield Per Hectare
33-071-10582	192-48	Karaj	19	17	2	2	45	108	46	12	4	644
33-071-10418		Ardabil	23	16	1	1	43	112	36	11	4	600
33-152-10048	178971	Turkey	19	16	2	2	42	110	36	11	4	583
33-071-10588	192-67	Karaj	20	15	1	1	42	109	43	11	4	567
33-032-10253	299224	Chile	23	14	2	2	44	114	52	10	3	455
33-071-10430		Tabriz	20	15	2	2	42	112	52	10	4	435
33-032-10202	299164	Chile	25	18	2	2	46	113	39	11	5	427
33-032-10199	299160	Chile	18	15	2	2	47	114	38	10	4	377
33-032-10254	299225	Chile	21	14	2	2	45	114	44	10	3	360
33-032-10210	299174	Chile	17	14	2	2	45	115	43	10	4	319
LSD 5%												167
CV%												27

جدول شماره ۹ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ عدس — تاریخ کشت ۴۹/۱/۱۲ (دانشکده کشاورزی دانشگاه تهران)

Table 9 Agronomic Data - Lentils- Uniform Advanced Yield Test 2 -Planted April 1, 1970 - RPIP Karaj, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Plants /Meter	(5) Stand	(6) Vigor	(7) Fl. to 1st Fl.	(8) Fl. to 1st Mat.	(9) Fl. to Com.Mat.	(10) Disease Rating	(11) Seeds per 10 Pods	(12) Seed Color	(13) 1000 Seeds Wt.	(14) Yield per Hectare
33-032-10253	299224	Chile	22	2	2	55	88	110	1	20	LG	39	1606
33-032-10202	299164	Chile	31	2	2	55	89	105	1	18	LG	47	1536
33-071-10588	192-67	Karaj	30	2	2	55	87	105	2	22	LG	47	1443
33-152-10048	178971	Turkey	21	2	1	55	90	105	1	19	LG	48	1433
33-032-10199	299160	Chile	21	2	2	55	90	106	1	22	LG	44	1432
33-071-10582	192-48	Karaj	30	2	2	56	86	105	3	19	LG	40	1405
33-071-10430		Tabriz	26	2	2	55	90	106	2	21	LG	49	1360
33-032-10210	299174	Chile	30	2	2	54	92	106	1	21	LG	48	1300
33-032-10254	299225	Chile	28	2	2	55	92	110	1	23	LG	42	1281
33-071-10418		Ardebil	22	2	2	54	91	108	2	21	LG	44	1168
LSD 5%													515
CV %													20

جدول شماره ۱۰ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ عدس ـ تاریخ کشت ۴۹/۱/۱۷ (قزوین ـ سازمان عمران دشت قزوین)

Table 10 Agronomic Data - Lentils - Uniform Advanced Yield Test 1 - Planted April 6, 1970 - Ghazvin, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Plants /Meter	(9) Pl. to Com. Mat.	(14) Yield per Hectare
33-071-10408		Ahar	29	113	948
33-039-11177	142	Cyprus	29	113	808
33-071-10428		Moghan	24	113	808
33-071-10436		Ghazvin	25	113	770
33-071-11175	176	Arasbaran	23	113	758
33-085-11147	127	Lebanon	25	113	748
33-071-10411		Moghan	27	113	716
33-071-10425		Ahar	27	113	712
33-071-10437		Ghazvin	24	113	674
33-071-10450	64	Karaj	25	113	657
LSD 5%					152
CV %					16

جدول شماره ۱۱ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ عدس ـ تاریخ کشت ۴۹/۱/۲۰ (وزارت کشاورزی ـ مشهد)

Table 11 Agronomic Data - Lentils - Uniform Advanced Yield Test 1 - Planted April 9, 1970 - Ministry of Agriculture, Meshed, Iran

Accession Number	Source Number	SOURCE	Stand	Vigor	Pl. to 1st Fl.	1000 Seeds Weight	Yield per Hectare
33-071-11175	176	Arasbaran	1	1	50	40	1484
33-085-11147	127	Lebanon	1	1	50	50	1382
33-071-10450	64	Karaj	1	1	56	40	1320
33-071-10428		Moghan	1	1	52	60	1318
33-071-10436		Ghazvin	1	1	51	40	1278
33-071-10408		Ahar	1	1	53	50	1262
33-039-11177	142	Cyprus	1	1	53	45	1248
33-071-10437		Ghazvin	1	1	52	50	1216
33-071-10411		Moghan	1	1	53	50	1160
33-071-10425		Ahar	1	1	52	70	1074
LSD 5%							216
CV%							13

جدول شماره ۱۲ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ عدس — تاریخ کشت ۱۸ / ۱ / ۴۰۹ (وزارت کشاورزی — رضائیه)

Table 12 Agronomic Data - Lentils - Uniform Advanced Yield Test 1 - Planted April 7, 1970 - Ministry of Agriculture, Reziayeh, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(5) Stand	(6) Vigor	(7) Pl. to 1st Fl.	(11) Seeds Per 10 Pods	(12) Seed Color	(13) 1000 Seeds Weight	(14) Yield per Hectare
33-071-10408		Ahar	1	1	59	15	GY	25	1220
33-071-11175	176	Arasbaran	1	1	61	10	GY	25	980
33-071-10450	64	Karaj	3	3	60	12	G	35	920
33-071-10425		Ahar	1	1	61	15	GB	35	910
33-071-10428		Moghan	2	2	59	11	GY	35	1000
33-071-10436		Ghazvin	1	1	60	14	GY	30	780
33-085-11147	127	Lebanon	1	1	57	13	GY	30	740
33-039-11177	142	Cyprus	1	1	59	14	GY	35	620
33-071-10411		Moghan	1	1	60	12	GY	30	600
33-071-10437		Ghazvin	2	3	59	13	WG	35	553

جدول شماره ۱۳ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ عدس — تاریخ کشت ۹ / ۱ / ۴۹ (شیراز — دانشگاه پهلوی)

Table 13 Agronomic Data - Lentils - Uniform Advanced Yield Test 1 - Planted March 30, 1970 - Pahlavi University, Shiraz, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(5) Stand	(6) Vigor	(7) Pl. to 1st Fl.	(11) Seeds per 10 Pods	(13) 1000 Seeds Weight	(14) Yield per Hectare
33-071-10408		Ahar	7	1	59	15	38	958
33-071-10436		Ghazvin	7	1	57	11	40	955
33-071-10450	64	Karaj	7	1	58	12	40	924
33-071-11175	176	Arasbaran	7	2	56	12	38	846
33-085-11147	127	Lebanon	7	1	56	14	40	841
33-071-10428		Moghan	7	1	60	11	37	841
33-071-10411		Moghan	7	2	60	10	39	749
33-071-10437		Ghazvin	7	2	60	14	38	727
33-071-10425		Ahar	7	1	57	15	40	667
33-039-11177	143	Cyprus	7	1	58	11	40	507
LSD 5%								66

جدول شماره ۱۴ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ عدس ـ تاریخ کشت ۴۹/۲/۵ (شیراز ـ دانشگاه پهلوی)

Table 14 Agronomic Data - Lentils-Uniform Advanced Yield Test 1 - Planted April 26,1970 - Tabriz, Iran

(1)	(2)	(3)	(5)	(6)	(7)	(9)	(11)	(13)	(14)
Accession Number	Source Number	SOURCE	Stand	Vigor	Pl. to 1st Fl.	Pl. to Com. Mat.	Seeds per 10 Pods	1000 Seeds Weight	Yield per Hectare
33-071-11175	176	Arasbaran	2	1	46	105	11	40	613
33-071-10450	64	Karaj	1	1	46	109	11	40	603
33-085-11147	127	Lebanon	2	2	46	107	11	40	542
33-071-10408		Ahar	1	1	45	108	11	40	539
33-071-10425		Ahar	1	2	46	106	11	50	492
33-071-10428		Moghan	1	1	45	107	11	40	491
33-071-10436		Ghazvin	2	1	46	108	10	40	488
33-039-11177	142	Cyprus	1	2	45	106	9	50	454
33-071-10437		Ghazvin	2	1	46	106	10	50	450
33-071-10411		Moghan	1	1	45	106	10	50	433
LSD 5%									112
CV %									17

جدول شماره ۱۵ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ عدس ـ تاریخ کشت ۴۹/۲/۶ (تبریز ـ دانشگاه تبریز)

Table 15 Agronomic Data - Lentils - Dryland - Uniform Advanced Yield Test 1 - Planted April 26, 1970 - Tabriz, Iran

(1)	(2)	(3)	(5)	(6)	(7)	(9)	(11)	(13)	(14)
Accession Number	Source Number	SOURCE	Stand	Vigor	Pl. to 1st Fl.	Pl. to Com. Mat.	Seeds per 10 Pods	1000 Seeds Weight	Yield per Hectare
33-085-11147	127	Lebanon	2	2	46	116	13	50	397
33-071-11175	176	Arasbaran	2	2	47	116	12	50	308
33-071-10408		Ahar	1	1	46	118	11	40	292
33-071-10437		Ghazvin	2	1	47	115	10	40	289
33-071-10425		Ahar	2	2	47	116	9	40	288
33-071-10428		Moghan	2	2	47	114	10	50	274
33-039-11177	142	Cyprus	2	3	48	112	9	40	261
33-071-10411		Moghan	1	1	46	114	10	50	252
33-071-10450	64	Karaj	1	1	46	114	9	40	246
33-071-10436		Ghazvin	2	2	47	116	9	40	222
LSD 5%									118
CV%									33

جدول شماره ۱۶ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ عدس — تاریخ کشت ۴۹/۱/۱۲ (دانشکده کشاورزی دانشگاه تهران)

Table 16 Agronomic Data - Lentils-Uniform Advanced Yield Test 1 - Planted April 1, 1970 - RPIP Kararan

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Accession Number	Source Number	SOURCE	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Pl. to Com.Mat.	Disease Rating	Seeds per 10 Pods	Seed Color	1000 Seeds Wt.	Yield per Hectare
33-071-10408		Ahar	33	1	1	55	88	104	2	20	LG	43	1618
33-071-10428		Moghan	27	1	1	55	88	106	2	23	LG	46	1608
33-071-11175	(176)	Arasbaran	25	2	2	54	87	104	3	21	LG	45	1599
33-071-10450	(64)	Karaj	30	1	1	55	93	105	2	21	LG	52	1538
33-071-10425		Ahar	24	1	2	54	88	107	2	23	LG	43	1502
33-071-10437		Ghazvin	26	2	1	55	88	105	3	20	LG	41	1359
33-071-10436		Ghazvin	30	2	2	54	89	105	2	19	LG	42	1341
33-039-11177	(142)	Cyprus	39	2	2	54	89	108	2	21	LG	47	1180
33-085-11147	(127)	Lebanon	28	3	2	54	85	105	3	20	LG	47	1084
33-071-10411		Moghan	22	2	2	55	91	104	2	20	LG	50	1083
LSD 5%													
CV %													259

Legend for Chickpea Agronomic Data Tables 17 - 57

(1) Numbers assigned to collection maintained by the Regional Pulse Improvement Project.

(2) Source numbers are numbers assigned to populations or collections by the Iranian Ministry of Agriculture; six digit numbers are PI numbers from Crops Research Division, ARS, U.S.Department of Agriculture, Beltsville, Maryland, U.S.A.

(3) Source indicates origin of seed either country or section of Iran.

(4) W = White; P = Purple; LP = Light Purple.

(5) Average plant height in centimeters.

(6) Average plant width in centimeters.

(7) Average number of plants per meter based on one meter of row per replication.

(8) Rated 1 to 9: 1 = Complete stand; 9 = Poor stand.

(9) Rated 1 to 9: 1 = Vigorous plants; 9 = Weak plants.

(10) Days from planting to first opened flower.

(11) Indicates number of days after planting the first pod in plot reached full maturity, ready for harvest.

(12) Indicates number of days after planting the whole plot was ready for harvest.

(13) Disease rated 1 to 9: 1 = Free from disease symptoms; 9 = Severe disease symptoms including yellowing and wilting.

(14) Average number of pods per plant.

(15) Average number of seeds per 10 pods.

(16) Br = Brown; W = White; Bl = Black; Cr = Cream; Y = Yellow; Gr = Green; Li = Light; D = Dark.

(17) Average weight (in grams) of 100 seeds.

(18) Yield in kilograms per hectare based on 5 or 10 square meters per plot.

جدول شماره ۱۷ : آزمایش مقایسه عملکرد مقدماتی نخود سیاه ـ تاریخ کشت ۴۹/۱/۱۰ (دانشکده کشاورزی دانشگاه تهران)

Table 17 - Agronomic Data - Black Chickpeas - Preliminary Yield Trial - Planted March 30, 1970 - RPIP Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plant Height	Plant Width	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Pl. to Com.Mat.	Disease Rating	Seeds Per Pod	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-10108		Isfahan	P	27	46	21	1	2	52	85	110	3	18	BL	12	2748
12-071-10111	153	Karaj	P	26	46	21	1	2	53	85	109	3	17	BL	13	2663
12-071-10109		Isfahan	P	28	44	23	2	1	52	84	110	3	19	BL	11	2616
12-071-10113		Isfahan	P	26	42	22	1	1	51	83	110	3	20	BL	13	2582
12-071-10112		Nishabour	P	27	43	17	1	1	52	85	111	3	20	BL	12	2527
12-071-10106	47	Karaj	P	26	40	20	2	2	52	84	109	3	18	BL	12	2505
12-071-10115	221	Isfahan	P	28	42	21	1	2	52	83	110	2	19	BL	13	2425
12-071-10110	47	Karaj	P	28	45	21	1	2	51	84	108	3	16	BL	12	2394
12-071-10114		Isfahan	P	29	43	22	1	2	50	83	111	4	16	BL	13	2379
12-071-10107		Isfahan	P	27	41	19	2	3	50	85	108	3	15	BL	12	2229
LSD 5%																420
CV%																13

جدول شماره ۱۸ : آزمایش مقایسه عملکرد مقدماتی نخود سفید ـ تاریخ کشت ۴۹/۱/۱۰ (دانشکده کشاورزی دانشگاه تهران)

Table 18 - Agronomic Data - White Chickpeas - Preliminary Yield Test - Planted March 30, 1970 - RPIP Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plant Height	Plant Width	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Pl. to Com.Mat.	Disease Rating	Seeds per Pod	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-05472		Karaj	LP	31	52	17	1	1	49	93	111	1	10	LiBr	24	3833
12-071-05475		Moghan	LP	30	53	19	2	1	52	93	112	2	10	LiBr	21	3700
12-071-05464		Ardabil	LP	34	55	16	1	1	50	91	114	2	10	LiBr	23	3184
12-074-10008	319	Israel	W	26	44	13	1	2	47	85	114	3	10	W	27	3120
12-071-10055	207	Mazandaran	W	27	48	14	2	2	48	89	113	3	10	W	28	3109
12-071-10059	169	Ardabil	W	28	48	15	2	1	50	91	123	2	10	W	29	3084
12-071-10064		Rezaieh	W	32	50	13	2	1	52	91	123	2	10	W	28	3053
12-071-10063		Kurdestan	W	33	53	10	2	1	53	92	123	3	10	W	30	2939
12-071-03232	41	Varamin	W	32	51	10	2	2	54	87	112	3	15	W	32	2789
12-071-10093		FAO 13/680	W	31	49	11	2	1	52	88	114	3	11	W	39	2778
12-071-10058	168	Mamaghan	W	30	53	12	2	1	51	89	125	3	10	W	28	2739
12-071-10057	162	Shahpour	W	31	51	9	3	1	53	89	122	3	10	W	28	2628
12-071-02896	170	Ardabil	W	30	56	12	2	1	52	90	123	3	10	W	29	2566
12-071-10105		Unknown	W	36	52	11	2	1	53	91	123	3	11	W	30	2517
12-071-10009	CP 42	Israel	W	31	54	8	3	1	53	90	121	3	10	W	44	2474
12-071-10065		Bonab	W	31	52	10	3	1	51	89	119	4	12	W	29	2443
12-155-10002		Giza (UAR)	W	29	45	12	2	2	45	88	111	4	11	W	33	2423
12-071-01919	84	Karaj Selection	W	27	45	11	2	2	49	85	112	4	10	W	31	2414
12-071-03289	111	Varamin	W	26	45	13	2	2	51	86	112	4	10	W	34	2336
12-113-10005		Punjab (Pakistan)	W	27	46	10	3	3	51	86	113	4	17	W	25	2271
12-074-10011	CP	Israel	W	34	53	8	4	1	53	93	122	4	11	W	45	2235
12-071-10066		Ahar Shah Abad	W	30	50	10	3	1	53	90	122	3	11	W	31	2226
12-074-10012	CP 43	Israel	W	32	55	9	4	1	53	91	118	3	10	W	45	2200
12-071-10067	217	Torbat Hassanabad	W	24	42	11	3	3	49	86	114	4	11	W	28	2196
12-079-10004		Jordan	W	29	51	6	5	2	50	90	119	4	12	W	40	1935
LSD 5%																637
CV%																21

جدول شماره ۱۹ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سیاه ــ تاریخ کشت ۴۹/۱/۲۰ (مشهد ــ وزارت کشاورزی)

Table 19 Agronomic Data - Black Chickpeas - Uniform Yield Test 2 - Planted April 9, 1970 - Ministry of Agriculture, Meshed, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Flower Color	(5) Plant Height	(6) Plant Width	(8) Stand	(9) Vigor	(10) Pl. to 1st Fl.	(14) Pods Per Plant	(15) Seeds Per 10 Pods	(16) Seed Color	(17) 100 Seeds Weight	(18) Yield per Hectare
12-071-04287		Isfahan	P	39	38	1	1	48	53	15	BL	12	2576
12-071-04432	231	Isfahan	P	34	34	1	1	45	53	14	BL	12	2474
12-071-05436	175	Pyrouz	P	26	37	2	1	45	51	11	LiBr	14	2458
12-071-05132	174	Kaka	P	39	35	1	1	45	50	16	BL	12	2446
12-071-04509	193	Kermanshah	P	39	37	1	1	45	56	15	BL	11	2420
12-071-04439	221	Isfahan	P	33	33	1	1	43	53	16	BL	12	2418
12-071-04282	129	Isfahan	P	35	36	1	1	43	53	10	BL	11	2394
12-071-04279	174	Ahar	P	36	33	1	1	45	35	16	BL	11	2332
12-071-05331	154	Gharyen-gole	P	39	37	1	1	45	45	16	BL	12	2310
12-074-10010	I 13	Israel	P	53	42	1	1	54	17	14	BL	23	1346
LSD 5%													309
CV%													11

جدول شماره ۲۰ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سیاه دیم ــ تاریخ کشت ۴۹/۲/۵ (مشهد ــ وزارت کشاورزی)

Table 20 Agronomic Data - Black Chickpeas - Dryland Uniform Yield Test 2 - Planted April 25, 1970 - Ministry of Agriculture, Meshed, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Flower Color	(5) Plant Height	(6) Plant Width	(8) Stand	(9) Vigor	(10) Pl. to 1st Fl.	(14) Pods Per Plant	(15) Seeds Per 10 Pods	(16) Seed Color	(17) 100 Seeds Weight	(18) Yield per Hectare
12-071-04439	221	Isfahan	P	26	25	1	1	33	17	13	BL	11	536
12-071-05331	154	Gharyeh-gole	P	25	24	1	1	34	18	16	BL	10	478
12-071-04432	231	Isfahan	P	25	27	1	1	35	18	14	BL	11	466
12-071-04282	129	Isfahan	P	27	25	1	1	34	21	14	BL	12	458
12-071-04509	193	Kermanshah	P	24	23	1	1	34	18	14	BL	11	446
12-071-04279	174	Ahar	P	23	24	1	1	34	14	15	BL	11	440
12-071-04287		Isfahan	P	24	22	1	1	36	14	17	BL	12	408
12-071-05132	174	Kaka	P	25	23	1	1	34	14	15	BL	11	372
12-071-05436	175	Pyrouz	P	20	24	1	1	35	18	11	LiBr	13	318
LSD 5%													99
CV%													20

جدول شماره ۲۱ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سیاه ــ تاریخ کشت ۴۹/۱/۱۹ (رضائیه ــ وزارت کشاورزی)

Table 21 Agronomic Data - Black Chickpeas - Uniform Yield Test 2 - Planted April 8, 1970 - Ministry of Agriculture - Rezaieh, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Flower Color	(5) Plant Height	(6) Plant Width	(8) Stand	(9) Vigor	(10) Pl. to 1st Fl.	(14) Pods Per Plant	(15) Seeds Per 10 Pods	(16) Seed Color	(17) 100 Seeds Weight	(18) Yield per Hectare
12-071-04432	231	Isfahan	P	28	37	1	1	56	53	10	BL	18	2340
12-071-05331	154	Gharyeh-gole	P	30	39	1	1	56	53	12	BL	17	2340
12-071-05132	174	Kaka	P	32	37	1	1	57	52	13	BL	18	2300
12-071-04282	129	Isfahan	P	37	41	1	1	56	53	12	BL	17	2240
12-074-10010	I 13	Israel	P	38	49	1	1	56	35	10	BL	30	2120
12-071-04509	193	Kermanshah	P	34	41	1	1	56	56	14	BL	17	2020
12-071-04439	221	Isfahan	P	31	40	1	1	56	55	15	BL	18	1880
12-071-04279	174	Ahar	P	34	42	1	1	57	50	10	BL	17	1860
12-071-04287		Isfahan	P	30	36	1	1	55	55	20	BL	17	1660
12-071-05436	174	Pyrouz	P	25	34	1	1	58	52	10	LiBr	19	1600
CV%													33

جدول شماره ۲۲ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سیاه ــ تاریخ کشت ۴۹/۱/۳ (ورامین ــ وزارت کشاورزی)

Table 22 Agronomic Data - Black Chickpeas-Uniform Yield Test 2 - Planted March 23, 1970 - Ministry of Agriculture, Varamin, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Flower Color	(8) Stand	(13) Disease Rating	(16) Seed Color	(18) Yield per Hectare
12-071-04287		Isfahan	P	2	2	Bl	955
12-071-04282	129	Isfahan	P	2	3	Bl	795
12-071-04439	221	Isfahan	P	3	3	Bl	725
12-071-05132	174	Kaka	P	2	2	Bl	720
12-071-04432	231	Isfahan	P	2	3	Bl	705
12-071-04279	174	Ahar	P	3	3	Bl	685
12-071-04509	193	Kermanshah	P	2	3	Bl	605
12-071-05436	175	Pyrouz	P	2	3	LiBr	535
12-071-05331	154	Gharyeh-gole	P	2	3	Bl	352
12-074-10010	I13	Israel	P	2	2	Bl	295
LSD 5%							228
CV %							28

جدول شماره ۲۳ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سیاه ــ تاریخ کشت ۴۹/۲/۳ (تبریز ــ دانشکده کشاورزی)

Table 23 Agronomic Data - Black Chickpeas - Uniform Yield Test No. 2 - Planted April 23, 1970 - Tabriz University, Tabriz, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(12)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Pl. to Com.Mat.	Pods per Plant	Seeds per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-05132	174	Kaka	LP	30	40	1	1	45	114	56	16	Bl	17	2424
12-071-04439	221	Isfahan	LP	28	38	1	2	44	112	46	17	Bl	14	2343
12-071-04282	129	Isfahan	LP	27	46	2	2	48	113	45	16	Bl	14	2284
12-071-04279	174	Ahar	LP	28	39	2	2	46	108	48	17	Bl	14	2269
12-071-05331	154	Gharyeh-gole	LP	30	41	1	2	45	105	43	18	Bl	14	2232
12-071-04432	221	Isfahan	LP	31	44	2	2	46	112	61	17	Bl	14	2206
12-071-04287		Isfahan	LP	25	43	1	2	47	115	35	16	Bl	16	2067
12-071-04509	193	Kermanshah	LP	33	45	3	3	47	110	62	15	Bl	13	2035
12-071-05436	175	Pyrouz	LP	26	46	2	2	48	112	45	15	LiBr	17	2000
12-074-10010	I13	Israel	LP	34	37	2	3	47	113	47	14	Bl	29	1989
LSD 5%														91
CV %														10

جدول شماره ۲۴ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سیاه ــ تاریخ کشت ۴۹/۱/۱۰ (دانشکده کشاورزی دانشگاه تهران)

Table 24 Agronomic Data - Black Chickpeas-Uniform Yield Test 2 - Planted March 30, 1970 - RPIP Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plant Height	Plant Width	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Pl. to Com.Mat.	Disease Rating	Seeds per 10 Pods	Seed Color	100 Seeds Wt.	Yield per Hectare
12-071-04287		Isfahan	P	28	49	21	1	1	54	87	115	3	16	Bl	15	3327
12-071-05436	175	Pyrouz	P	22	44	17	2	2	51	87	112	2	13	LiBr	16	3173
12-071-05132	174	Kaka	P	30	50	23	1	1	50	86	115	3	20	Bl	12	3092
12-071-04439	221	Isfahan	P	27	46	22	1	2	50	84	116	3	18	Bl	12	3076
12-074-10010	I13	Israel	P	37	53	22	1	1	63	95	110	2	16	Bl	25	3072
12-071-04509	193	Kermanshah	P	27	44	17	2	2	48	86	114	3	19	Bl	12	3052
12-071-05331	154	Gharyeh-gole	P	25	40	17	1	2	51	85	115	4	17	Bl	12	2997
12-071-04432	231	Isfahan	P	25	43	18	2	1	53	86	117	3	17	Bl	12	2956
12-071-04279	174	Ahar	P	28	44	23	1	2	50	84	115	3	16	Bl	12	2946
12-071-04282	129	Isfahan	P	28	43	21	2	2	50	85	115	3	15	Bl	13	2943

Yield differences not significant at .05 level
CV %

12

جدول شماره ۲۵ : آزمایش مقایسه عملکرد عالی یونیفورم نخود سیاه ــ تاریخ کشت ۴۹/۸/۱۰ (دزفول ــ سازمان آب و برق خوزستان)

Table 25 Agronomic Data - Black Chickpeas - Uniform Yield Test 1-Planted November 1, 1969 - Dezful, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(18) Yield per Hectare
12-071-05132	174	Kaka	2456
12-071-05301	154	Gharyeh-gole	1690
12-071-05093	174	Ahar	1592
12-071-05432	154	Karaj	1582
12-071-05442	251514	Iran	1532
12-071-04244		Ardabil	1498
12-071-10050	174	Ardabil	1494
12-071-05436	175	Pyrouz	1200
12-071-10054	171	Ardabil	1152
12-074-10010	I13	Israel	1012
12-071-05451	175	Gharyeh-gole	878
LSD 5%			530
CV %			28

جدول شماره ۲۶ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سیاه ــ تاریخ کشت ۴۹/۱/۱۷ (قزوین ــ سازمان مستقل عمران قزوین)

Table 26 Agronomic Data Black Chickpeas - Uniform Yield Test 1 - Planted April 6, 1970 - Ghazvin Development Project, Ghazvin, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Flower Color	(5) Plant Height	(6) Plant Width	(7) Plants /Meter	(8) Stand	(9) Vigor	(13) Disease Rating	(15) Seeds Per 10 Pods	(16) Seed Color	(18) Yield per Hectare
12-071-04244		Ardabil	P	26	36	20	3	3	1	14	BL	2453
12-071-10050	174	Ardabil	P	27	33	19	4	3	2	15	BL	2371
12-071-05436	175	Pyrouz	P	24	24	22	5	4	3	15	LiBr	2257
12-071-05093	174	Ardabil	P	28	35	19	5	4	3	14	BL	2254
12-071-05301	154	Gharyeh-gole	P	27	36	22	3	4	3	14	BL	2223
12-071-05132	174	Kaka	P	29	36	16	3	4	3	15	BL	2198
12-071-05442	251514	Iran	P	30	33	23	4	3	2	15	BL	2198
12-071-05451	175	Gharyeh-gole	P	25	35	21	4	5	2	14	LiBr	2151
12-071-10054	171	Ardabil	P	26	37	20	4	5	3	14	BL	2076
12-071-05432	154	Karaj	P	29	31	19	4	4	2	15	BL	2061
LSD 5%												302
CV%												10

جدول شماره ۲۷ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سیاه ــ تاریخ کشت ۴۹/۱/۹ (گرگان ــ وزارت کشاورزی)

Table 27 Agronomic Data - Black Chickpeas - Uniform Yield Test 1 - Planted March 29, 1970 - Ministry of Agriculture, Gorgan, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-05093	174	Ahar	P	36	30	1	1	44	51	10	BL	12	2580
12-071-05432	154	Karaj	P	36	22	1	1	43	27	10	BL	12	2460
12-071-04244		Ardabil	P	48	31	1	1	42	69	10	BL	12	2460
12-071-10050	174	Ardabil	P	37	22	1	1	43	43	10	BL	12	2440
12-071-05436	175	Pyrouz	P	43	40	1	1	44	86	10	LiBr	15	2340
12-071-05442	251514	Iran	P	40	23	1	1	44	45	10	BL	12	2300
12-071-05451	175	Gharyeh-gole	P	39	31	1	1	45	35	10	LiBr	16	2300
12-071-05301	154	Gharyeh-gole	P	39	26	1	1	44	50	10	BL	12	2300
12-071-10054	171	Ardabil	P	50	31	1	1	42	61	10	BL	12	2280
12-071-05132	174	Kaka	P	38	27	1	1	45	47	10	BL	12	2160
LSD 5%													333
CV%													11

جدول شماره ۲۸ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سیاه ــ تاریخ کشت ۴۹/۱/۲۰ (مشهد ــ وزارت کشاورزی)

Table 28 Agronomic Data Black Chickpeas - Uniform Yield Test 1 - Planted April 9, 1970 - Ministry of Agriculture, Meshed, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	1000Seeds Weight	Yield per Hectare
12-071-10054	171	Ardabil	P	34	39	2	1	41	51	16	BL	80	2832
12-071-05451	175	Gharyeh-gole	P	37	40	2	1	45	37	15	LiBr	125	2822
12-071-05093	174	Ahar	P	39	37	1	1	42	53	14	BL	120	2816
12-071-10050	174	Ardabil	P	37	40	2	1	45	37	15	BL	125	2664
12-071-05442	251514	Iran	P	39	38	1	1	44	70	13	BL	120	2652
12-071-05132	174	Kaka	P	38	40	1	1	44	51	15	BL	110	2652
12-071-05301	154	Gharyeh-gole	P	32	37	2	1	45	46	14	BL	115	2622
12-071-04244		Ardabil	P	35	39	1	1	44	55	15	BL	110	2598
12-071-05432	154	Karaj	P	34	36	1	1	44	43	16	BL	110	2598
12-071-05436	175	Pyrouz	P	30	39	1	1	46	58	11	LiBr	130	2588
CV%													11

جدول شماره ۲۹ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سیاه دیم ــ تاریخ کشت ۴۹/۲/۵ (مشهد ــ وزارت کشاورزی)

Table 29 Agronomic Data - Black Chickpeas - Dryland Uniform Yield Test 1 - Planted April 25, 1970 - Ministry of Agriculture, Meshed, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-05093	174	Ahar	P	25	25	1	2	33	24	14	BL	10	594
12-071-05442	251514	Iran	P	27	24	1	1	33	23	13	BL	11	568
12-071-10054	171	Ardabil	P	27	24	1	2	32	22	14	BL	12	564
12-071-05132	174	Kaka	P	29	27	1	1	34	17	15	BL	10	518
12-071-05436	175	Pyrouz	P	22	25	1	1	34	26	10	BL	13	506
12-071-05432	154	Karaj	P	24	22	1	1	32	18	14	BL	13	504
12-071-05301	154	Gharyeh-gole	P	24	26	1	1	34	17	16	BL	12	494
12-071-10050	174	Ardabil	P	28	25	1	1	34	20	14	BL	13	484
12-071-05451	175	Gharyeh-gole	P	24	29	1	1	35	19	12	BL	14	466
12-071-04244		Ardabil	P	25	25	1	1	33	19	14	BL	12	292
LSD 5%													217
CV%													32

جدول شماره ۳۰ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سیاه ــ تاریخ کشت ۴۹/۱/۱۹ (رضائیه ــ وزارت کشاورزی)

Table 30 Agronomic Data - Black Chickpeas - Uniform Yield Test 1 - Planted April 8, 1970 - Ministry of Agriculture, Rezaieh, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-05436	175	Pyrouz	P	28	37	1	1	60	42	10	LiBr	20	2400
12-071-05301	154	Gharyeh-gole	P	34	40	1	1	56	32	16	BL	19	2220
12-071-05442	251514	Iran	P	32	36	1	1	61	25	16	BL	19	2140
12-071-05451	175	Gharyeh-gole	P	32	38	1	1	56	47	11	LiBr	20	2100
12-071-10054	171	Ardabil	P	36	42	1	1	57	11	17	BL	19	2040
12-071-04244		Ardabil	P	37	46	1	1	56	27	13	BL	18	1960
12-071-05132	174	Kaka	P	29	34	1	1	58	19	15	BL	18	1800
12-071-05093	174	Ahar	P	30	35	2	2	56	13	13	BL	18	1800
12-071-10050	174	Ardabil	P	29	36	1	1	56	50	14	BL	20	1760
12-071-05432	154	Karaj	P	31	39	1	1	55	42	17	BL	19	1700
CV%													35

جدول شماره ۳۱ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سیاه ـ تاریخ کشت ۴۹/۱/۳ (ورامین ـ وزارت کشاورزی)

Table 31 Agronomic Data - Black Chickpeas-Uniform Yield Test 1 - Planted March 23, 1970 - Ministry of Agriculture, Varamin, Iran

(1)	(2)	(3)	(4)	(7)	(8)	(13)	(15)	(16)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plants /Meter	Stand	Disease Rating	Seeds per 10 Pods	Seed Color	Yield per Hectar
12-071-05442	251514	Iran	P	23	1	1	16	Bl	1370
12-071-05451	175	Gharyeh-gole	P	21	2	2	13	LiBr	1115
12-071-05093	174	Ahar	P	19	1	2	14	Bl	1050
12-071-10050	174	Ardabil	P	19	1	2	15	Bl	1045
12-071-05301	154	Gharyeh-gole	P	22	1	2	14	Bl	1000
12-071-05432	154	Karaj	P	19	1	2	15	Bl	995
12-071-05436	175	Pyrouz	P	22	1	2	16	LiBr	955
12-071-04244		Ardabil	P	20	2	2	15	Bl	880
12-071-10054	171	Ardabil	P	20	2	2	14	Bl	770
12-071-05132	174	Kaka		16	2	2	16	Bl	760
LSD 5%									530
CV %									42

جدول شماره ۳۲ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سیاه ـ تاریخ کشت ۴۹/۱/۱۰ (شیراز ـ دانشگاه پهلوی)

Table 32 Agronomic Data - Black Chickpeas - Uniform Yield Test 1 - Planted March 30, 1970 - Pahlavi University, Shiraz, Iran

(1)	(2)	(3)	(5)	(6)	(8)	(9)	(10)	(15)	(17)	(18)
Accession Number	Source Number	SOURCE	Plant Height	Plant Width	Stand	Vigor	Fl. to 1st Fl.	Seeds Per 10 Pods	100 Seeds Weight	Yield per Hectare
12-071-04244		Ardebil	37	39	2	1	53	18	11	5260
12-071-05442	251514	Iran	38	48	2	1	57	16		4192
12-071-10050	174	Ardebil	39	45	3	1	51	15	38	3935
12-071-05301	154	Gharyeh-gole	37	44	4	2	53	16	12	3226
12-071-05093	174	Ahar	36	39	3	1	51	16	12	2864
12-071-10054	171	Ardebil	33	39	4	2	51	15	10	2519
12-071-05132	174	Kaka	33	37	4	2	53	12	13	2271
12-071-05451	175	Gharyeh-gole	24	36	3	3	54	10		1988
12-071-05432	154	Karaj	30	33	5	2	52	15	13	1923
12-071-05436	175	Pyrouz	28	32	7	3	51	10	14	694
LSD 5%										183

جدول شماره ۳۳ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سیاه ـ تاریخ کشت ۴۹/۲/۳ (تبریز ـ دانشکده کشاورزی)

Table 33 Agronomic Data - Black Chickpeas - Uniform Yield Test No. 1 - Planted April 23, 1970 - Tabriz University, Tabriz, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(12)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plant Height	Plant Width	Stand	Vigor	Fl. to 1st Fl.	Fl. to Com. Mat.	Pods per Plant	Seeds per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-05301	154	Gharyeh-gole	LP	29	37	2	2	46	94	43	16	BL	16	1804
12-071-05093	174	Ahar	LP	25	41	2	3	45	96	39	17	BL	15	1727
12-071-05132	174	Kaka	LP	28	37	2	2	47	98	43	15	BL	15	1683
12-071-10054	171	Ardabil	LP	26	37	2	3	44	93	44	14	BL	18	1629
12-071-10050	174	Ardabil	LP	26	35	2	3	46	95	39	18	BL	16	1575
12-071-05451	175	Gharyeh-gole	LP	27	38	3	4	48	94	52	12	LiBr	17	1554
12-071-05442	251514	Iran	LP	29	37	3	3	47	97	41	15	BL	16	1540
12-071-04244		Ardabil	LP	27	42	2	2	47	96	45	14	BL	18	1477
12-071-05436	175	Pyroux	LP	24	39	2	3	47	94	35	17	LiBr	17	1437
12-071-05432	154	Karaj	LP	30	43	2	3	47	92	50	14	BL	15	1388
LSD 5%														252
CV %														12

جدول شماره ۳۴ : آزمایش مقایسه عملکرد شماره ۱ نخود سیاه دیم ـ تاریخ کشت ۴۹/۲/۵ (تبریز ـ دانشکده کشاورزی)

Table 34 Agronomic Data - Black Chickpeas - Dryland Uniform Yield Test 1 - Planted April 25, 1970 - Tabriz University, Tabriz, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(12)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plant Height	Plant Width	Stand	Vigor	Fl. to 1st Fl.	Fl. to Com. Mat.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-05442	251514	Iran	LP	26	39	2	2	47	115	50	20	BL	14	844
12-071-05451	175	Gharyeh-gole	LP	20	32	2	2	48	113	56	15	LiBr	16	810
12-071-10050	174	Ardabil	LP	26	37	2	3	47	115	53	17	BL	15	799
12-071-05093	174	Ahar	LP	27	38	2	2	47	116	60	15	BL	15	771
12-071-05436	175	Pyroux	LP	24	35	2	2	48	114	45	16	LiBr	16	753
12-071-04244		Ardabil	LP	26	32	1	2	47	116	40	18	BL	15	730
12-071-05132	174	Kaka	LP	19	28	2	2	48	118	31	16	BL	16	665
12-071-05432	154	Karaj	LP	18	26	2	3	46	110	39	17	BL	14	632
12-071-05301	154	Gharyeh-gole	LP	28	38	1	2	48	115	55	15	BL	14	624
12-071-10054	171	Ardabil	LP	22	31	2	3	46	113	47	14	BL	12	544
LSD 5%														193
CV%														21

جدول شماره ۳۵ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سیاه ـ تاریخ کشت ۱۰/۱/۴۹ (دانشکده کشاورزی دانشگاه تهران)

Table 35 Agronomic Data - Black Chickpeas-Uniform Yield Test 1 - Planted March 30, 1970 - RPIP Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Pl. to Com.Mat.	Disease Rating	Seeds per 10 Pods	Seed Color	100 Seeds	Yield per Hectare
12-071-05132	174	Kaka	P	29	46	21	1	1	50	91	116	2	14	Bl	12	3575
12-071-05442	251514	Iran	P	31	42	24	1	1	52	79	117	2	14	Bl	12	3532
12-071-05093	174	Ahar	P	31	39	20	1	2	51	87	117	2	15	Bl	11	3493
12-071-05436	175	Pyrouz	P	24	41	19	1	1	52	88	112	2	13	LiBr	15	3474
12-071-04244		Ardabil	P	30	40	19	1	2	50	87	115	2	17	Bl	12	3403
12-071-10054	171	Ardabil	P	29	41	17	2	2	44	87	119	3	17	Bl	12	3393
12-071-05451	175	Gharyeh-gole	P	25	40	17	1	2	53	88	116	2	13	LiBr	16	3270
12-071-10050	174	Ardabil	P	31	40	17	1	1	51	86	118	2	19	Bl	13	3220
12-071-05301	154	Gharyeh-gole	P	30	40	21	1	1	52	85	118	2	17	Bl	12	3117
12-071-05432	154	Karaj	P	26	38	19	1	3	49	86	113	2	19	Bl	12	3092

Yield differences not significant at .05 level.
CV %

25

جدول شماره ۳۶ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سفید ـ تاریخ کشت ۱۰/۸/۴۹ (دزفول ـ سازمان آب و برق خوزستان)

Table 36 Agronomic Data - White Chickpeas-Uniform Yield Test 2 - Planted November 1, 1969 - Dezful, Iran

(1)	(2)	(3)	(18)
Accession Number	Source Number	S O U R C E	Yield per Hectare
12-071-10031	169	Ardabil	1406
12-071-10033	111	Isfahan	1384
12-071-10025	111	Isfahan	1190
12-071-10032	152	Karaj	1180
12-071-10026	162	Shahpour	1086
12-071-02518	232	Darehgaz	1004
12-071-10020	169	Ardabil	984
12-071-10029	152	Karaj	868
12-071-10034	152	Karaj	818
12-071-02089	254	Karaj Selection	724
LSD 5%			497
CV%			36

جدول شماره ۳۷ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ ــ تاریخ کشت ۴۹/۱/۱۷ (قزوین ــ سازمان مستقل عمران قزوین)

Table 37 Agronomic Data - White Chickpeas - Uniform Yield Test 2 - Planted April 6, 1970 - Ghazvin Development Project, Ghazvin, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(13)	(15)	(16)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Plants /Meter	Stand	Vigor	Disease Rating	Seeds Per 10 Pods	Seed Color	Yield per Hectare
12-071-10032	152	Karaj	W	34	59	25	3	3	2	15	W	4500
12-071-10034	153	Karaj	W	33	65	23	4	3	2	14	W	4440
12-071-10033	111	Isfahan	W	30	54	26	3	3	2	14	W	4218
12-071-10025	111	Isfahan	W	38	57	24	4	3	3	15	W	4198
12-071-10026	162	Shahpour	W	34	60	23	3	3	3	14	W	3994
12-071-02518	232	Darehgaz	W	31	59	21	3	3	2	15	W	3948
12-071-10029	152	Karaj	W	31	59	22	4	4	2	15	W	3833
12-071-10031	169	Ardabil	W	33	60	21	3	3	2	14	W	3802
12-071-10020	169	Ardabil	W	37	57	24	4	2	2	14	W	3336
12-071-02089	254	Karaj Selection	W	35	60	20	3	3	3	15	W	3330
LSD 5%												377
CV%												7

جدول شماره ۳۸ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سفید ــ تاریخ کشت ۴۹/۱/۹ (گرگان ــ وزارت کشاورزی)

Table 38 Agronomic Data - White Chickpeas - Uniform Yield Test 2 - Planted March 29, 1970 - Ministry of Agriculture, Gorgan, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-10026	162	Shahpour	W	45	25	1	1	45	66	10	W	24	2600
12-071-10029	152	Karaj	W	40	27	1	1	47	29	10	W	28	2540
12-071-10025	111	Isfahan	W	50	31	1	1	44	64	10	W	28	2460
12-071-10033	111	Isfahan	W	47	32	1	1	44	50	10	W	30	2400
12-071-02089	254	Karaj Selection	W	41	29	1	1	45	34	10	W	28	2400
12-071-10034	153	Karaj	W	40	33	1	1	47	31	10	W	30	2360
12-071-10032	152	Karaj	W	50	23	1	1	49	43	10	W	30	2340
12-071-10031	169	Ardabil	W	43	15	1	1	45	32	10	W	27	2260
12-071-02518	232	Darehgaz	W	40	24	1	1	48	18	10	W	33	2240
12-071-10020	169	Ardabil	W	42	29	1	1	48	38	10	W	30	2060
LSD 5%													196
CV%													7

جدول شماره ۳۹ : آزمایش مقایسه عملکرد عالی یونیفورم نخود سفید ــ تاریخ کشت ۴۹/۱/۲۷ (اصفهان ــ وزارت کشاورزی)

Table 39 – Agronomic Data – White Chickpeas – Uniform Yield Test 2 – Planted April 15, 1970 – Ministry of Agriculture, Isfahan, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(14)	(15)	(16)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	Yield per Hectare
12-071-10029	152	Karaj	W	31	29	1	1	64	28	10	W	1460
12-071-10020	169	Ardabil	W	35	27	2	2	65	30	10	W	1460
12-071-02089	254	Karaj Selection	W	32	30	1	1	65	34	10	W	1460
12-071-10026	162	Shahpour	W	31	25	2	2	65	32	10	W	1380
12-071-10033	111	Isfahan	W	30	27	2	2	64	35	10	W	1340
12-071-10031	169	Ardabil	W	32	29	1	1	64	29	10	W	1300
12-071-10032	152	Karaj	W	33	22	2	2	62	32	10	W	1300
12-071-10025	111	Isfahan	W	30	25	2	2	65	32	10	W	1160
12-071-10034	153	Karaj	W	30	25	2	2	64	34	10	W	1140
12-071-02518	232	Darehgaz	W	35	30	3	2	64	26	10	W	1044
LSD 5%												237
CV%												15

جدول شماره ۴۰ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سفید ــ تاریخ کشت ۴۹/۱/۲۰ (مشهد ــ وزارت کشاورزی)

Table 40 Agronomic Data – White Chickpeas – Uniform Yield Test 2 – Planted April 9, 1970 – Ministry of Agriculture, Meshed, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	S O U R C E	Plant Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-10026	162	Shahpour	W	39	39	1	1	47	46	11	W	27	2444
12-071-10032	152	Karaj	W	38	44	1	1	49	44	10	W	29	2436
12-071-10025	111	Isfahan	W	42	45	1	1	50	36	10	W	27	2412
12-071-10034	153	Karaj	W	42	40	1	1	50	45	10	W	25	2410
12-071-10029	152	Karaj	W	39	35	1	1	48	30	10	W	26	2402
12-071-10031	169	Ardabil	W	39	28	1	1	48	56	10	W	28	2366
12-071-10020	169	Ardabil	W	26	38	1	1	51	48	10	W	26	2302
12-071-10033	111	Isfahan	W	40	41	1	1	49	26	10	W	24	2290
12-071-02518	232	Darehgaz	W	39	45	1	1	51	23	10	W	31	2264
12-071-02089	254	Karaj Selection	W	40	43	1	1	49	29	10	W	23	1896
LSD 5%													384
CV%													17

جدول شماره ٤١ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سفید ــ تاریخ کشت ۲۹/۲/۵ (مشهد ــ وزارت کشاورزی)

Table 41 Agronomic Data - White Chickpeas - Dryland Uniform Yield Test 2 - Planted April 25, 1970 - Ministry of Agriculture, Meshed, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Stand	Vigor	Fl. to 1st Fl.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-10026	162	Shahpour	W	26	25	2	1	34	10	11	W	24	286
12-071-02089	254	Karaj Selection	W	26	26	2	1	33	9	11	W	29	248
12-071-10032	152	Karaj Selection	W	29	27	1	1	36	8	10	W	25	244
12-071-10034	153	Karaj Selection	W	27	29	2	1	38	10	11	W	25	232
12-071-02518	232	Dareh-gaz	W	29	28	2	1	35	9	20	W	24	218
12-071-10033	111	Isfahan	W	26	25	2	1	36	5	11	W	28	186
12-071-10031	169	Ardabil	W	27	30	2	1	35	5	10	W	25	172
12-071-10025	111	Isfahan	W	29	27	2	1	36	8	10	W	25	172
12-071-10029	152	Karaj	W	27	27	2	1	36	10	10	W	24	160
12-071-10020	169	Ardabil	W	28	30	2	1	35	9	10	W	23	78
LSD 5%													97
CV%													38

جدول شماره ٤٢ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سفید ــ تاریخ کشت ٤۹/۱/۱۹ (رضائیه ــ وزارت کشاورزی)

Table 42 Agronomic Data - White Chickpeas - Uniform Yield Test 2 - Planted April 8, 1970 - Ministry of Agriculture, Rezaieh, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Stand	Vigor	Fl. to 1st Fl.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-10029	152	Karaj	W	36	45	1	1	60	46	11	W	38	1900
12-071-10034	153	Karaj	W	33	42	1	1	59	9	20	W	39	1900
12-071-02089	254	Karaj Selection	W	35	40	1	1	58	28	11	W	38	1680
12-071-10025	111	Isfahan	W	32	40	1	1	57	35	10	W	32	1660
12-071-10020	169	Ardabil	W	33	42	1	1	58	13	10	W	31	1620
12-071-02518	232	Darehgaz	W	32	40	1	1	59	22	11	W	39	1440
12-071-10026	162	Shahpour	W	29	37	1	1	58	49	10	W	30	1340
12-071-10033	111	Isfahan	W	22	30	1	1	59	10	10	W	39	1240
12-071-10031	169	Ardabil	W	30	37	1	1	59	39	10	W	37	1220
12-071-10032	152	Karaj	W	28	35	1	1	58	45	10	W	32	1100
CV%													53

جدول شماره ۴۳: آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سفید ـ تاریخ کشت ۴۹/۱/۳ (ورامین ـ وزارت کشاورزی)

Table 43 - Agronomic Data - White Chickpeas-Uniform Yield Test 2- Planted March 23 1970 - Ministry of Agriculture, Varamin, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Flower Color	(7) Plants /Meter	(8) Stand	(13) Disease Rating	(15) Seeds per 10 Pods	(16) Seed Color	(18) Yield per Hectare
12-071-10033	111	Isfahan	W	26	3	3	14	W	714
12-071-02518	232	Darrehgaz	W	21	3	3	14	W	515
12-071-10029	152	Karaj	W	22	3	3	16	W	470
12-071-10032	152	Karaj	W	25	3	3	16	W	450
12-071-10031	169	Ardabil	W	21	2	3	14	W	420
12-071-02089	254	Karaj Selection	W	20	3	4	14	W	350
12-071-10020	169	Ardabil	W	24	2	3	15	W	325
12-071-10034	153	Karaj	W	23	3	3	15	W	310
12-071-10026	162	Shahpour	W	23	3	4	13	W	223
12-071-10025	111	Isfahan	W	24	3	4	14	W	180
LSD 5%									271
CV %									53

جدول شماره ۴۴: آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سفید ـ تاریخ کشت ۴۹/۱/۱۰ (شیراز ـ دانشگاه پهلوی)

Table 44 Agronomic Data - White Chickpeas - Uniform Yield Test 2 - Planted March 30, 1970, Pahlavi University, Shiraz, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(5) Plant Height	(6) Plant Width	(8) Stand	(9) Vigor	(10) Pl. to 1st Fl.	(15) Seeds Per 10 Pods	(17) 100 Seeds Weight	(18) Yield per Hectare
12-041-10033	111	Isfahan	34	54	4	2	59	10	34	4137
12-071-02518	232	Darehgaz	37	47	4	3	60	11	38	3901
12-071-10031	169	Ardebil	40	54	5	4	59	15	28	3008
12-071-10032	152	Karaj	39	58	3	2	58	9	30	2918
12-071-10029	125	Karaj	38	49	4	2	57	11	30	2788
12-071-10034	153	Karaj	33	52	4	3	59	13	32	2783
12-071-02089	254	Karaj	42	49	6	4	55	12	30	2686
12-071-10020	169	Ardebil	49	62	2	1	59	11	30	2599
12-071-10025	111	Isfahan	39	52	4	3	58	12	33	2588
12-071-10026	162	Shahpour	36	41	6	3	54	10	28	2432
LSD 5%										104

جدول شماره ٤٥ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سفید ــ تاریخ کشت ۴۹/۲/۳ (تبریز ــ دانشکده کشاورزی)

Table 45 - Agronomic Data - White Chickpeas - Uniform Yield Test No. 2 - Planted April 23, 1970 - Tabriz University, Tabriz, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(12)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Pl. to Com.Mat.	Pods per Plant	Seeds per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-10029	125	Karaj	W	26	40	2	2	45	105	31	12	W	30	2118
12-071-10033	111	Isfahan	W	24	48	3	5	47	99	29	10	W	32	1815
12-071-10032	152	Karaj	W	23	40	3	4	48	100	30	10	W	29	1808
12-071-10031	169	Ardabil	W	26	39	3	3	48	108	29	10	W	28	1755
12-071-02518	232	Darehgaz	W	20	48	3	4	48	98	25	11	W	29	1633
12-071-10034	153	Karaj	W	22	41	2	3	46	103	28	11	W	28	1614
12-071-10025	111	Isfahan	W	26	42	2	3	47	97	32	11	W	29	1590
12-071-10026	162	Shahpour	W	25	35	2	3	49	106	24	10	W	30	1553
12-071-02089	254	Karaj Selection	W	26	40	2	3	46	103	23	10	W	29	1508
12-071-10020	169	Ardabil	W	29	50	2	3	47	102	26	10	W	30	1268
LSD 5%														353
CV %														17

جدول شماره ٤٦ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ نخود سفید ــ تاریخ کشت ۴۹/۱/۱۰ (دانشکده کشاورزی دانشگاه تهران)

Table 46 Agronomic Data - White Chickpeas - Uniform Yield Test 2 - Planted March 30, 1970 - RPIP Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plant Height	Plant Width	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Pl. to Com.Mat.	Disease Rating	Seeds per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-10031	169	Ardabil	W	31	46	14	2	1	53	90	120	3	11	W	29	3724
12-071-10029	125	Karaj	W	36	53	13	2	1	51	89	122	3	11	W	31	3578
12-071-10020	169	Ardabil	W	34	53	16	1	1	52	92	120	2	12	W	28	3561
12-071-10032	152	Karaj	W	33	52	13	2	1	54	88	111	3	11	W	36	3530
12-071-10026	162	Shahpour	W	33	47	15	2	2	51	86	118	3	10	W	28	3458
12-071-10025	111	Isfahan	W	35	47	14	2	1	53	89	117	3	14	W	34	3359
12-071-02518	232	Darehgaz	W	30	48	12	3	1	53	88	117	3	13	W	36	3248
12-071-02089	254	Karaj Selection	W	34	50	12	3	1	49	88	121	3	11	W	39	2979
12-071-10033	111	Isfahan	W	31	45	10	3	2	53	89	111	3	11	W	34	2970
12-071-10034	153	Karaj	W	29	44	13	3	1	56	88	114	3	13	W	34	2538
LSD 5%																752
CV %																17

جدول شماره ٤٧ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سفید ـ تاریخ کشت ۱۰/۸/۴۹ (دزفول ـ سازمان آب و برق خوزستان)

Table 47 Agronomic Data - White Chickpeas-Uniform Yield Test 1 - Planted November 1, 1969 - Dezful, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(18) Yield per Hectare
12-071-10014	162	Shahpour	2218
12-071-05473	249982	Iran	2122
12-071-10015	129	Moghan	2075
12-071-10025	111	Isfahan	2056
12-071-10017	111	Isfahan	1866
12-071-05466	18	Karaj Selection	1758
12-071-10013	129	Moghan	1560
12-071-05456	34	Karaj Selection	1476
12-071-05468	3	Karaj Selection	1408
12-071-10016	129	Moghan	1074
Yield differences not significant at .05 level.			
CV%			41

جدول شماره ٤٨ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سفید ـ تاریخ کشت ۱۷/۱/۴۹ (قزوین ـ سازمان مستقل عمران قزوین)

Table 48 Agronomic Data - White Chickpeas - Uniform Yield Test 1 - Planted April 6, 1970 - Ghazvin Development Project, Ghazvin, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Flower Color	(5) Plant Height	(6) Plant Width	(7) Plants /Meter	(8) Stand	(9) Vigor	(13) Disease Rating	(15) Seeds Per 10 Pods	(16) Seed Color	(18) Yield per Hectare
12-071-10014	162	Shahpour	W	33	56	26	3	2	2	14	W	4455
12-071-10025	111	Isfahan	W	33	58	22	3	2	2	15	W	4424
12-071-10013	129	Moghan	W	34	53	25	3	2	2	15	W	4107
12-071-05468	3	Karaj Selection	W	31	62	25	3	3	2	16	W	4080
12-071-05473	249982	Iran	W	33	53	23	3	3	2	14	W	4067
12-071-10015	129	Moghan	W	35	59	23	4	3	2	15	W	4042
12-071-05456	34	Karaj Selection	W	32	49	22	3	3	3	15	W	3976
12-071-10016	129	Moghan	W	35	57	23	4	3	2	15	W	3750
12-071-05466	18	Karaj Selection	W	33	56	25	4	3	2	17	W	3306
12-071-10017	111	Isfahan	W	37	55	19	4	3	3	16	W	3240
LSD 5%												644
CV%												13

جدول شماره ۴۹ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سفید ـ تاریخ کشت ۴۹/۱/۹ (گرگان ـ وزارت کشاورزی)

Table 49 Agronomic Data - White Chickpeas - Uniform Yield Test 1 - Planted March 29, 1970 - Ministry of Agriculture, Gorgan, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-05456	34	Karaj Selection	W	40	35	1	1	44	40	10	W	26	2800
12-071-10015	129	Moghan	W	48	30	1	1	42	30	10	W	35	2680
12-071-10016	129	Moghan	W	50	45	1	1	43	58	10	W	33	2640
12-071-10014	162	Shahpour	W	45	25	1	1	45	14	10	W	31	2640
12-071-10013	129	Moghan	W	50	36	1	1	44	41	10	W	33	2620
12-071-10025	111	Isfahan	W	40	27	1	1	44	34	10	W	39	2540
12-071-05468	3	Karaj Selection	W	37	50	1	1	44	70	10	W	27	2500
12-071-10017	111	Isfahan	W	50	37	1	1	45	31	10	W	38	2500
12-071-05466	18	Karaj Selection	W	48	36	1	1	42	65	10	W	30	2460
12-071-05473	249982	Iran	W	45	32	1	1	48	41	10	W	30	2460

Yield Differences Not Significant at .05 Level.

CV% 7

جدول شماره ۵۰ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سفید ـ تاریخ کشت ۴۹/۱/۲۰ (مشهد ـ وزارت کشاورزی)

Table 50 Agronomic Data - White Chickpeas - Uniform Yield Test 1 - Planted April 9, 1970 - Ministry of Agriculture, Meshed, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Pods Per Plant	Seeds Per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-10025	111	Isfahan	W	32	39	1	1	48	32	14	W	29	2600
12-071-05456	34	Karaj Selection	W	36	39	1	1	46	36	10	W	24	2284
12-071-10014	162	Shahpour	W	36	38	1	1	49	35	10	W	28	2270
12-071-10015	129	Moghan	W	37	40	2	1	47	34	10	W	33	2220
12-071-05468	3	Karaj Selection	W	37	38	2	1	45	33	10	W	28	2188
12-071-10016	129	Moghan	W	34	36	2	1	46	42	10	W	30	2160
12-071-05473	249982	Iran	W	39	38	1	1	48	35	11	W	31	2104
12-071-05466	18	Karaj Selection	W	40	42	1	1	47	41	10	W	24	2032
12-071-10017	111	Isfahan	W	39	39	2	1	48	41	10	W	33	1820
12-071-10013	129	Moghan	W	32	45	2	1	47	41	11	W	27	1790

LSD 5% 395

CV% 10

جدول شماره ۵۱ . آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سفید ــ تاریخ کشت ۴۹/۲/۵ (مشهد ــ وزارت کشاورزی)

Table 51 Agronomic Data - White Chickpeas - Dryland Uniform Yield Test 1 - Planted April 25, 1970 - Ministry of Agriculture, Meshed, Iran

(1) Accession Number	(2) Source Number	(3) S O U R C E	(4) Flower Color	(5) Plant Height	(6) Plant Width	(8) Stand	(9) Vigor	(10) Pl. to 1st Fl.	(14) Pods Per Plant	(15) Seeds Per 10 Pods	(16) Seed Color	(17) 100 Seeds Weight	(18) Yield per Hectare
12-071-10016	129	Moghan	W	27	30	2	1	35	12	11	W	26	388
12-071-05456	34	Karaj Selection	W	27	28	2	1	51	12	10	W	22	382
12-071-10025	111	Isfahan	W	30	32	2	1	35	12	10	W	25	382
12-071-10015	129	Moghan	W	27	27	2	1	34	13	11	W	28	370
12-071-10013	129	Moghan	W	27	29	2	1	34	12	11	W	25	318
12-071-05468	3	Karaj Selection	W	28	26	1	1	34	10	10	W	23	300
12-071-05473	249982	Iran	W	29	33	2	1	37	13	11	W	24	280
12-071-05466	18	Karaj Selection	W	25	32	1	1	35	8	10	W	22	242
12-071-10014	162	Shahpour	W	27	27	2	1	35	7	11	W	27	228
12-071-10017	111	Isfahan	W	29	30	3	1	37	10	11	W	30	208
LSD 5%													156
CV%													39

جدول شماره ۵۲ . آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سفید ــ تاریخ کشت ۴۹/۱/۱۹ (رضائیه ــ وزارت کشاورزی)

Table 52 Agronomic Data - White Chickpeas - Uniform Yield Test 1 - Planted April 8, 1970 - Ministry of Agriculture, Rezaieh, Iran

(1) Accession Number	(2) Source Number	(3) S O U R C E	(4) Flower Color	(5) Plant Height	(6) Plant Width	(8) Stand	(9) Vigor	(10) Pl. to 1st Fl.	(14) Pods Per Plant	(15) Seeds Per 10 Pods	(16) Seed Color	(17) 100 Seeds Weight	(18) Yield per Hectare
12-071-05473	249982	Iran	W	40	50	1	1	60	18	10	W	32	2040
12-071-10015	129	Moghan	W	40	45	1	1	59	21	15	W	40	1780
12-071-05456	34	Karaj Selection	W	27	35	1	1	54	52	10	W	30	1720
12-071-10013	129	Moghan	W	33	42	1	1	59	17	10	W	39	1700
12-071-10014	162	Shahpour	W	36	45	1	1	60	22	11	W	40	1700
12-071-05468	3	Karaj Selection	W	28	35	1	1	54	25	10	W	29	1640
12-071-10025	111	Isfahan	W	44	49	1	1	59	21	15	W	31	1520
12-071-05466	18	Karaj Selection	W	33	39	2	2	57	25	10	W	33	1420
12-071-10016	129	Moghan	W	31	41	2	2	56	12	10	W	31	1380
12-071-10017	111	Isfahan	W	39	50	2	2	61	16	10	W	31	1380
LSD 5%													656
CV%													33

جدول شماره ۵۳ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سفید ـ تاریخ کشت ۴۹/۱/۳ (ورامین)

Table 53 - Agronomic Data - White Chickpeas-Uniform Yield Test 1 - Planted March 23, 1970 - Ministry of Agriculture, Varamin, Iran

(1)	(2)	(3)	(4)	(7)	(8)	(13)	(15)	(16)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plants /Meter	Stand	Disease Rating	Seeds per 10 Pods	Seed Color	Yield per Hectare
12-071-05473	249982	Iran	W	23	2	2	13	W	1465
12-071-10016	129	Moghan	W	23	2	2	15	W	1284
12-071-10014	162	Shahpour	W	24	1	1	16	W	1270
12-071-05468	3	Karaj Selection	W	25	2	1	18	W	1250
12-071-10025	111	Isfahan	W	22	2	1	18	W	1240
12-071-10015	129	Moghan	W	23	2	3	17	W	1200
12-071-10013	129	Moghan	W	25	2	2	17	W	1200
12-071-10017	111	Isfahan	W	19	2	2	17	W	9[illegible]
12-071-05456	34	Karaj Selection	W	22	2	2	15	W	920
12-071-05466	18	Karaj Selection	W	25	2	2	16	W	855
Differences not significant at .05 level.									
CV %									40

جدول شماره ۵۴ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سفید ـ تاریخ کشت ۴۹/۱/۱۰ (شیراز ـ دانشگاه پهلوی)

Table 54 Agronomic Data - White Chickpeas - Uniform Yield Test 1 - Planted March 30, 1970, Pahlavi University, Shiraz, Iran

(1)	(2)	(3)	(5)	(6)	(8)	(9)	(10)	(15)	(17)	(18)
Accession Number	Source Number	SOURCE	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Seeds Per 10 Pods	100 Seeds Weight	Yield per Hectare
12-071-10025	111	Isfahan	44	58	2	2	57	14	30	5210
12-071-05466	18	Karaj	47	56	3	2	53	10	27	4617
12-071-10015	129	Moghan	40	56	3	3		17	28	4574
12-071-05473	249982	Iran	38	54	3	2	59	12	30	4450
12-071-10013	129	Moghan	40	54	3	3	53	12	30	4420
12-071-05468	3	Karaj	45	53	2	1	54	12	26	4410
12-071-10016	129	Moghan	39	56	4	3	56	12	20	4373
12-071-10014	162	Shahpour	42	56	3	2	56	12	28	4243
12-071-05456	34	Karaj	41	47	3	3	55	12	22	3956
12-071-10017	111	Isfahan	39	53	7	5	60	10	36	2871

جدول شماره ٥٥ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سفید ــ تاریخ کشت ۴۹/۱/۱۸ (تبریز ــ دانشکده کشاورزی)

Table 55 - Agronomic Data - White Chickpeas - Dryland Uniform Yield Test No. 1 - Planted April 22, 1970 - Tabriz University, Tabriz, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(12)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plant Height	Plant Width	Stand	Vigor	Fl. to 1st Fl.	Fl. to Com.Mat.	Pods per Plant	Seeds per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-10014	162	Shahpour	W	24	31	5	6	52	125	29	12	W	32	824
12-071-05468	3	Karaj Selection	W	22	28	3	4	49	129	38	11	LiCr	28	820
12-071-10025	111	Isfahan	W	25	27	3	5	51	120	23	14	W	31	756
12-071-05466	18	Karaj Selection	W	25	30	3	5	51	127	36	11	W	28	698
12-071-05473	249982	Iran	W	20	25	3	5	50	119	33	11	W	31	651
12-071-10015	129	Moghan	W	23	29	4	5	51	122	23	10	W	34	620
12-071-10013	129	Moghan	W	19	28	5	5	52	126	36	10	W	32	601
12-071-10016	129	Moghan	W	18	26	5	6	52	124	27	11	W	32	598
12-071-10017	111	Isfahan	W	27	31	3	6	51	120	27	10	LiCr	37	567
12-071-05456	34	Karaj Selection	W	18	22	2	3	50	125	23	10	W	28	547

Yield Difference Not Significant at .05 Level.
CV % 33

جدول شماره ٥٦ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سفید دیم ــ تاریخ کشت ۴۹/۲/۳ (تبریز ــ دانشکده کشاورزی)

Table 56 - Agronomic Data - White Chickpeas - Uniform Yield Test No. 1 - Planted April 7, 1970 - Tabriz University, Tabriz, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(12)	(14)	(15)	(16)	(17)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plant Height	Plant Width	Stand	Vigor	Fl. to 1st Fl.	Fl. to Com.Mat.	Pods per Plant	Seeds per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-10025	111	Isfahan	W	29	46	3	3	45	110	22	15	W	34	1669
12-071-05456	34	Karaj Selection	W	27	38	2	2	43	116	23	12	W	27	1520
12-071-05466	18	Karaj Selection	W	22	25	3	4	44	118	20	12	W	34	1502
12-071-05468	3	Karaj Selection	W	27	34	2	2	42	120	18	10	W	32	1486
12-071-10014	162	Shahpour	W	23	38	3	2	46	115	24	11	W	34	1469
12-071-05473	249982	Iran	W	25	35	3	3	46	114	18	12	W	32	1391
12-071-10017	111	Isfahan	W	28	45	2	1	47	112	26	10	W	35	1335
12-071-10013	129	Moghan	W	27	38	3	2	44	115	29	10	W	27	1331
12-071-10015	129	Moghan	W	22	35	2	2	42	113	16	10	W	34	1224
12-071-10016	129	Moghan	W	21	33	3	4	44	115	14	11	W	33	1204

LSD 5% 364
CV % 20

جدول شماره ۵۷ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ نخود سفید ـ تاریخ کشت ۴۹/۱/۱۰ (دانشکده کشاورزی دانشگاه تهران)

Table 57 - Agronomic Data - White Chickpeas - Uniform Yield Test 1 - Planted March 30, 1970 - RFIP Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	Source Number	SOURCE	Flower Color	Plant Height	Plant Width	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Pl. to Com.Mat.	Disease Rating	Seeds per 10 Pods	Seed Color	100 Seeds Weight	Yield per Hectare
12-071-10014	162	Shahpour	W	27	48	17	3	1	51	89	116	3	10	W	34	2756
12-071-10025	111	Isfahan	W	28	45	16	2	1	48	88	115	3	17	W	31	2695
12-071-05466	18	Karaj Selection	W	29	48	18	2	2	49	89	116	3	10	W	29	2581
12-071-05468	3	Karaj Selection	W	27	47	14	2	2	48	85	121	3	11	W	27	2576
12-071-05473	249982	Iran	W	25	48	14	2	3	52	87	113	3	11	W	35	2480
12-071-05456	34	Karaj Selection	W	24	44	16	2	2	48	87	114	3	10	W	27	2463
12-071-10013	129	Moghan	W	27	46	13	3	2	47	89	119	3	10	W	34	2411
12-071-10017	111	Isfahan	W	32	47	11	4	1	50	89	117	4	11	W	40	2242
12-071-10016	129	Moghan	W	26	45	13	3	2	48	87	113	3	11	W	34	2195
12-071-10015	129	Moghan	W	24	47	12	3	3	49	87	113	4	10	W	33	2076
LSD 5%																509
CV %																16

Legend for Beans Agronomic Data Tables 58 - 76

(1) Numbers assigned to collection maintained by the Regional Pulse Improvement Project.

(2) Indicates variety name or area of origin. Numbers are numbers assigned to populations or collections by the Iranian Ministry of Agriculture; six digit numbers are PI numbers from Crops Research Division, ARS, U.S.Department of Agriculture, Beltsville, Maryland, U.S.A.

(3) W = White; P = Purple; LP = Light Purple.

(4) V = Viney; B = Bushy.

(5) Average number of plants per meter, based on one meter of row per replication.

(6) Rated 1 to 9: 1 = Complete stand; 9 = Poor stand.

(7) Rated 1 to 9: 1 = Vigorous plants; 9 = Weak plants.

(8) Days from planting to first opened flower.

(9) Indicates number of days after planting the first pod in plot reached full maturity, ready for harvest.

(10) Indicates number of days after planting the whole plot was ready for harvest.

(11) Disease rated 1 to 9: 1 = Free from disease symptoms; 9 = Severe disease symptoms.

(12) First column: C = Curved; S = Straight. Second column: C = Cylindrical; F = Flat.

(13) S = Short; M = Medium; L = Long; VL = Very long.

(14) Average of 10 pods per replication.

(15) W = White; Cr = Cream; R = Red; P = Purple; Br = Brown; Pi = Pink; Y = Yellow; Bl = Black; M = Mottled; S = Spotted; L = Light; D = Dark.

(16) R = Reniform; RC = Reniform Compressed; RE = Reniform Elongated; OG = Oblong globular; SC = Subcylindric; OC = Oblong Cylindric; OB = Oblong; SG = Subglobular; O = Oval.

(17) Average weight (grams) of 100 seeds.

(18) Yield in kilograms per hectare based on 5 or 10 square meter plots.

جدول شماره ۵۸ : آزمایش مقایسه عملکرد مقدماتی لوبیا قرمز ـ تاریخ کشت ۴۹/۲/۱۲ (دانشکده کشاورزی دانشگاه تهران)

Table 58 - Agronomic Data - Red Beans - Preliminary Yield Test - Planted May 2, 1970, Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	SOURCE	Flower Color	Plant Type	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Pl. to Com. Mat.	Disease Rating	Pod Shape	Pod Size	Seed Color	Seed Shape	100 Seeds Weight	Yield per Hectare
65-035-00876	Congo	W	V	26	1	1	66	100	116	4	CF	M	LP	OB	29	2413
65-032-01627	Chile	W	V	25	2	2	64	100	116	3	CF	M	R	R	31	2400
65-000-02612	Unknown	W	V	24	2	2	57	97	116	4	CF	S	R	OB	30	2272
65-071-00580	Darehgaz	W	V	26	1	1	65	98	116	4	CF	M	P	OB	28	2185
65-000-02615	Unknown	W	V	24	2	1	63	96	116	5	CF	S	R	OB	30	2148
65-071-00582	Naz	W	V	25	2	1	66	100	117	3	CF	M	P	OB	25	2127
65-000-02602	Unknown	W	V	21	1	2	64	97	115	3	CF	M	R	OB	30	2097
65-153-01282	Turkey	W	V	25	2	1	66	99	116	4	CF	M	P	OB	25	2089
65-153-01616	Turkey	W	V	28	1	1	65	100	116	3	CF	M	LP	OB	25	2062
65-000-02613	Unknown	W	V	21	2	1	58	96	117	5	CF	S	R	OB	30	1845
65-002-01034	Afghanistan	W	V	24	2	2	67	99	116	4	CF	M	R	OB	28	1827
65-000-02604	Unknown	W	V	21	2	2	58	97	116	5	CF	M	R	OB	31	1780
65-000-02605	Unknown	W	V	20	2	2	61	96	116	5	CF	M	R	OB	27	1747
65-062-00832	Guatamala	LP	B	19	2	2	64	100	120	3	SF	M	LR	RE	37	1650
65-069-01534	India	W	V	25	2	2	69	105	119	3	CF	M	R	OB	25	1477
LSD 5%																483
CV%																17

جدول شماره ۵۹ : آزمایش مقایسه عملکرد مقدماتی لوبیا سفید ـ تاریخ کشت ۴۹/۲/۱۲ (دانشکده کشاورزی دانشگاه تهران)

Table 59 - Agronomic Data - Beans (White) - Preliminary Yield Test - Planted May 2, 1970, Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	SOURCE	Flower Color	Plant Type	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Pl. to Com.Mat.	Disease Rating	Pod Shape	Pod Size	Seed Color	Seed Shape	100 Seeds Weight	Yield per Hectare
65-153-02252	Turkey	W	V	21	1	1	70	104	124	1	CF	M	W	OB	24	2857
65-000-02578	Unknown	W	V	23	2	2	65	98	117	3	CF	M	W	OB	28	2621
65-153-01938	Turkey	W	V	21	2	2	64	103	122	2	CF	M	W	RC	53	2584
65-153-02274	Turkey	W	V	25	1	1	63	98	118	3	CF	M	W	R	31	2500
65-071-00353	Arak	W	V	25	1	1	64	99	117	4	CF	M	W	R	28	2487
65-153-02066	Turkey	W	V	22	2	2	63	99	119	3	CF	M	W	OB	29	2453
65-153-02503	Turkey	W	B	18	2	2	59	98	118	3	SF	M	W	RE	48	2426
65-153-01735	Turkey	W	V	18	3	3	63	101	121	4	CF	M	W	RC	55	2369
65-153-02551	Turkey	W	B	16	2	2	59	99	118	3	SF	M	W	RE	49	2353
65-071-00772	Iran Selection	W	V	21	2	2	65	99	117	4	CF	M	W	R	27	2338
65-153-01846	Turkey	W	B	19	1	1	57	99	119	2	SF	M	W	RE	44	2164
65-153-02552	Turkey	W	B	16	2	2	59	98	119	3	SF	L	W	RE	49	2118
65-071-00042	Marmar	W	V	25	1	1	64	98	118	4	CF	M	W	R	27	2113
65-153-01801	Turkey	W	V	19	1	1	62	100	121	4	CF	M	W	RC	51	2056
65-153-02470	Turkey	W	B	17	2	2	58	99	119	3	SB	M	W	RE	49	2050

Yield differences not significant at the .05 level
CV%

جدول شماره ٦٠ : آزمایش مقایسه عملکرد عالی لوبیا چیتی ـ تاریخ کشت ٤٩/٢/١٢ (دانشکده کشاورزی دانشگاه تهران)

Table 60 - Agronomic Data - Pinto Beans - Advanced Yield Test - Planted May 2, 1970, Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	SOURCE	Flower Color	Plant Type	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Pl. to Com.Mat.	Disease Rating	Pod Shape	Pod Size	Seed Color	Seed Shape	100 Seeds Weight	Yield per Hectare
65-153-02167	Turkey	LP	V	20	1	1	62	101	123	3	SF	M	LPIM	SG	36	2924
65-071-00446	Chad	LP	V	20	2	2	63	102	122	3	SF	M	LPIM	OC	44	2369
65-032-00793	Chile	LP	V	19	2	2	62	102	123	2	SF	M	LPIM	OC	44	2366
65-153-01724	Turkey	LP	V	18	2	2	63	103	122	3	SF	M	LPIM	SG	41	2173
65-137-01650	Africa	LP	V	20	1	1	67	105	124	1	SF	M	LPIM	OC	39	2164
65-153-01297	Turkey	LP	V	21	2	2	66	103	122	2	SF	M	LPIM	OC	35	2147
65-153-02241	Turkey	LP	V	19	2	2	63	102	123	2	SF	M	LPIM	SG	42	2100
65-153-01722	Turkey	LP	V	21	2	2	62	103	123	2	SF	M	LPIM	SG	42	2053
65-071-00396	Jiroft	LP	V	21	2	2	66	110	126	2	SF	M	LPIM	OG	36	1386
65-153-02261	Turkey	LP	V	21	2	2	65	105	124	2	SF	M	LPIM	SG	39	1255
LSD 5%																522
CV%																18

جدول شماره ٦١ : آزمایش مقایسه عملکرد عالی لوبیا قرمز ـ تاریخ کشت ٤٩/٢/١٤ (شیراز ـ دانشگاه پهلوی)

Table 61 - Agronomic Data - Red Beans - Advanced Yield Test - Planted May 4, 1970 - Pahlavi University, Shiraz, Iran

(1)	(2)	(6)	(7)	(8)	(14)	(17)	(18)
Accession Number	SOURCE	Stand	Vigor	Pl. to 1st Fl.	Seeds Per Pod	100 Seeds Weight	Yield per Hectare
65-071-00537	Nishabour	7	1	69	5	25	1532
65-007-00292	Argentina	7	1	66	4	25	1482
65-085-00100	Lebanon	7	1	56	4	24	1388
65-071-00582	Naz	7	1	66	5	27	1378
65-071-00536	Torbat Hedarieh	7	1	57	4	22	1357
65-071-00702	Torbat Hedarieh	7	1	61	3	29	1356
65-071-00713	Darehgaz	7	1	70	4	21	1328
65-071-00727	Unknown	7	1	55	5	31	1266
65-071-00734	Nishabour	7	1	68	4	21	1255
65-071-00721	Darehgaz	7	1	67	5	21	1128

جدول شماره ٦٢ : آزمایش مقایسه عملکرد عالی لوبیا قرمز ـ تاریخ کشت ٤٩/٢/١٢ (دانشکده کشاورزی دانشگاه تهران)

Table 62 - Agronomic Data - Red Beans - Advanced Yield Test - Planted May 2, 1970, Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	SOURCE	Flower Color	Plant Type	Plants /Meter	Stand	Vigor	Pl. to 1st.Fl.	Pl. to 1st Mat.	Pl. to Com.Mat.	Disease Rating	Pod Shape	Pod Size	Seed Color	Seed Shape	100 Seeds Weight	Yield per Hectare
65-071-00537	Nishabour	W	V	24	1	1	76	111	126	1	CF	M	R	R	24	3214
65-071-00721	Darehgaz	W	V	25	1	1	76	110	127	2	CF	M	R	R	23	3203
65-007-00292	Argentina	W	V	22	1	1	76	110	125	2	CF	M	R	R	24	3004
65-071-00734	Nishabour	W	V	28	2	1	75	110	127	2	CF	M	R	R	21	2870
65-071-00702	Torbat Heydarieh	W	V	21	2	2	67	99	117	3	CF	M	R	OB	32	2862
65-071-00536	Torbat Heydarieh	W	V	24	1	2	65	99	116	3	CF	M	LP	R	24	2722
65-071-00713	Darehgaz	W	V	22	1	1	76	111	127	2	CF	M	R	R	31	2705
65-085-00100	Lebanon	W	V	23	2	2	63	98	117	3	CF	M	R	OB	28	2638
65-071-00582	Naz	W	V	24	2	2	66	100	116	3	SF	M	LP	R	25	2526
65-071-00727	Unknown	W	V	19	2	2	61	97	117	4	CF	M	R	OB	31	2196
LSD 5%																594
CV%																17

جدول شماره ٦٣ : آزمایش مقایسه عملکرد عالی لوبیا سفید ـ تاریخ کشت ٤٩/٢/١٤ (شیراز ـ دانشگاه پهلوی)

Table 63 - Agronomic Data - White Beans - Advanced Yield Test - Planted May 4, 1970 - Pahlavi University, Shiraz, Iran

(1)	(2)	(6)	(7)	(8)	(14)	(17)	(18)
Accession Number	SOURCE	Stand	Vigor	Pl. to 1st Fl.	Seeds Per Pod	100 Seeds Weight	Yield per Hectare
65-071-00212	Iran	7	1	53	4	48	1611
65-071-00671	Karaj	7	1	62	4	29	1397
65-071-00042	Marmar	7	1	60	4	28	1291
65-071-00674	Karaj	7	1	56	4	28	1246
65-071-00699	Unknown	6	1	57	4	25	1180
65-071-00695	Isfahan	7	1	58	4	27	1148
65-071-00638	Shiraz	7	1	59	3	26	1135
65-085-00690	Lebanon	7	1	58	4	28	1122
65-071-00675	Karaj	7	1	61	4	29	1121
65-071-00643	Shiraz	7	1	57	4	26	1085
LSD 5%							

جدول شماره ٦٤ : آزمایش مقایسه عملکرد عالی لوبیا سفید ـ تاریخ کشت ٤٩/٢/١٢ (دانشکده کشاورزی دانشگاه تهران)

Table 64 - Agronomic Data - White Beans - Advanced Yield Test - Planted May 2, 1970, Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	SOURCE	Flower Color	Plant Type	Plants /Meter	Stand	Vigor	Fl. to 1st Fl.	Fl. to 1st Mat.	Fl. to Com. Mat.	Disease Rating	Pod Shape	Pod Size	Seed Color	Seed Shape	100 Seeds Weight	Yield per Hectare
65-071-00638	Shiraz	W	V	23	1	1	66	101	120	2	CF	M	W	R	23	3220
65-071-00699	Unknown	W	V	20	1	1	65	98	118	3	CF	M	W	OB	30	3041
65-071-00212	Iran	W	V	23	3	2	58	104	124	2	CF	M	W	RC	41	2931
65-071-00042	Marmar	W	V	21	2	1	65	98	118	3	CF	M	W	R	26	2815
65-085-00690	Lebanon	W	V	20	2	1	61	97	117	4	CF	M	W	R	26	2771
65-071-00643	Shiraz	W	V	24	2	2	64	99	118	3	CF	S	W	OB	28	2765
65-071-00674	Karaj	W	V	20	2	2	63	98	117	4	CF	M	W	OB	27	2728
65-071-00695	Isfahan	W	V	23	2	2	63	99	118	4	CF	M	W	OB	28	2558
65-071-00675	Karaj	W	V	20	2	2	64	99	117	3	CF	M	W	R	29	2481
65-071-00671	Karaj	W	V	19	3	2	67	100	118	3	CF	M	W	R	27	2420
LSD 5%																398
CV%																12

جدول شماره ٦٥ : آزمایش مقایسه عملکرد عالی لوبیا چیتی ـ تاریخ کشت ٤٩/٤/٤ (گرگان ـ ایران)

Table 65 - Agronomic Data - Pinto Beans - Uniform Advanced Yield Test - Planted May 25, 1970 - Ministry of Agriculture, Gorgan, Iran

(1)	(2)	(3)	(8)	(17)	(18)
Accession Number	SOURCE	Flower Color	Fl. to 1st Fl.	100 Seeds Weight	Yield per Hectare
65-157-00068	U.S.A.	W	36	35	1496
65-071-00603	Isfahan	W	42	35	1422
65-071-00593	Isfahan	W	42	38	1290
65-071-00604	Isfahan	W	42	17	1286
65-071-00605	Isfahan	W	42	31	1236
65-071-00594	Isfahan	W	37	38	1200
65-071-00601	Isfahan	W	41	38	1136
65-071-00446	Shad	W	43	34	1120
65-153-00930	Turkey	W	43	30	358
65-071-00457	Isfahan	W	43	36	288

جدول شماره ٦٦ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا چیتی ــ تاریخ کشت ٤٩/٢/١٤ (شیراز ــ دانشگاه پهلوی)

Table 66 - Agronomic Data - Pinto Beans - Uniform Advanced Yield Test - Planted May 4, 1970 - Pahlavi University,, Shiraz, Iran

(1) Accession Number	(2) SOURCE	(6) Stand	(7) Vigor	(8) Pl. to 1st Fl.	(14) Seeds Per Pod	(17) 100 Seeds Weight	(18) Hectare per Hectare
65-152-00930	Turkey	7	1	53	3	34	1693
65-071-00605	Isfahan	7	1	60	4	29	1524
65-071-00603	Isfahan	7	1	51	5	40	1335
65-071-00593	Isfahan	7	1	53	4	47	1234
65-071-00446	Shad	7	1	52	3	42	1216
65-071-00601	Isfahan	7	1	52	4	47	1167
65-071-00594	Isfahan	7	1	53	4	47	1148
65-071-00457	Isfahan	7	1	51	3	47	1134
65-071-00604	Isfahan	7	2	52	4	50	1059
65-157-00068	USA	7	2	53	3	52	1059
LSD 5%							159

جدول شماره ٦٧ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا چیتی ــ تاریخ کشت ٤٩/٢/١٢ (دانشکده کشاورزی دانشگاه تهران)

Table 67 - Agronomic Data - Pinto Beans - Uniform Advanced Yield Test - Planted May 2, 1970, Karaj, Iran

(1) Accession Number	(2) SOURCE	(3) Flower Color	(4) Plant Type	(5) Plants /Meter	(6) Stand	(7) Vigor	(8) Pl. to 1st Fl.	(9) Pl. to 1st Mat.	(10) Pl. to COM.MAT	(11) Disease Rating	(12) Pod Shape	(13) Pod Size	(15) Seed Color	(16) Seed Shape	(17) 100 Seeds Weight	(18) Yield per Hectare
65-157-00068	USA	W	V	17	2	2	56	94	123	4	CF	M	CrM	OC	39	2764
65-071-00446	Shad	LP	V	20	2	2	61	101	123	3	SF	M	CrM	OC	45	2581
65-071-00593	Isfahan	W	V	23	2	2	64	104	125	3	SF	M	PiM	SG	42	2163
65-153-00930	Turkey	W	V	21	3	2	66	104	127	2	SF	M	PiM	OC	42	1991
65-071-00604	Isfahan	W	V	22	2	2	63	103	124	3	SF	M	PiM	OG	42	1921
65-071-00601	Isfahan	W	V	20	2	2	63	101	124	3	SF	M	PiM	OG	41	1884
65-071-00457	Isfahan	W	V	21	3	2	67	111	129	1	SF	M	PiM	SG	39	1849
65-071-00603	Isfahan	W	V	21	3	2	63	103	124	3	SF	M	PiM	OG	39	1716
65-071-00605	Isfahan	W	V	22	2	2	63	103	124	3	SF	M	PiM	SG	40	16[illegible]
65-071-00594	Isfahan	W	V	20	3	2	63	103	125	4	SF	M	PiM	SG	41	161[illegible]
LSD 5%																434
CV%																18

جدول شماره ٦٨ : آزمایش مقایسه عملکرد عالی لوبیا قرمز ــ تاریخ کشت ٤٩/٢/١٥ (رضائیه ــ ایران)

Table 68 - Agronomic Data - Red Beans - Uniform Advanced Yield Test - Planted May 5, 1970 - Ministry of Agriculture, Rezaieh, Iran

(1)	(2)	(3)	(8)	(17)	(18)
Accession Number	SOURCE	Flower Color	Pl. to 1st Fl.	100 Seeds Weight	Yield per Hectare
65-085-00440	Lebanon	W	67	22	2440
65-071-00431	Iran	W	65	21	2040
65-071-00566	Isfahan	W	72	20	1920
65-071-00744	Torbat Heidarieh	W	74	29	1920
65-071-00582	Naz	W	64	21	1800
65-071-00731	Nishabour	W	75	21	1720
65-071-00707	Darehgaz	W	72	20	1660
65-071-00538	Darehgaz	W	74	20	1580
65-071-00569	Nishabour	W	75	29	1400
65-157-00589	U.S.A. Red Kidney	R	65	39	1080

جدول شماره ٦٩ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا قرمز ــ تاریخ کشت ٤٩/٢/١٤ (شیراز ــ دانشگاه پهلوی)

Table 69 - Agronomic Data - Red Beans - Uniform Advanced Yield Test - Planted May 4, 1970 - Pahlavi University, Shiraz, Iran

(1)	(2)	(6)	(7)	(8)	(14)	(17)	(18)
Accession Number	SOURCE	Stand	Vigor	Pl. to 1st Fl.	Seeds Per Pod	100 Seeds Weight	Yield per Hectare
65-085-00440	Lebanon	7	1	63	4	30	1404
65-071-00566	Isfahan	7	1	61	4	24	1400
65-071-00431	Unknown	7	1	59	4	31	1311
65-071-00569	Nishabour	7	1	65	5	26	1304
65-071-00744	Torbat Hedarieh	7	1	59	5	31	1290
65-071-00538	Darehgaz	7	1	66	4	22	1200
65-071-00582	Naz	7	1	58	4	27	1195
65-071-00707	Darehgaz	7	1	66	5	24	1174
65-071-00731	Nishabour	7	1	66	5	27	1067
65-157-00589	USA Red Kidney	7	1	54	3	44	919
LSD 5%							85

جدول شماره ۷۰ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا قرمز (تبریز ــ دانشکده کشاورزی)

Table 70 - Agronomic Data - Red Beans - Uniform Advanced Yield Test - Planted May 18, 1970, Tabriz University, Tabriz, Iran

(1)	(2)	(3)	(4)	(6)	(7)	(8)	(9)	(14)	(15)	(16)	(17)	(18)
Accession Number	SOURCE	Flower Color	Plant Type	Stand	Vigor	Pl. to 1st Fl.	Pl. to Com.Mat.	Seeds Per Pod	Seed Color	Seed Shape	100 Seeds Weight	Yield per Hectare
65-071-00582	Naz	W	V	3	3	49	114	5	P	R	27	1466
65-071-00569	Nishabour	W	V	3	3	48	114	5	R	R	20	1421
65-071-00538	Darehgaz	W	V	3	4	50	114	5	R	R	26	1328
65-071-00566	Isfahan	W	V	3	2	46	114	5	R	R	29	1303
65-071-00707	Darehgaz	W	V	2	3	48	114	4	R	R	22	1263
65-085-00440	Lebanon	W	V	3	3	49	108	5	R	R	26	1252
65-157-00589	USA Red Kidney	W	B	3	3	49	107	4	R	R.E	30	1205
65-071-00431	Unknown	W	V	3	2	49	109	4	D Pi	R	22	1161
65-071-00731	Nishabbur	W	V	4	4	48	114	5	R	R	25	1086
65-071-00744	Torbat Hedarieh	W	V	2	3	49	110	5	P Br	R	26	1032
LSD 5%												308
CV%												19

جدول شماره ۷۱ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا قرمز ــ تاریخ کشت ۴۹/۲/۱۲ (دانشکده کشاورزی دانشگاه تهران)

Table 71 - Agronomic Data - Red Beans - Uniform Advanced Yield Test - Planted May 2, 1970 - Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	SOURCE	Flower Color	Plant Type	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1stMat.	Pl. to Com.Mat.	Disease Rating	Pod Shape	Pod Size	Seed Color	Seed Shape	100 Seeds Weight	Yield per Hectare
65-071-00538	Darehgaz	W	V	24	1	1	76	109	129	2	CF	M	R	R	26	3722
65-071-00431	Unknown	W	V	21	2	2	68	104	119	2	CF	M	D Pi	R	26	3367
65-071-00569	Nishabour	W	V	22	2	1	77	110	128	2	CF	M	R	R	28	3344
65-071-00707	Darehgaz	W	V	25	1	1	73	110	131	1	CF	M	R	R	27	3282
65-071-00744	Torbat Heydareh	W	V	24	2	2	70	103	119	2	CF	M	LP	R	32	3051
65-071-00731	Nishabour	W	V	22	2	1	77	109	130	1	CF	M	R	R	29	2967
65-085-00440	Lebanon	W	V	24	2	2	69	107	121	3	CF	M	LR	R	29	2875
65-071-00582	Naz	W	V	24	2	2	66	104	119	3	CF	M	R	R	26	2759
65-071-00566	Isfahan	W	V	23	2	2	65	102	118	3	CF	M	R	R	23	2574
65-157-00589	Red Kidney USA	LP	B	19	3	2	59	99	120	3	SF	M	R	RE	39	1769
LSD 5%																402
CV%																11

جدول شماره ۷۲ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا سفید ــ تاریخ کشت ۴۹/۳/۴ (گرگان ــ ایران)

Table 72 - Agronomic Data - White Beans - Uniform Advanced Yield Test - Planted May 25, 1970 - Ministry of Agriculture, Gorgan, Iran

(1)	(2)	(3)	(8)	(17)	(18)
Accession Number	SOURCE	Flower Color	Pl. to 1st Fl.	100 Seeds Weight	Yield per Hectare
65-071-00517	Ghochan	W	39	25	2344
65-071-00040	Kermanshah	W	38	25	2130
65-071-00680	Kermanshah	W	38	25	2072
65-071-00515	Ghochan	W	40	18	2050
65-071-00505	Shiraz	W	40	26	2048
65-071-01948	Shiraz	W	39	24	1916
65-157-00014	U.S.A.	W	39	23	1882
65-071-00042	Marmar	W	39	25	1828
65-071-00658	Dasht-Sar Amol	W	37	30	1720
65-153-00757	Turkey	W	39	37	1670
CV%					18

جدول شماره ۷۳ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا سفید ــ تاریخ کشت ۴۹/۲/۱۵ (رضائیه ــ ایران)

Table 73 - Agronomic Bata - White Beans - Uniform Advanced Yield Test - Planted May 5, 1970 - Ministry of Agriculture, Rezaieh, Iran

(1)	(2)	(3)	(8)	(17)	(18)
Accession Number	SOURCE	Flower Color	Pl. to 1st Fl.	100 Seeds Weight	Yield per Hectare
65-071-00042	Marmar	W	69	23	2900
65-071-00517	Ghochan	W	67	21	2900
65-157-00014	U.S.A.	W	69	21	2860
65-071-00040	Kermanshah	W	69	20	2580
65-071-00505	Shiraz	W	67	28	2560
65-071-00658	Dashtsar Amol	W	61	30	2380
65-071-00680	Kermansnah	W	68	22	2320
65-071-01948	Shiraz	W	67	21	2240
65-153-00757	Turkey	W	62	39	1780
65-071-00515	Ghochan	W	71	19	1700

جدول شماره ۷۴ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا سفید ـ تاریخ کشت ۴۹/۲/۱۴ (شیراز ـ دانشگاه پهلوی)

Table 74 - Agronomic Data - White Beans - Uniform Advanced Yield Test - Planted May 4, 1970 - Pahlavi University, Shiraz, Iran

(1)	(2)	(6)	(7)	(8)	(14)	(17)	(18)
Accession Number	SOURCE	Stand	Vigor	Pl. to 1st Fl.	Seeds Per Pod	100 Seeds Weight	Yield per Hectare
65-071-00042	Marmar	7	1	58	5	32	3509
65-157-00014	USA	7	1	56	5	29	3495
65-071-00515	Ghochan	7	1	61	5	24	3342
65-071-00680	Kermanshah	7	1	53	5	29	3269
65-071-01948	Shiraz	6	1	57	5	27	3171
65-071-00040	Kermanshah	7	1	56	4	31	3105
65-071-00658	Dashtsar Amol	7	1	53	3	45	3063
65-071-00505	Shiraz	7	1	60	4	33	3042
65-071-00517	Ghochan	7	1	56	5	27	2773
65-153-00757	Turkey	7	1	52	5	48	2500
LSD 5%							57

جدول شماره ۷۵ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا سفید ـ (تبریز ـ دانشکده کشاورزی)

Table 75- Agronomic Data - White Beans - Uniform Advanced Yield Test - Planted May 19, 1970, Tabriz University, Tabriz, Iran

(1)	(2)	(3)	(4)	(6)	(7)	(8)	(9)	(14)	(15)	(16)	(17)	(18)
Accession Number	SOURCE	Flower Color	Plant Type	Stand	Vigor	Pl. to 1st Fl.	Pl. to Com.Mat.	Seeds per Pod	Seed Color	Seed Shape	100 Seed Weight	Yield per Hectare
65-071-00505	Shiraz	W	V	3	3	48	110	5	W	R	30	1877
65-071-00515	Ghouchan	W	V	3	3	48	112	5	W	OB	22	1808
65-071-00040	Kermanshah	W	V	3	3	47	111	5	W	R	41	1710
65-071-00517	Ghouchan	W	V	3	3	48	111	4	W	OB	24	1664
65-071-00680	Kermanshah	W	V	2	2	48	110	4	W	OB	28	1550
65-071-00658	Dashtsar Amol	W	V	3	3	47	115	4	W	R.C	21	1390
65-071-00042	Shiraz	W	V	3	3	48	111	4	W	R	28	1239
65-157-00014	USA	W	V	2	2	47	112	4	W	OB	25	1158
65-153-00757	Turkey	W	B	3	3	49	111	4	W	R.E	26	1156
65-071-01948	Shiraz	W	V	4	4	47	110	5	W	OB	45	1121
LSD 5%												483
CV%												26

جدول شماره ۷۶ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا سفید ـ تاریخ کشت ۴۹/۲/۱۲ (دانشکده کشاورزی دانشگاه تهران)

Table 76 - Agronomic Data - White Beans - Uniform Advanced Yield Test - Planted May 2, 1970, Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)
Accession Number	SOURCE	Flower Color	Plant Type	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Pl. to Com.Mat.	Disease Rating	Pod Shape	Pod Size	Seed Color	Seed Shape	100 Seeds Weight	Yield per Hectare
65-157-00014	U.S.A.	W	V	21	2	2	65	99	118	3	CF	M	W	OB	25	2791
65-071-00515	Ghochan	W	V	25	2	2	67	104	120	2	CF	M	W	OB	23	2670
65-071-00505	Shiraz	W	V	23	3	2	64	101	119	2	CF	M	W	R	28	2542
65-071-00040	Kermanshah	W	V	22	2	2	65	99	117	3	CF	M	W	R	28	2438
65-071-00517	Ghochan	W	V	21	2	2	61	99	117	3	CF	M	W	OB	23	2433
65-071-01948	Shiraz	W	V	22	2	2	66	100	118	3	CF	M	W	OB	27	2402
65-071-00042	Marmar	W	V	22	2	3	66	99	117	3	CF	S	W	R	27	2356
65-071-00658	Dashtesar Amol	W	V	18	4	3	63	105	124	2	CF	M	W	RC	43	2317
65-071-00680	Kermanshah	W	V	19	3	2	65	99	118	3	CF	M	W	OB	26	2267
65-153-00757	Turkey	W	B	17	2	2	63	100	121	1	SF	L	W	RE	41	2154
LSD 5%																298
CV%																10

Legend for Cowpea Agronomic Data Tables 77 - 86

(1) Numbers assigned to collection maintained by the Regional Pulse Improvement Project.

(2) Source numbers refer to PI numbers from New Crops Research Branch, Crops Research Division, ARS, U.S. Department of Agriculture, Beltsville, Maryland, "C" numbers are strains obtained from Oklahoma State University. Other three and four digit numbers are numbers assigned by the Iranian Ministry of Agriculture.

(3) Source indicates variety name or area of origin.

(4) Flower color: PR = Purple; W = White; WPR = Mixed White and Purple flowers.

(5) Plant type: E = Erect; SE = Semi-erect; B = Bushy; P = Prostrate; BP = Bushy Prostrate.

(6) Plant height (in centimeters) at near full plant growth.

(7) Plant width (in centimeters) at near full plant growth.

(8) Plants per meter is an average number of plants per meter of row based on one meter sample per replication.

(9) Rated 1 to 9: 1 = Complete stand; 9 = Poor stand.

(10) Rated 1 to 9: 1 = Vigorous plants; 9 = Weak plants.

(11) Days from planting to first opened flower.

(12) Days from planting to first mature pod ready for harvest.

(13) Rated 1 to 9: 1 = Free from disease symptoms; 9 = Severe disease symptoms, major disease mosaic virus.

(14) Pod shape: S = Straight; C = Curved; M = Mixture of straight and curved.

(15) Pod color: Br = Brown; Pu = Purple; P = Pink; Cr = Cream; W = White; Y = Yellow; G = Green; L = Light; D = Dark.

(16) Pod size: VL = Very large; L = Large; M = Medium; S = Small.

(17) Seeds per pod is average based on five random pods per replication.

(18) Seed Color: Cr = Cream; P = Pink; M = Milky; Bk = Black; Br = Brown; G = Green; Bl = Blue; W = White; Y = Yellow; R = Red; Pu = Purple; Sp = Spotted; D = Dark; L = Light.

(19) Eye color: Cr = Cream; P = Pink; M = Milky; Bk = Black; Br = Brown; G = Green; Bl =Blue; W = White; Y = Yellow; R = Red; Pu = Purple; D = Dark; L = Light.

(20) Seed size: L = Large, approximately 24 grams per 100 seeds; M = Medium, approximately 15 grams per 100 seeds; S = Small, approximately 8 grams per 100 seeds.

(21) Shattering rated 1 to 9: 1 = No loss of seed from shattering; 9 = considerable loss of seed from shattering.

(22) 100 seeds weight - average weight (in grams) of 100 seeds.

(23) Yield in kilogram per hectare based on 10 M^2 plots.

جدول شماره ۷۷ : آزمایش مقایسه عملکرد مقدماتی لوبیا چشم بلبلی ـ تاریخ کشت ۴۹/۲/۵ (گـــــــرگان)

طـرح : بلوکهای تصادفـی ۱۰ رقم در ۵ تکـرار

Table 77 - Agronomic Data - Cowpeas - Preliminary Yield Test - Planted April 25, 1970 - Ministry of Agriculture,,Gorgan, Iran

(1)	(2)	(3)	(4)	(6)	(9)	(10)	(11)	(17)	(22)	(23)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Stand	Vigor	Pl. to 1st Fl.	Seeds Per Pod	100 Seeds Weight	Yield per Hectare
62-071-10003	238	Meshed	Y	48	1	1	62	13	19	2846
62-157-00347	293505	Parastoo	Y	54	1	1	60	14	21	2732
62-157-00316	293477	California Black Eye	Y	45	1	1	61	12	19	2688
62-069-00070	183363	India	W	57	2	2	62	11	20	2546
62-157-00295	293458	Black Eye No. 5	Y	52	1	1	60	13	21	2542
62-071-01432	178	Isfahan	Pr	63	1	1	60	13	20	2494
62-153-00057	179555	Kamran	W Pr	50	3	3	28	13	20	2486
62-155-00224	250587	Egypt	Y	65	1	1	61	12	20	2468
62-157-00287	293449	Bunch	W	74	1	1	30	12	20	2404
62-071-01446	179	Isfahan	W	55	1	1	62	11	19	2328

Yield differences not significant at .05 level.

CV% 19

جدول شماره ۷۸ : آزمایش مقایسه عملکرد مقدماتی لوبیا چشم بلبلی ـ تاریخ کشت ۴۹/۲/۱۰ (ورامـین)

Table 78 - Agronomic Data - Cowpeas - Preliminary Yield Test - Planted April 30, 1970 - Ministry of Agriculture, Varamin, Iran

(1)	(2)	(3)	(4)	(9)	(10)	(17)	(22)	(23)
Accession Number	Source Number	S O U R C E	Flower Color	Stand	Vigor	Seeds per Pod	100 Seeds Weight	Yield per Hectare
62-157-00295	293458	Black Eye No. 5	W	4	6	10	21	2355
62-157-00347	293505	Parastoo	W	3	3	10	21	2140
62-157-00316	293477	California Black Eye	W	1	2	7	20	2000
62-155-00224	250587	Egypt	W	3	3	8	21	1970
62-071-01432	178	Isfahan	W	2	3	8	21	1825
62-071-10003	238	Meshed	W	3	4	9	19	1670
62-069-00070	183363	India	W	2	4	10	24	1450
62-153-00057	179555	Kamran	W	1	2	10	19	1380
62-157-00287	293449	Bunch	W	2	2	11	22	1345
62-071-01446	179	Isfahan	W	1	3	8	22	1095

LSD 5% 757

CV% 34

جدول شماره ۷۹ : آزمایش مقایسه عملکرد مقدماتی لوبیا چشم بلبلی — تاریخ کشت ۴۹/۳/۴ (دانشکده کشاورزی دانشگاه تهران)

طرح : بلوکهای تصادفی ۱۰ رقم در ۵ تکرار

Table 79 - Agronomic Data - Cowpeas - Preliminary Yield Test - Planted May 25, 1970, Karaj, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Flower Color	(5) Plant Type	(6) Plant Height	(7) Plant Width	(8) Plants /Meter	(9) Stand	(10) Vigor	(11) Pl. to 1st Fl.	(12) Pl. to 1st Mat.	(13) Disease Rating	(14) Pod Shape	(15) Pod Color	(16) Pod Size	(17) Seeds per Pod	(18) Seed Color	(19) Eye Color	(20) Seed Size	(21) Shatter	(23) Yield per Hectare
62-157-00287	293449	Bunch	W	E	37	42	29	2	2	73	94	3	S	L Br	M	10	W	Br	M	1	1809
62-071-10003	238	Meshed	PR	E	34	34	30	2	2	60	87	2	S	LY	M	7	W	BK	M	1	1676
62-157-00347	293505	Parastoo	W	SE	31	31	30	2	2	54	83	2	S	LY	S	8	W	BK	L	1	1660
62-153-00057	179555	Kamran	W	E	33	43	29	2	2	72	91	3	S	W	M	9	Cr	Cr	M	1	1621
62-071-01446	179	Isfahan	PR	E	34	40	32	3	2	57	87	3	S	LY	M	8	W	BK	M	1	1603
62-157-00316	293477	Calif. Black Eye	W	SE	30	37	30	3	2	58	86	3	S	LY	M	8	W	BK	L	2	1576
62-069-00070	183363	India	W	E	39	42	31	2	2	65	93	3	S	W	M	8	Cr	Br	M	1	1474
62-155-00224	250587	Egypt	PR	SE	30	33	26	2	2	55	86	3	S	W	S	7	W	BK	L	2	1442
62-157-00295	293458	Black Eye No. 5	W	SE	28	30	30	3	2	55	84	3	S	LY	S	7	W	BK	L	1	1427
62-071-01432	178	Isfahan	PR	SE	29	34	27	3	3	55	85	2	S	LY	M	8	W	BK	S	1	1357

Yield differences not significant at .05 level.
CV% 9

جدول شماره ۸۰ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا چشم بلبلی — تاریخ کشت ۴۹/۳/۴ (اهواز)

Table 80 - Agronomic Data - Cowpeas - Uniform Advanced Yield Test - Planted May 25, 1970 - Ministry of Agriculture, Ahwaz, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Flower Color	(6) Plant Height	(9) Stand	(10) Vigor	(11) Pl. to 1st Fl.	(17) Seeds per Pod	(18) Seed Color	(22) 100 Seeds Weight	(23) Yield per Hectare
62-157-00296	293459	Black Eye No. 7	W Pr	66	1	1	40	7	W	26	3867
62-157-00470	642 C	Princess Ann	W Pr	68	1	1	40	7	W	24	3625
62-157-00353	293513	Giant Ramshorn	W Pr	56	1	1	41	6	W	24	3584
62-157-00347	293505	Parastoo	W Pr	58	1	1	38	7	W	27	3109
62-071-00472	2421375	Karaj 150	W Pr	47	1	1	41	8	W	21	2517
62-110-00234	255765	Nigeria	W Pr	34	1	1	42	6	W	16	1235
62-085-00065	181833	Lebanon	W Pr	32	1	1	41	8	Br	14	935
62-071-10003	238	Meshed	W Pr	42	1	1	42	6	W	22	931
62-157-00318	293480	Calara	W Pr	37	1	1	42	6	W	15	914
62-153-00057	179555	Kamran	W Pr	50	1	1	41	6	W	24	550

LSD 5% 95
CV% 14

جدول شماره ۸۱ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا چشم بلبلی ـ تاریخ کشت ۴۹/۲/۵ (گـــــرگان)

طرح : بلوکهای تصادفی ۱۰ رقم در ۵ تکـرار

Table 81 - Agronomic Data - Cowpeas - Uniform Advanced Yield Test - Planted April 25, 1970 - Ministry of Agriculture, Gorgan, Iran

(1)	(2)	(3)	(4)	(6)	(9)	(10)	(11)	(17)	(22)	(23)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Stand	Vigor	Pl. to 1st Fl.	Seeds Per Pod	100 Seeds Weight	Yield per Hectare
62-157-00296	293459	Black Eye No. 7	W	52	1	1	55	13	24	3580
62-071-00472	2-42-1375	Karaj 150	W	64	1	1	57	14	20	3552
62-153-00057	179555	Kamran	W Pr	54	1	1	54	14	24	3442
62-071-10003	238	Meshed	Y	65	1	1	55	13	22	3286
62-157-00353	293513	Giant Ramshorn	W Pr	58	1	1	57	12	24	3126
62-157-00470	642 C	Princess Ann	Y	54	2	2	53	14	18	3024
62-157-00347	293505	Parastoo	W	38	1	1	54	14	24	2980
62-157-00318	293480	Calara	Pr	38	1	1	55	15	18	2904
62-110-00234	255765	Nigeria	Pr	55	1	1	54	17	17	2654
62-085-00065	181833	Lebanon	Y	40	1	1	55	15	16	2562
LSD 5%										547
CV%										14

جدول شماره ۸۲ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا چشم بلبلی ـ تاریخ کشت ۴۹/۲/۲۰ (رضائـــــیه)

Table 82 - Agronomic Data - Cowpeas - Uniform Advanced Yield Test - Planted May 10, 1970 - Ministry of Agriculture, Rezaieh, Iran

(1)	(2)	(3)	(4)	(6)	(7)	(9)	(10)	(11)	(17)	(18)	(22)	(23)
Accession Number	Source Number	S O U R C E	Flower Color	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Seeds per Pod	Seed Color	100 Seeds Weight	Yield per Hectare
62-071-00472	2421375	Karaj 150	W	40	27	1	1	83	10	W	22	2720
62-157-00470	642 C	Princess Ann	W	40	25	1	1	73	10	W	20	1860
62-157-00296	293459	Black Eye No. 7	W Pr	45	27	1	1	75	9	W	22	1820
62-110-00234	255765	Nigeria	W	24	33	1	1	73	10	W	18	1700
62-157-00318	293480	Calara	W	42	28	1	1	74	12	W	20	1680
62-071-10003	238	Meshed	W	40	30	1	1	74	10	W	19	1520
62-157-00353	293513	Giant Ramshorn	W	39	24	1	1	80	12	W	20	1440
62-085-00065	181833	Lebanon	W	39	24	1	1	83	11	Br	19	1320
62-157-00347	293505	Parastoo	W Pr	41	23	1	1	76	12	W	20	1300
62-153-00057	179555	Kamran	W	36	29	1	1	83	12	W	11	1020
LSD 1%												796
CV%												28

جدول شماره ۸۳ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا چشم بلبلی — تاریخ کشت ۴۹/۲/۱۰ (ورامین — وزارت کشاورزی)

Table 83 - Agronomic Data - Cowpeas - Uniform Advanced Yield Test - Planted April 30, 1970 - Ministry of Agriculture, Varamin, Iran

(1)	(2)	(3)	(4)	(7)	(9)	(10)	(17)	(22)	(23)
Accession Number	Source Number	SOURCE	Flower Color	Plant Width	Stand	Vigor	Seeds Per Pod	100 Seeds Weight	Yield per Hectare
62-157-00296	293459	Black Eye No. 7	W	46	2	4	12	21	2017
62-153-00057	179555	Kamran	W	62	2	4	9	22	1685
62-157-00347	293505	Parastoo	W	42	4	5	9	21	1681
62-157-00353	293513	Giant Ramshorn	W	77	7	9	11	20	1544
62-071-10003	238	Meshed	W	45	4	5	9	20	1411
62-157-00470	642 C	Princess Ann	W	76	7	8	10	17	1056
62-110-00234	255765	Nigeria	W	84	5	6	9	15	1000
62-085-00065	181833	Lebanon	W	52	5	6	10	14	994
62-157-00318	293480	Calara	W	66	5	6	9	15	855
62-071-00472	2-42-1375	Karaj 150	W	76	8	9	8	19	800
LSD 5%									701
CV%									37

جدول شماره ۸۴ : آزمایش مقایسه عملکرد یونیفورم لوبیا چشم بلبلی — تاریخ کشت ۴۹/۲/۱۳ (شیراز — دانشگاه پهلوی)

Table 84 - Agronomic Data - Cowpeas - Uniform Advanced Yield Test - Planted May 3, 1970 - Pahlavi University, Shiraz, Iran

(1)	(2)	(3)	(6)	(7)	(9)	(10)	(11)	(17)	(22)	(23)
Accession Number	Source Number	SOURCE	Plant Height	Plant Width	Stand	Vigor	Pl. to 1st Fl.	Seeds Per Pod	100 Seeds Weight	Yield per Hectare
62-085-00065	181833	Lebanon	38	50	7	1	70	11	12	796
62-071-00472	2-42-1375	Karaj 150	40	48	7	1	71	8	17	776
62-157-00318	293480	Calara	42	48	7	1	64	10	12	769
62-110-00234	255765	Nigeria	42	47	7	1	64	9	12	767
62-071-10003	238	Meshed	39	46	7	1	71	8	19	645
62-157-00347	293505	Parastoo	48	48	6	1	64	8	19	636
62-157-00296	293459	Black Eye No. 7	47	42	7	1	64	8	19	609
62-153-00057	179555	Kamran	44	49	7	1	71	10	19	594
62-157-00470	642 C	Princess Ann	42	43	5	2	56	7	16	361
62-157-00353	293513	Giant Ramshorn	52	48	6	1	65	8	18	356
LSD 5%										32

جدول شماره ۸۵ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا چشم بلبلی ـ تاریخ کشت ۴۹/۲/۲۷ (تبریز ـ دانشکده کشاورزی)

Table 85 - Agronomic Data - Cowpeas - Uniform Advanced Yield Test - Planted May 17, 1970 - Tabriz College, Tabriz, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Flower Color	(5) Plant Type	(6) Plant Height	(7) Plant Width	(9) Stand	(10) Vigor	(11) Pl. to 1st Fl.	(12) Pl. to Com.Mat.	(17) Seeds per Pod	(18) Seed Color	(19) Eye Color	(20) Seed Size	(22) 100 Seeds Weight	(23) Yield per Hectare
62-153-00057	179555	Turkey - Kamran	W	SE	44	25	3	3	56	155	12	Cr	BK	L	25	895
62-157-00296	293459	USA Black Eye No. 7	W	E	36	22	3	3	56	153	12	W	BK	L	24	885
62-071-10003	238	Meshed	W	SE	39	21	3	2	55	150	12	W	BK	L	28	847
62-157-00353	293513	USA Giant Ramshorn	W	E	43	22	3	3	57	155	12	W	Br	L	24	788
62-157-00470	642 C	USA Princess Ann	WP	E	33	16	3	4	56	157	13	W	BK	L	25	786
62-157-00318	293480	USA Calara	WP	SE	31	15	3	3	54	156	10	W	BK	L	24	776
62-110-00234	255765	Nigeria	WP	SE	30	14	3	4	54	158	11	W	BK	L	23	744
62-085-00065	181833	Lebanon	W	P	46	25	3	3	56	157	13	LBr	Br	MS	12	645
62-071-00472	2-42-1375	Karaj 150	W	SE	42	24	3	3	57	156	13	W	BK	ML	19	585
62-157-00347	293505	USA Parastoo	W	SE	41	20	3	4	54	155	9	W	BK	L	24	554

Yield Differences Not Significant at .05 Level.
CV% 30

جدول شماره ۸۶ : آزمایش مقایسه عملکرد عالی یونیفورم لوبیا چشم بلبلی ـ تاریخ کشت ۴۹/۳/۴ (دانشکده کشاورزی دانشگاه تهران)

طرح : بلوکهای تصادفی ۱۰ رقم در ۵ تکرار

Table 86 - Agronomic Data - Cowpeas - Uniform Advanced Yield Test - Planted May 25, 1970 - Karaj, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Flower Color	(5) Plant Type	(6) Plant Height	(7) Plant Width	(8) Plants /Meter	(9) Stand	(10) Vigor	(11) Pl. to 1st Fl.	(12) Pl. to 1st Mat.	(13) Disease Rating	(14) Pod Shape	(15) Pod Color	(16) Pod Size	(17) Seeds per Pod	(18) Seed Color	(19) Eye Color	(20) Seed Size	(21) Shatter	(23) Yield per Hectare
62-071-00472	2-42-1375	Karaj 150	W	E	34	44	24	2	2	59	85	3	S	LY	M	7	W	BK	L	1	2080
62-157-00296	293459	Black Eye No. 7	PR	E	33	35	27	2	2	54	84	2	S	LY	S	9	W	BK	M	1	2021
62-153-00057	179555	Kamran	W	SE	29	46	20	2	2	58	87	3	S	W	M	8	Cr	Cr	M	1	1998
62-085-00065	181833	Lebanon	PR	B	22	45	26	2	2	60	87	3	S	LY	S	8	Br	Cr	S	1	1894
62-157-00353	293513	Giant Ramshorn	W	E	44	35	23	2	2	57	87	3	S	LY	M	8	W	BK	L	1	1868
62-071-10003	238	Meshed	PR	SE	33	40	30	2	2	59	86	2	S	LY	M	7	W	BK	L	1	1801
62-110-00234	255765	Nigeria	PR	SE	28	38	28	2	3	55	85	3	S	Y	S	8	W	BK	S	2	1620
62-157-00318	293480	Calara	PR	SE	25	37	24	2	3	56	86	3	S	T	M	9	W	BK	S	2	1599
62-157-00470	C 642	Princess Ann	PR	SE	33	35	28	2	2	54	84	3	S	Br	M	6	W	BK	M	1	1538
62-157-00347	293505	Parastoo	W	SE	30	38	23	3	2	56	85	3	S	LY	S	9	W	BK	L	1	1426

Yield differences not significant at .05 level.
CV%

Legend for Mungbean Agronomic Data Tables 87 - 92

(1) Numbers assigned to collection maintained by the Regional Pulse Improvement Project.

(2) Three digit numbers are Iranian Ministry of Agriculture numbers, six digit numbers refer to PI numbers from New Crops Research Branch, CRD, ARS, U. S. Department of Agriculture, Beltsville, Maryland, USA.

(3) Indicates variety name or area of origin.

(4) E = Erect; B = Bushy; P = Prostrate; SP = Semi-prostrate.

(5) Plant height measured in centimeters at full plant growth.

(6) Number of plants per meter of row, based on one meter sample per replication.

(7) Rated 1 to 9: 1 = Complete Stand; 9 = Poor stand.

(8) Rated 1 to 9: 1 = Vigorous plants; 9 = Weak plants.

(9) Days from planting to first open flower.

(10) Days from planting to first mature pod ready for harvest.

(11) Rated 1 to 9: 1 = Free from disease symptoms; 9 = Severe disease symptoms.

(12) Average number of seeds per 10 pods based on ten pods/Replication.

(13) Average weight (in grams) of 100 seeds.

(14) Yield in kilogram based on $5m^2$ or $10m^2$ plots.

جدول شماره ۸۷ : آزمایش مقایسه عملکرد ماش ـ تاریخ کشت ۱۰ / ۳ / ۱۳۴۹ (دانشکده کشاورزی دانشگاه تهران)

Table 87 - Agronomic Data - Mungbeans - Preliminary Yield Test - Planted May 31, 1970 RPIP Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Accession Number	Source Number	S O U R C E	Plant Type	Plant Height	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st. Mat.	Disease Rating	Seeds Per 10 Pods	1000 Seeds Weight	Yield per Hectare
48-071-10827	224	Darehgaz	B	27	30	3	2	49	70	2	110	47	2216
48-071-10962	184	Shiraz	SE	33	26	2	2	47	66	4	110	43	2200
48-071-10961	210	Sari	SE	35	27	2	1	51	70	3	110	55	2017
48-071-11167		Iran	E	42	29	2	2	53	74	2	120	39	1842
48-071-10681	223	Isfahan	SE	39	21	2	1	56	72	2	110	44	1832
48-157-11087		USA Berken	SE	41	20	2	2	54	73	3	110	63	1830
48-071-10414	216	Jiroft	B	37	27	2	2	55	76	2	110	56	1767
48-071-10960	211	Nosratabad	SE	39	23	1	2	55	72	3	100	45	1723
48-071-11168		Iran	SE	38	19	2	2	49	71	3	100	64	1719
48-071-10528	217	Kermanshah	SE	40	28	1	1	50	73	2	110	27	1715
48-071-10293	218	Zahedan	B	31	18	1	1	56	75	1	120	57	1703
48-071-10865	218	Zahedan	B	36	20	2	1	53	74	2	110	48	1697
48-071-10677	223	Isfahan	SE	35	18	1	2	52	73	3	100	48	1691
48-071-10539	217	Kermanshah	SE	47	31	2	2	50	73	3	110	49	1608
48-071-10707	222	Sari	B	19	26	3	2	48	65	4	110	64	1573
48-157-11085		USA Kilgoa	SE	32	21	2	2	49	69	2	120	45	1551
48-071-10288	215	Karaj	B	32	18	3	2	57	75	2	110	53	1542
48-071-10421	214	Isfahan	SE	34	26	2	1	56	74	2	110	30	1507
48-071-10913	215	Karaj	SE	45	24	2	1	57	75	3	110	36	1464
48-071-10957	223	Isfahan	SE	48	27	3	2	52	72	3	110	49	1446
48-071-10862	218	Zahedan	SE	43	17	1	2	58	76	2	110	38	1421
48-071-10429	214	Isfahan	SE	33	18	2	2	49	73	2	110	31	1417
48-071-10808	224	Darehgaz	SE	43	26	2	1	55	72	2	110	53	1378
48-071-10829	224	Darehgaz	SE	54	21	1	1	59	76	3	120	35	1354
48-069-11007		Dezful (S) Iran	E	62	26	2	1	62	80	2	120	51	1151
LSD 5%													240
CV%													10

جدول شماره ۸۸ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۲ ماش ـ تاریخ کشت ۴۹/۲/۱۰ (ورامین)

Table 88 - Agronomic Data - Mungbeans - Advanced Yield Test - Planted April 30, 1970 - Ministry of Agriculture, Varamin, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(5) Plant Height	(7) Stand	(8) Vigor	(9) Pl. to 1st Fl.	(12) Seeds per 10 Pods	(13) 1000 Seeds Weight	(14) Yield per Hectare
48-071-10926	215	Karaj	58	2	2	51	100	40	2030
48-157-11085	M1	Kiloga USA	55	4	3	51	110	60	1775
48-071-10783	226	Karaj	76	3	2	52	110	50	1556
48-071-10283	215	Karaj	72	3	2	48	100	50	1510
48-071-11089	15279	Kerman	95	4	2	48	120	50	1493
48-071-10292	215	Karaj	69	2	1	51	110	60	1290
48-071-10855	218	Zahedan	65	4	2	51	100	50	1215
48-071-10757	226	Karaj	75	2	2	45	110	50	1173
48-071-10865	218	Zahedan	76	2	2	50	90	60	1079
48-071-10810	224	Darehgaz	87	2	2	50	110	50	1060
LSD 5%									484
CV%									27

جدول شماره ۸۹ : آزمایش مقایسه عملکرد عالی شماره ۲ ماش ـ تاریخ کشت ۴۹/۳/۱۰ (دانشکده کشاورزی دانشگاه تهران)

Table 89 - Agronomic Data - Mungbeans - Advanced Yield Test - Planted May 31, 1970 - Karaj, Iran

(1) Accession Number	(2) Source Number	(3) SOURCE	(4) Plant Type	(5) Plant Height	(6) Plants /Meter	(7) Stand	(8) Vigor	(9) Pl. to 1st Fl.	(10) Pl. to 1st Mat.	(11) Disease Rating	(12) Seeds Per 10 Pods	(13) 1000 Seeds Weight	(14) Yield per Hectare
48-071-10757	226	Karaj	SE	30	19	2	1	48	66	4	104	41	1740
48-071-10926	215	Karaj	SE	36	19	2	2	54	72	2	104	41	1704
48-071-10865	218	Zahedan	E	40	24	2	1	56	72	2	112	59	1626
48-071-10783	226	Karaj	SE	39	20	2	2	53	72	2	112	51	1616
48-071-10855	218	Zahedan	SE	36	25	1	1	54	72	2	104	50	1548
48-071-11089	15279	Kerman	SE	33	26	3	2	54	70	2	104	45	1541
48-157-11085	M1	Kiloga USA	SE	33	23	2	1	59	75	2	104	55	1399
48-071-10810	224	Darehgaz	E	47	22	1	1	54	72	3	104	43	1348
48-071-10292	215	Karaj	E	48	26	2	2	57	73	3	112	43	1303
48-071-10283	215	Karaj	E	44	21	3	1	54	72	3	110	46	1223
LSD 5%													359
CV%													19

جدول شماره ۹۰ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ ماش ـ تاریخ کشت ۴۹/۲/۱۰ (مشهد)

Table 90 - Agronomic Data - Mungbeans - Uniform Advanced Yield Test - Planted April 30, 1970, Ministry of Agriculture, Meshed, Iran

(1)	(2)	(3)	(5)	(7)	(8)	(9)	(12)	(13)	(14)
Accession Number	Source Number	S O U R C E	Plant Height	Stand	Vigor	Pl. to 1st Fl.	Seeds Per 10 Pods	1000 Seeds Weight	Yield per Hectare
48-157-10307	31287	Partow	58	1	1	53	110	60	2240
48-157-11155	906 V	USA	60	1	1	58	110	70	2009
48-157-11156	921 V	USA	58	1	1	53	110	70	1996
48-157-10023	31728	Beltsville, USA	59	1	1	55	90	40	1995
48-157-11153	903 V	USA	49	1	1	63	100	50	1986
48-069-10075	183136	Ghohar	28	3	2	52	110	70	1962
48-071-10282	215	Karaj	57	1	1	54	100	35	1958
48-033-10045	171435	China	58	1	2	52	100	40	1911
48-071-10293	218	Zahedan	55	1	1	55	90	60	1875
48-069-10104	212908	India	64	1	2	54	90	35	1544
LSD 5%									257
CV%									10

جدول شماره ۹۱ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ ماش ـ تاریخ کشت ۴۹/۲/۱۰ (ورامین)

Table 91 - Agronomic Data - Mungbeans - Uniform Advanced Yield Test - Planted April 30, 1970 - Ministry of Agriculture, Varamin, Iran

(1)	(2)	(3)	(5)	(7)	(8)	(9)	(12)	(13)	(14)
Accession Number	Source Number	S O U R C E	Plant Height	Stand	Vigor	Pl. to 1st Fl.	Seeds Per 10 Pods	1000 Seeds Weight	Yield per Hectare
48-157-11155	906 V	U.S.A.	68	3	2	46	100	40	1620
48-071-10293	218	Zahedan	63	2	2	50	100	60	1575
48-157-11153	903 V	U.S.A.	58	4	3	53	100	60	1540
48-069-10104	212908	India	76	4	2	48	100	40	1520
48-071-10282	215	Karaj	65	3	3	52	70	50	1322
48-033-10045	171435	China	87	2	2	46	110	50	1320
48-157-11156	921 V	U.S.A.	105	2	2	53	100	50	1285
48-157-10023	31728	Beltsville, U.S.A.	79	2	2	51	90	50	1265
48-157-10307	31287	Partow	123	2	2	48	110	40	1194
48-069-10075	183136	Ghofar	47	2	2	45	90	70	1030

Yield differences not significant at .05 level.
CV %

35

جدول شماره ۹۲ : آزمایش مقایسه عملکرد عالی یونیفورم شماره ۱ ماش ـ تاریخ کشت ۴۹/۳/۱۰ (دانشکده کشاورزی دانشگاه تهران)

Table 92 - Agronomic Data - Mungbeans - Uniform Advanced Yield Test - Planted May 31, 1970, Karaj, Iran

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Accession Number	Source Number	S O U R C E	Plant Type	Plant Height	Plants /Meter	Stand	Vigor	Pl. to 1st Fl.	Pl. to 1st Mat.	Disease Rating	Seeds Per 10 Pods	1000 Seeds Weight	Yield per Hectare
48-069-10104	212908	India	E	33	28	2	1	52	71	3	110	43	1514
48-157-11156	921 V	USA	SE	35	23	2	2	54	75	2	110	47	1494
48-069-10075	183136	Ghofar	B	17	22	2	1	48	66	3	110	62	1461
48-157-10307	31287	Partow	E	38	23	2	2	50	69	2	110	48	1457
48-071-10282	215	Karaj	SE	37	22	1	1	51	71	2	100	43	1424
48-071-10293	218	Zahedan	SE	33	22	3	2	55	71	2	110	49	1385
48-157-11153	903 V	USA	SE	34	24	3	2	53	75	2	110	54	1376
48-157-11155	906 V	USA	SE	35	19	3	2	51	68	3	110	42	1361
48-157-10023	31728	Beltsville, USA	E	38	19	2	2	52	70	2	120	52	1334
48-033-10045	171435	China	B	27	17	2	3	50	68	3	100	48	1133

Yield differences not significant at .05 level.
CV%

SOIL AND CROP MANAGEMENT

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SUMMARY

Plant Population Density - Crops were planted in one and two rows on 50 cm beds at different spacings between plants in the row. For lentils, two rows per bed increased yields over one row at populations in excess of about 400,000 plants/ha. Maximum yields were obtained at 600,000 plants/ha for each row spacing. However, the maximum yield for two rows per bed was 3.2 tons/ha compared with 2.8 for one row.

For three other pulse crops, yields were not increased by planting in double rows per bed. Maximum yields were obtained at a population density of approximately 400,000 plants/ha for dry beans and chickpeas and at 200,000 for cowpeas.

Fertilization - Phosphorus and zinc fertilization of dry beans had no significant effect on grain yields, although the average phosphorus content of the leaves at three stages of growth was increased from 0.22 to 0.24% by the application of 150 kg P/ha.

Irrigation - Eleven varieties of dry beans were irrigated at intervals of 5, 7, and 9 days, to test varietal response to frequency of irrigation. Four of the varieties had an average yield decrease of 15% for the 5-day interval as compared with the 7-day. Although symptoms were not evident, this yield despression suggests that these four varieties are more susceptible to root rot. For the other seven varieties, yields for the 5- and 7-day intervals were approximately equal. Irrigating at 9-day intervals generally resulted in lower yields.

Yields of dry beans were maintained at higher levels by irrigating at short intervals (6 days) with a low level of water (5 cm) at each irrigation than by irrigating less frequently (12 days) with a higher level (10 cm). Although these two irrigation regimes required equal quantities (60 cm) of water for the growing season, yield was decreased by one-third as the result of irrigating less frequently. An additional yield reduction resulted from levels of 48 and 36 cm for the season, especially with 9- and 12-day irrigation frequencies.

Plant Population Density

Plantings were made on 50-cm beds, with one row and two rows per bed. With two rows per bed, the rows were spaced approximately 20 cm apart. Plants were spaced within the row so as to give a range of 7.5 to 37.5 plants per meter of row for lentils and from 5 to 25 plants per meter of row for chickpeas, dry beans, and cowpeas. Population densities of lentils ranged from 300,000 to 750,000 plants per hectare for a single row per bed and from 300,000 to 1,200,000 for the double row beds. Densities of the other crops ranged from 200,000 to 800,000 plants per hectare. A split-plot design in five replications was used.

The effects of row spacing and plant population density on grain yields are given in Table 93. Closer row spacing, resulting from two rows per 50-cm bed, increased the yield of lentils, but had no significant effect on the yield of chickpeas, beans, and cowpeas. In the case of lentils, for plant population densities of 450,000 or more per hectare, two rows per bed produced approximately one-fourth more grain than one row per bed. This difference held for the various plant spacings within the row. The differential response of lentils to row spacing, in comparison with the other crops, is probably associated with smaller size of the lentil plants.

Maximum yields were obtained at approximately 600,000 plants per hectare for lentils, 400,000 for chickpeas and dry beans, and 200,000 for cowpeas. These data, as well as previous results, show that reduced yields are generally obtained for plant population densities that are lower than these values.

Fertilization

Fertilizer treatments for dry beans consisted of (1) mixing soil applied fertilizer in the surface 10 cm of soil compared with banding

near the seed, (2) superphosphate applied at rates of 0, 50, and 150 kg P_2O_5 per hectare, and (3) zinc sulfate applied to soil at a rate of 40 kg zinc per hectare and as foliar application at a 20 kg rate. Foliar applications were made at pre-bloom and full bloom stages of growth. Leaf samples collected at pre-bloom, full bloom, and post bloom were analyzed for total phosphorus. A split plot design in four replications was used, with the method of fertilizer application as the main plots, zinc treatments as the sub-plots, and rates of phosphorus as the sub-sub-plots.

Grain yields were not significantly affected by any of the fertilization treatments, although phosphorus fertilization slightly increased the phosphorus content of the bean leaves (Table 94). The expected yield response to phosphorus, based on soil analyses, was not shown. Zinc applications had no appreciable effect on phosphorus uptake or crop yield. Zinc deficiency symptoms were not evident.

Irrigation

Two irrigation studies with dry beans were conducted: (1) to evaluate the response of different varieties to frequency of irrigation and (2) to determine the effect of the combination of frequency and level of irrigation. In the first study, 10 varieties were irrigated at intervals of 5, 7, and 9 days. Sufficient water was applied at each irrigation to raise the soil moisture content to field capacity or higher. In the second study, irrigations were made at intervals of 6, 9, and 12 days in zero-grade closed-end furrows. A specific quantity of water was applied to each plot at each irrigation, representing 3 levels for each irrigation frequency. These levels were calculated to equal the amount of water required to raise the soil moisture content to 100, 80, and 60 percent respectively, of the field capacity. The quantity of water applied was measured by means of siphons set at specific heads for specific periods of time.

Data in Table 95 show a differential response among varieties to the frequency of irrigation. The 10 varieties were divided into two groups, based on the relative yields for the 5- and 7-day irrigation treatments. The four varieties in Group I had significantly lower yields when irrigated every five days, as compared with every 7 days. Yields of the other six varieties with 5-day irrigations were equal to or greater than those with the other treatments. These results show that short irrigation intervals may be detrimental to crop production as well as wasteful of water resources. Although disease symptoms were

not evident in 1970, observations in previous years indicated that excessive irrigation may result in the occurrence of root rot.

Dry bean yields were affected by the amount of water applied at each irrigation as well as by the length of time between irrigations (Table 96). The amounts of water applied at each irrigation ranged from 3 cm for the 5-day frequency to 10 cm for 12 days. The three levels of water application at each irrigation frequency totaled 60, 48, and 36 cm, respectively, during the 72-day irrigation season. Based on soil moisture data, it was estimated that the 60-cm level resulted in the soil moisture content in the root zone being raised to field capacity at each irrigation. The other two levels approximated 80 to 60% of field capacity. At the highest level (60 cm), grain yields were reduced by irrigating at 12-day intervals. That is, an application of 10 cm of water each 12 days was not as effective as applications of 7.5 cm each 9 days or 5 cm each 6 days. At the intermediate and low levels, yields were markedly reduced, especially with 9- and 12-day irrigation frequencies. These data indicate that, with a limited supply of water, it would be advantageous to apply moderate amounts of water at short intervals of time.

Table 93 . -- Influence of spacing of rows and plants within the row on grain yields of pulse crops. Karaj, 1970.

Plants/ha	Plants/m of row		Yield, T/ha	
	1 row/bed	2 rows/bed	1 row/bed	2 rows/bed
Lentils:				
300,000	15	7.5	2.15 b 1/	2.27 b
450,000	22.5	----	2.47 ab	----
600,000	30	15	2.80 a	3.16 a
750,000	37.5	----	2.48 ab	----
900,000	----	22.5	----	3.15 a
1,200,000	----	30	----	3.27 a
Chickpeas:				
200,000	10	5	0.77 b	0.92 a
300,000	15	----	0.89 ab	----
400,000	20	10	0.94 ab	1.01 a
500,000	25	----	1.05 a	----
600,000	----	15	----	1.09 a
800,000	----	20	----	1.00 a
Dry beans:				
200,000	10	5	1.98 c	1.78 c
300,000	15	----	2.29 b	----
400,000	20	10	2.51 ab	2.31 b
500,000	25	----	2.69 a	----
600,000	----	15	----	2.45 ab
800,000	----	20	----	2.61 a
Cowpeas:				
200,000	10	5	1.87 a	2.06 a
300,000	15	----	1.86 a	----
400,000	20	10	1.96 a	2.11 a
500,000	25	----	1.93 a	----
600,000	----	15	----	1.90 a
800,000	----	20	----	1.90 a

1/ Figures within a column followed by the same letter are not significantly different at the 5% level.

Table 94. -- Effect of zinc and phosphorus fertilization on phosphorus content of leaves and grain yield of dry beans, Karaj, 1970.

Fertilization		Phosphorus content of leaves, % P				Grain Yield
Zinc 1/	Phosphorus, kg P_2O_5/ha.	Pre-bloom	Full bloom	Post bloom	Mean	tons/ha
Fertilizer mixed in top 10 cm of soil						
None	0	0.26	0.17	0.21	0.21	2.01
	50	0.28	0.17	0.24	0.23	2.20
	150	0.30	0.19	0.25	0.25	1.85
Soil	0	0.24	0.15	0.22	0.20	2.35
	50	0.28	0.18	0.24	0.23	2.39
	150	0.26	0.21	0.23	0.23	2.16
Foliar	0	0.30	0.18	0.23	0.24	2.05
	50	0.26	0.17	0.26	0.23	2.26
	150	0.25	0.17	0.23	0.22	2.29
Fertilizer banded in soil						
None	0	0.30	0.18	0.20	0.22	2.10
	50	0.27	0.15	0.20	0.21	2.17
	150	0.31	0.18	0.27	0.25	2.13
Soil	0	0.29	0.18	0.25	0.24	2.26
	50	0.29	0.20	0.27	0.25	2.33
	150	0.29	0.19	0.26	0.25	2.20
Foliar	0	0.26	0.17	0.19	0.21	2.16
	50	0.28	0.15	0.18	0.21	2.21
	150	0.31	0.19	0.23	0.24	2.08
Means:						
Fertilizer mixed		0.27	0.18	0.23	0.23	2.17
Fertilizer banded		0.29	0.18	0.23	0.23	2.18
No zinc		0.29	0.17	0.23	0.23	2.08
Soil zinc		0.28	0.19	0.24	0.24	2.28
Foliar zinc		0.28	0.17	0.22	0.23	2.18
No P_2O_5		0.27	0.17	0.22	0.22	2.15
50 P_2O_5		0.28	0.17	0.23	0.23	2.26
150 P_2O_5		0.29	0.19	0.24	0.24	2.12

1/ Zinc as zinc sulfate applied to soil at 40 kg Zn/ha as a foliar application at 20 kg Zn/ha.

Table 95. -- Effect of irrigation frequency on grain yields (tons/ha) of different varieties of dry beans, Karaj, 1970.

Variety Accession Number	Irrigation frequency, days		
	5	7	9
Group I			
65-071-00042	2.47 b 1/	2.77 a	2.27 b
65-071-00040	2.37 b	3.10 a	2.44 b
65-071-00014	2.48 b	2.90 a	2.14 c
65-071-00517	2.45 b	2.80 a	2.54 b
Mean	2.44 b	2.89 a	2.35 b
Group II			
65-071-00505	2.53 a	2.56 a	2.25 b
65-071-00582	1.97 ab	2.07 a	1.91 b
65-085-00440	2.60 a	2.31 b	2.14 b
65-071-00431	2.48 a	2.43 ab	2.27 b
65-071-00566	2.41 a	2.34 a	2.11 b
65-157-00072	2.40 a	2.50 a	2.14 b
Mean	2.43 a	2.41 a	2.15 b

1/ Figures within a horizontal row followed by the same letter are not significantly different at the 5% level.

Table 96. -- Effect of frequency of irrigation and the quantity of water applied at each irrigation on yield of dry beans, Karaj, 1970.

Irrigation Frequency (days)	Number of Irrigations	Water applied (cm)		Grain Yield (tons/ha)
		Each Irrigation	Season Total 1/	
6	12	5.0	60	1.63 a 2/
		4.0	48	1.24 abc
		3.0	36	0.70 de
9	8	7.5	60	1.57 ab
		6.0	48	0.64 e
		4.0	36	0.55 e
12	6	10.0	60	1.15 bcd
		8.0	48	0.57 e
		6.0	36	0.44 e

1/ Irrigation treatments were started July 9, 1970, following two blanket irrigations. Crop was planted on June 18, 1970.

2/ Figures followed by the same letter are not significantly different at the 5% level.

PLANT PATHOLOGY

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SUMMARY

Major emphasis in pulse disease research during 1970 was focused on diseases currently reducing or potentially limiting the cultivation of pulse crops in Iran, especially bean (*Phaseolus vulgaris*) and chickpea (*Cicer arietinum*).

The most widespread and destructive disease of bean in Iran is caused by bean common mosaic virus (BCMV), an aphid-transmitted, seed-borne disease. Studies were initiated to determine the distribution of BCMV in Iran, and whether strains of the virus occur in the country. Virus-infected bean plants from farmers' fields and seeds from bazzars were collected in many bean growing areas. Host range studies indicate that there are at least two and possibly more strains of BCMV in Iran. Some isolates of BCMV infected leguminous hosts other than beans, such as chickpea and feenugreek (*Trigonella foenum-graecum*).

Two isolates of BCMV, one from bean and the other from mungbean (*Phaseolus aureus*), were studied in greater detail. The isolates from bean and mungbean differed in their host ranges, especially in the bean varieties that were infected. From electron micrographs of diseased tissue, the virus particles were similar, both having flexuous rods about 750 mμ in length.

In field inoculation studies utilizing two bean varieties and both BCMV isolates, yields of Bountiful and Red Kidney beans were reduced by 32 to 37% with the bean isolate, respectively, and by 61 to 80% with the mungbean isolate, respectively, when infection occurred before flowering.

Seed transmission of both isolates of BCMV varied greatly. Transmission of the bean isolate in seed from Bountiful bean infected prior to flowering was 42%, while that of the mungbean isolate was 7%.

Ascochyta blight (A. rabiei), the cause of a foliar disease of chickpea, is often a limiting factor in the cultivation of Cicer, especially in areas with frequent rainfall and/or high humidity during part of the growing season. The effects of nutrition and environment on growth, sporulation, and survival of isolates of the fungus from various chickpea growing areas of Iran have been studied in the laboratory, greenhouse, and field.

The optimum temperature for growth and sporulation was usually 20°C, although on some agar media, maximum sporulation occurred at 10 to 15°C. Higher temperatures reduced mycelial growth and sporulation. The fungus usually ceased growing or was killed at 32 to 35°C. An agar medium utilizing crushed chickpea seed was found to increase sporulation of all isolates of A. rabiei by 3 to 10 times over convential agar media, such as potato-dextrose agar. Light has also been found to increase sporulation of the fungus many fold.

In nature A. rabiei appears to survive in seed or plant tissue from infected chickpea. Only the imperfect (pycnidial) stage of the fungus has been found in Iran. The importance of diseased chickpea tissue in survival of the pathogen was studied at different temperatures, relative humidities and soil. In naturally-infested chickpea tissue, A. rabiei survived at least 80 weeks at 10-35°C, 58 weeks at 0-30% relative humidity, and 54 weeks on the soil surface. The fungus lost its viability rapidly at 60 to 100% relative humidity or at soil depths of 10 to 40 cm. The pathogen survived over 90 weeks in naturally infected chickpea seed which was stored in a weather station shelter in Southwestern Iran where summer temperatures often exceeded 50°C.

A technique has been developed for inoculating chickpea lines to locate sources of resistance to Ascochyta blight. Chickpea selections have been screened against Iranian isolates of A. rabiei, and several, especially black-seeded types, were moderately to highly resistant to the fungus in field and greenhouse trials. Although isolates of A. rabiei from Iran exhibited a wide range of variation in colony appearance, mycelial growth, and spore production, it has not been established whether races of the pathogen occur in Iran which vary in their pathogenicity. The effects of foliar and seed treatment fungicides in disease control, particularly the newer systemic chemicals, are currently under investigation.

+ + + + + + + +

Bean (Phaseolus vulgaris)

Bean common mosaic virus (BCMV) is the most important virus disease of bean in many areas of Iran where this crop is grown. The virus is seed-borne and aphid transmitted in nature.

To determine whether strains of BCMV occur in Iran, bean seeds were purchased in bazzars from different Provinces. Seeds were planted in pasteurized soil in the greenhouse and plants which emerged with virus symptoms were inoculated on various test plants to determine the host range of the different seed-borne virus isolates. Percentage seed transmission of the seed collections varied greatly within and among Provinces, ranging from 0-35% (Table 97).

There were differences in the host ranges of several isolates and distinct symptoms were produced by some in certain test plants. The host range of all isolates was confined to the Leguminosae, although some isolates infected leguminous hosts other than beans, such as chickpea and feenugreek (Trigonella foenum-graecum) (Figure 1).

The host ranges and other properties of two isolates of BCMV from bean and mungbean were studied in greater detail (Table 98). These isolates were recovered from diseased plants in the Karaj area. The mungbean isolate (MMV) was also seed-borne in more than 35% of the seed from some virus-infected mungbean lines. However, in Bountiful bean seed transmission of MMV was 6.6% when compared to a bean isolate (Karaj) of BCMV which was 41.6% (Table 99).

In our host range studies, some bean varieties, like Bountiful, were susceptible to all isolates of BCMV collected from different regions of Iran. Virus symptoms in Bountiful infected with most isolates of BCMV were stunting, leaf deformation, curling or rolling, mottling, and poor pod set (Figures 2&3).

MMV produced distinct symptoms in bean and mungbean from most Iranian isolates of BCMV studied. On the inoculated primary leaves of bean 'Pinto U.I. 111' (Figure 4) and mungbean 'Oklahoma 12' (Figure 5), chlorotic and reddish-brown local lesions developed, respectively. The virus particles of MMV are long, flexuous rods, about 750 mμ in length (Figure6). Electron micrographs were prepared by Dr. F. Eskandari, Karaj Agricultural College.

In nature beans infected with BCMV were generally stunted and yields appeared to be decreased. To determine the effects of virus infection

on growth and yields, beans 'Bountiful' and 'Red Kidney' were inoculated at pre-bloom and full bloom stages of plant growth with BCMV (Karaj) and MMV in the field. Largest yield reductions occurred in plants inoculated with both viruses prior to flowering. Yields of Bountiful and Red Kidney bean were reduced by 32 to 37% with BCMV (Karaj), respectively, and by 61 to 80% with MMV, respectively, at pre-bloom (Table 100). In greenhouse inoculations utilizing Bountiful bean, yields were decreased by 18 to 92% by BCMV (Karaj) and MMV, respectively (Table 101).

Chickpea (Cicer arietinum)

Ascochyta blight, caused by the foliar plant pathogen A. rabiei, is a serious and destructive disease which can limit the cultivation of susceptible chickpea lines in areas with frequent rainfall and/or high humidity during part of the growing season.

In studies designed to locate sources of resistance to A. rabiei, large numbers of spores were needed in the inoculation tests. Therefore, the effects of nutrition and environment on growth and sporulation of the fungus were studied. Mycelial growth of Iranian isolates of Ascochyta occurred over a wide range of temperatures, but usually ceased at 32 to 35°C. Optimum temperature for growth and sporulation was generally 20°C, although on some agar media, maximum sporulation occurred at 10 to 15°C.

Growth and spore production of isolates of the pathogen were observed on different agar media. Greatest sporulation occurred on an agar medium supplemented with 8% crushed chickpea seed meal, and was often 3 to 10 times greater than on potato-dextrose agar (Figure 7). Continuous or alternating light and dark was found to increase sporulation of isolates of the fungus, especially on agar media where sporulation was generally sparse, such as potato-dextrose agar (Figure 8).

In nature A. rabiei survives within and/or on infected seeds or plant debris where it forms black pycnidia (Figure 9) which contain spores (conidia). Upon wetting, spores ooze from the pycnidia and may infect germinating seeds (Figure 10) or established chickpea plants. Only the imperfect (pycnidial) stage of the fungus has been observed in Iran.

Survival of Ascochyta in naturally-infected chickpea tissue has been studied at different temperatures, relative humidities and in soil.

The fungus survived at least 80 weeks at temperatures of 10-35°C, 58 weeks at 0-30% relative humidity and 54 weeks on the soil surface (Figure 11). The pathogen lost its viability rapidly at 60 to 100% relative humidity or at soil depths of 10 to 40 cm. In Ascochyta-infected chickpea seed and pods stored in a weather station at Safiabad, Dezful in Khuzestan Province (Southwestern Iran) where summer temperatures exceeded 50°C, the fungus survived over 90 weeks.

Numerous chickpea lines have been screened in greenhouse inoculation studies to Iranian isolates of A. rabiei. A special inoculation chamber (Figure 12) has been constructed with a humidifier that maintains a high humidity which is required for infection. Several black-seeded types were found which were moderately to highly resistant to a combined inoculum of Iranian isolates of the fungus (Table 102, Figure 13). Most white-seeded lines were very susceptible to the pathogen. Heavy infection often resulted in death of these lines.

Isolates of A. rabiei from Iran exhibited a wide range of variation in colony appearance (Figure 14), mycelial growth and spore production. It is not known whether races of the pathogen occur in Iran which vary in their pathogenicity to chickpea lines. Until this is determined all inoculations are being done with a composite of Iranian isolates.

Table 97 . -- Occurrence of bean common mosaic virus in seed purchased in bazzars from various Provinces of Iran.

Source	Province	Seed Color	No. Seeds Planted	No. Emerged Seedlings	No. Diseased Plants	% Seed Transmission
Isfahan	Isfahan	Red	120	110	17	15.5
Naien	Isfahan	White	100	97	--	0
Yazd	Isfahan	Red	120	116	11	9.5
Yazd	Isfahan	Pinto	120	119	5	4.2
Yazd	Isfahan	White	120	116	1	0.9
Yazd	Isfahan	Pinto	120	118	1	0.8
Yazd	Isfahan	Mixed	120	117	5	4.3
Yazd	Isfahan	White	120	107	--	0
Shiraz	Fars	Red	120	110	4	3.6
Ghazvin	Tehran	Red	120	113	1	0.9
Ghazvin	Tehran	Mixed	120	98	1	1.0
Ghazvin	Tehran	White	120	117	1	0.9
Ghazvin	Tehran	Red	120	119	5	4.2
Gilan	Gilan	Red	120	105	2	1.9
Gilan	Gilan	White	120	115	--	0
Rasht	Gilan	White	120	107	--	0
Rasht	Gilan	White	120	108	1	0.9
Hamadan	Hamadan	Pinto	120	120	1	0.8
Hamadan	Hamadan	White	120	118	--	0
Hamadan	Hamadan	White	120	119	--	0
Malayer	Hamadan	Red	120	117	41	35.0
Sanadaj	Kurdestan	Red	120	100	--	0
Sanadaj	Kurdestan	Red	100	33	--	0
Sanadaj	Kurdestan	Pinto	120	116	9	7.8
Sanadaj	Kurdestan	White	120	103	--	0
Kermanshah	Kermanshahan	Red	120	107	2	1.9
Kermanshah	Kermanshahan	White	120	106	1	0.9
Kermanshah	Kermanshahan	Red	120	115	8	7.0
Kermanshah	Kermanshahan	Red	120	114	--	0
Kermanshah	Kermanshahan	Pinto	120	112	--	0
Ardabil	Azarbaijan	Pinto	120	116	--	0
Ardabil	Azarbaijan	White	120	108	--	0
Ardabil	Azarbaijan	Pinto	120	117	--	0
Khoy	Azarbaijan	White	120	89	2	2.2
Khoy	Azarbaijan	Red	120	85	--	0
Khoy	Azarbaijan	Pinto	120	74	1	1.4
Khoy	Azarbaijan	White	120	58	--	0
Meshkin Shahr	Azarbaijan	Pinto	120	101	--	0
Rezaiyeh	Azarbaijan	Red	120	113	1	0.9
Rezaiyeh	Azarbaijan	Pinto	120	79	--	0
Rezaiyeh	Azarbaijan	White	120	92	1	1.0
Sarab	Azarbaijan	Pinto	120	99	--	0
Sarab	Azarbaijan	Pinto	120	113	1	0.9
Sarab	Azarbaijan	Pinto	120	120	--	0
Shahpour	Azarbaijan	White	120	73	--	0
Shahpour	Azarbaijan	White	120	73	1	1.3
Tabriz	Azarbaijan	White	120	96	1	1.0
Tabriz	Azarbaijan	Pinto	120	118	--	0
Bojnurd	Khorasan	Red	120	109	1	0.9
Bojnurd	Khorasan	Pinto	120	117	1	0.9
Bojnurd	Khorasan	White	120	106	1	0.9
Bojnurd	Khorasan	White	120	113	8	7.1
Meshed	Khorasan	Pinto	120	119	3	2.5
Meshed	Khorasan	Red	120	111	9	8.1
Babol	Mazandaran	White	120	115	--	0
Babol	Mazandaran	Pinto	120	119	6	5.0
Gonbad	Mazandaran	Pinto	120	116	2	1.7
Gonbad	Mazandaran	White	120	114	--	0

Table 98. -- Host range of two isolates of bean common mosaic virus from Iran.

Hosts a/	Virus Isolates b/	
	Bean	Mungbean
Amaranthaceae		
Gomphrena globosa L.	- c/	-
Compositae		
Zinnia elegans Jacq.	-	-
Cucurbitaceae		
Cucumis sativus L. 'National Pickling'	-	-
Leguminosae		
Cassia obtusifolia	LL	LL
Cassia occidentalis L.	-	-
Cicer arietinum L. 'Ghazvin'	M	M
Glycine max (L.) Merr. 'Chippewa'	-	-
Lens esculenta Moench 'Ghazvin'	-	M
Medicago sativa L.	-	-
Phaseolus aureus Roxb. 'Berken'	S	LL,M
P. aureus 'Oklahoma 12'	S	LL,M
Phaseolus lunatus L. 'Jackson Wonder'	-	-
Phaseolus vulgaris L. 'Black Valentine'	-	-
P. vulgaris 'Bountiful'	M,LD,St	CLL,M,LD,St
P. vulgaris 'Great Northern U.I. 61'	M	M
P. vulgaris 'Great Northern U.I. 123'	S	-
P. vulgaris 'Great Northern U.I. 1140'	M	-
P. vulgaris 'Idaho Bountiful'	-	-
P. vulgaris 'Pinto U.I. 111'	S	CLL,M
P. vulgaris 'Pinto U.I. 114'	-	-
P. vulgaris 'Red Mexican U.I. 34'	-	M,St
P. vulgaris 'Red Mexican U.I. 36'	M	M
P. vulgaris 'Resistant Asgrow Valentine'	S	-
P. vulgaris 'Sanilac'	S	M
P. vulgaris 'Stringless Green Refugee'	M,LD,St	M,LD,St
P. vulgaris 'Tendercrop'	-	-
P. vulgaris 'Topcrop'	-	-
P. vulgaris 'U.S. 5 Refugee'	-	-
P. vulgaris 'Wade'	-	-
Pisum sativum L. 'Rondo'	-	-
Trigonella foenum-graecum L.	M	-
Vicia faba L. 'Algerian'	-	-
Vigna sinensis (Torner) Savi 'Early Ramshorn'	-	-
Solanaceae		
Datura stramonium L.	-	-
Nicotiana glutinosa L.	-	-
N. tabacum L. 'Samsun'	-	-

a/ Hosts are listed alphabetically by family and genus.

b/ Virus isolates from bean and mungbean were isolated from diseased plants growing at Karaj, Iran.

c/ - = Not susceptible; LL = Local Lesions; CLL = Chlorotic Local Lesions; LD = Leaf Deformation; M = Mosaic; S = Symptomless infection; St = Stunting.

Table 99. -- Transmission of two isolates of bean common mosaic virus in seed of Bountiful Bean. a/

Virus Isolate b/	No. Seeds Planted	No. Seeds Emerged	No. Seedlings Infected from Seed	% Seed Transmission
BCMV	140	101	42	41.6
MMV	105	91	6	6.6

a/ Bountiful bean plants were infected with each isolate of the virus in the greenhouse before plants had flowered.

b/ BCMV = isolate of virus from bean, Karaj, Iran;

MMV = isolate of virus from mungbean, Karaj, Iran.

Table 100. -- Effect of inoculation on yield of two bean varieties in field trials at Karaj, Iran with two isolates of bean common mosaic virus.

Bean Variety	Virus Isolate a/	Time of Infection	Mean per plant b/ No. Pods	No. Seeds	Yield (g)	% Decrease In Yield
Bountiful	BCMV	Control (noninoculated)	7.4	32.3	11.9	----
		Pre-bloom	6.7	23.6	8.1	31.9
		Full bloom	6.9	25.7	8.6	27.7
Bountiful	MMV	Control (noninoculated)	6.2	25.6	7.7	----
		Pre-bloom	3.6	10.2	3.0	----
		Full bloom	5.7	20.4	6.4	16.9
Red Kidney	BCMV	Control (noninoculated)	10.5	38.6	14.8	----
		Pre-bloom	11.8	25.0	9.3	37.1
		Full bloom	12.0	43.5	16.5	(+)10.3
Red Kidney	MMV	Control (noninoculated)	14.0	36.0	13.5	----
		Pre-bloom	3.6	8.3	2.7	79.9
		Full bloom	11.4	25.9	9.5	29.4

a/ BCMV = isolate of virus from bean, Karaj, Iran; MMV = isolate of virus from mungbean, Karaj, Iran.

b/ Mean per plant figures were based on 4 replications.

Table 101. -- Effect of inoculation of Bountiful bean in greenhouse tests with two isolates of bean common mosaic virus.

Virus Isolate a/	Time of Infection	Mean per Plant b/ No. Pods	No. Seeds	Yield (g)	% Decrease In Yield
	Control (noninoculated)	10.2	44.8	15.4	----
BCMV	Pre-bloom	10.6	40.8	12.6	18.2
BCMV	Full bloom	9.1	35.7	12.7	17.5
MMV	Pre-bloom	2.5	10.3	3.0	80.5
MMV	Full bloom	3.2	9.0	1.3	91.6

a/ BCMV = isolate of virus from bean, Karaj, Iran;
MMV = isolate of virus from mungbean, Karaj, Iran.

b/ Mean per plant figures were based on 3 replications.

Table 102. -- Reaction of white and black-seeded chickpea lines to infection by the foliar plant pathogen, *Ascochyta rabiei*.

No.[a]	Chickpea Line[b]	Source	Accession Number	Disease Rating[c]
1	5001	Karaj 34, Iran	12-071-05456	4.0
2	5002	Karaj 3, Iran	12-071-05468	3.3
3	5003	Karaj 18, Iran	12-071-05466	3.5
4	5004	Iran 249982	12-071-05473	3.4
5	5005	Moghan 129, Iran	12-071-10016	3.5
6	5006	Moghan 129, Iran	12-071-10013	3.7
7	5007	Moghan 129, Iran	12-071-10015	3.7
8	5008	Isfahan 111, Iran	12-071-10017	3.7
9	5009	Shahpoor 162, Iran	12-071-10014	4.0
10	5010	Isfahan 11, Iran	12-071-10025	4.0
11	5011	Karaj 125, Iran	12-071-10029	3.8
12	5012	Ardabil 169, Iran	12-071-10020	3.7
13	5013	Ardabil 169, Iran	12-071-10031	3.7
14	5014	Karaj 152, Iran	12-071-10032	3.8
15	5015	Isfahan 111, Iran	12-071-10025	3.7
16	5016	Shahpoor 162, Iran	12-071-10026	3.5
17	5017	Karaj 153, Iran	12-071-10034	3.7
18	5018	Isfahan 111, Iran	12-071-10033	3.5
19	5019	Karaj 254, Iran	12-071-02089	3.5
20	5020	Darehgaz 232, Iran	12-071-02518	3.8
21	5021	Varamin 111, Iran	12-071-03289	3.8
22	5022	Ardabil 170, Iran	12-071-02896	4.0
23	5023	Karaj 84, Iran	12-071-01919	3.5
24	5024	Varamin 41, Iran	12-071-03232	3.7
25	5025	Mazandaran 207, Iran	12.071-10055	3.8
26	5026	Ardabil 169, Iran	12-071-10059	3.7
27	5027	Mamaghan 168, Iran	12-071-10058	3.8
28	5028	Shahpoor 162, Iran	12-071-10057	3.7
29	5029	Torbat Hasanabad 217, Iran	12-071-10067	3.3
30	5030	FAO 13/680	12-071-10093	3.0
31	5031	Rezaiyeh, Iran	12-071-10064	3.7
32	5032	Ahar Shah Abad, Iran	12-071-10066	3.5
33	5033	Bonab, Iran	12-071-10065	4.0
34	5034	Iran		3.3
35	5035	Kurdestan Vicinity, Iran		3.8
36	5036	Giza, UAR	12-155-10002	3.5
37	5037	Jordan	12-079-10004	3.1
38	5038	Punjab, West Pakistan	12-113-10005	4.0
39	5039	Iran 5006	12-071-05472	3.8
40	5040	Iran 5009	12-071-05475	3.8
41	5041	Iran 5015	12-071-05465	4.0

Table 102 (Continued)

No.	Chickpea Line	Source	Accession Number	Disease Rating
42	5042	Israel CP 42	12-074-10009	3.3
43	5043	Israel CP 43	12-074-10012	3.5
44	5044	Israel CP	12-074-10011	3.5
45	5045	Israel 319	12-074-10008	3.5
46	Bulgarian	Israel	12-074-06628	2.5
47	Local	Ghazvin, Iran		4.0
48	6001	Ahar 174, Iran	12-071-05132	2.5
49	6002	Ahar 174, Iran	12-071-05093	3.3
50	6003	Gharieh Gol, Iran	12-071-05436	3.8
51	6004	Iran 251514	12-071-05442	2.4
52	6005	Karaj 154, Iran	12-071-05432	2.8
53	6006	Gharieh Gol 175, Iran	12-061-05451	3.8
54	6007	Ardabil 174, Iran	12-071-10050	2.9
55	6008	Ardabil 171, Iran	12-071-10054	3.3
56	6009	Ardabil, Iran	12-071-04244	2.5
57	6010	Gharieh Gol 154, Iran	12-071-05301	3.1
58	6011	Ahar 174, Iran	12-071-05132	3.1
59	6012	Gharieh Gol 175, Iran	12-071-06465	3.8
60	6013	Isfahan, Iran	12-071-04287	3.2
61	6014	Israel I-13	12-074-06625	1.3
62	6015	Kermanshah 193, Iran	12-071-04509	2.6
63	6016	Isfahan 231, Iran	12-071-04432	2.5
64	6017	Gharieh Gol 154, Iran	12-071-05331	2.8
65	6018	Ahar 174, Iran	12-071-04279	3.1
66	6019	Isfahan 129, Iran	12-071-04282	2.3
67	6020	Isfahan 221,Iran	12-071-04439	3.1
68	6021	Karaj 47, Iran	12-071-10110	3.0
69	6022	Karaj 47, Iran	12-071-10106	2.8
70	6023	Isfahan 221, Iran	12-071-10115	2.5
71	6024	Isfahan, Iran	12-071-10114	2.3
72	6025	Isfahan, Iran	12-071-10109	3.3
73	6026	Isfahan, Iran	12-071-10107	3.3
74	6027	Isfahan, Iran	12-071-10108	2.6
75	6028	Nishaboor, Iran	12-071-10112	2.7
76	6029	Isfahan, Iran	12-071-10113	2.5
77	6030	Karaj 153, Iran	12-071-10111	2.3
78	I-13	Israel	12-074-06625	1.1

a/ Chickpea Nos. 1-47 are white-seeded and lines 48-78 are black-seeded.

b/ Chickpea lines 5001-5020 and 6001-6020 were included in the 1969 and 1970 Iran Advanced Yield Trials, and lines 5021-5045 and 6021-6030 were included in the 1970 Iran Preliminary Yield Trials

c/ Disease ratings of 0-4 are: 0 = no infection, plants immune; 1 = light infection, plants highly resistant; 2 = medium infection, plants moderately resistant; 3 = heavy infection with some plants killed, moderately susceptible; 4 = all plants killed, highly susceptible.

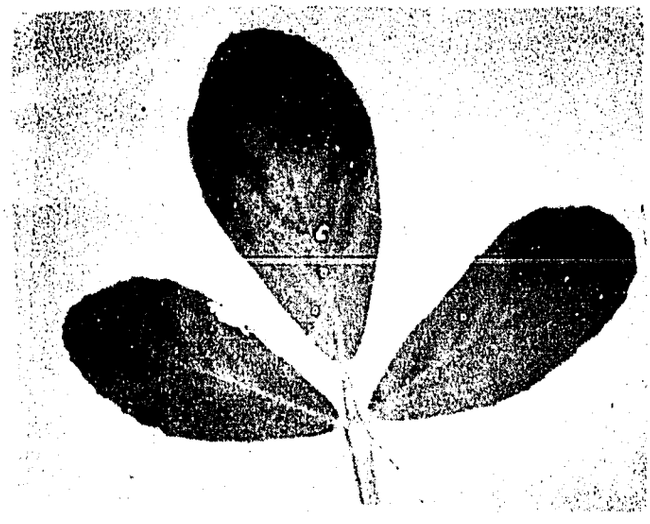

Figure 1. -- Mosaic symptoms in feenugreek (Trigonella foenum-graceum) infected with bean common mosaic virus.

Figure 2. -- Mottling, leaf deformation, and stunting are symptoms commonly observed in Bountiful bean infected with Iranian isolates of bean common mosaic virus (left); healthy plants, right.

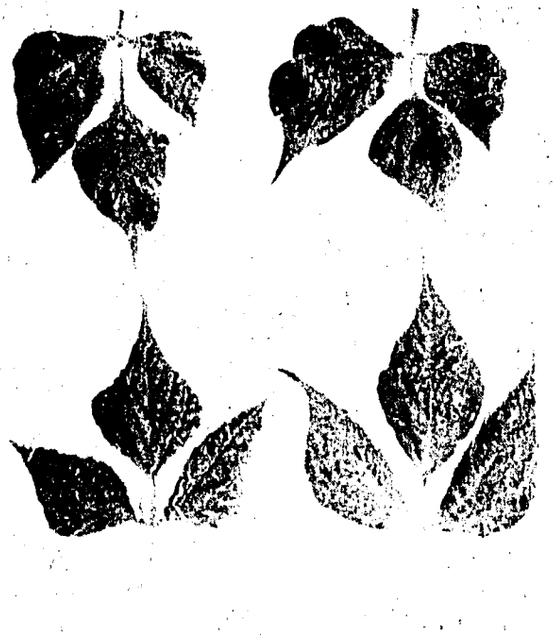

Figure 3. -- Foliar symptoms in Bountiful bean infected with a bean isolate (top row) and mungbean isolate (bottom row) of bean common mosaic virus.

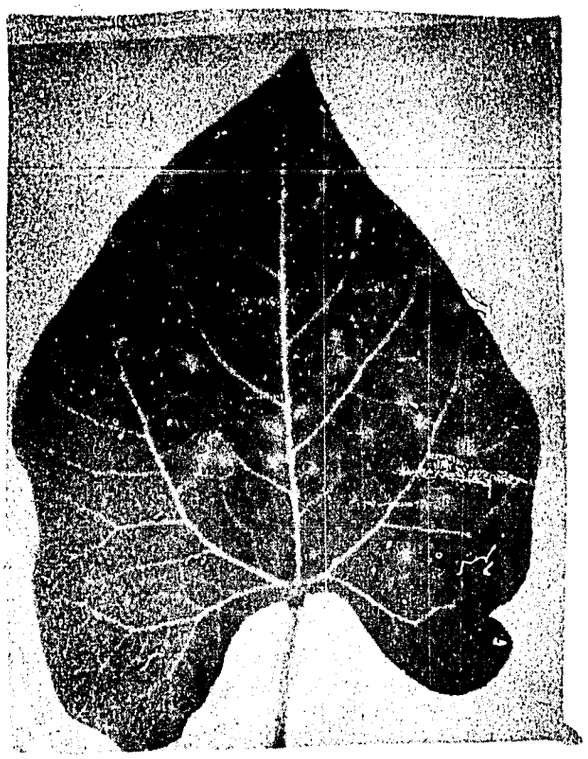

Figure 4. -- Chlorotic local lesions which have developed on a primary leaf of bean 'Pinto U.I. 111' inoculated with a mungbean isolate of bean common mosaic virus.

Figure 5. -- Reddish-brown local lesions which have formed on the primary leaf of mungbean 'Oklahoma 12' inoculated with a mungbean isolate of bean common mosaic virus.

Figure 6. -- An electron micrograph of a leaf dip preparation of bean infected with a mungbean isolate of bean common mosaic virus showing virus particles which are flexuous rods about 750 mu in length.

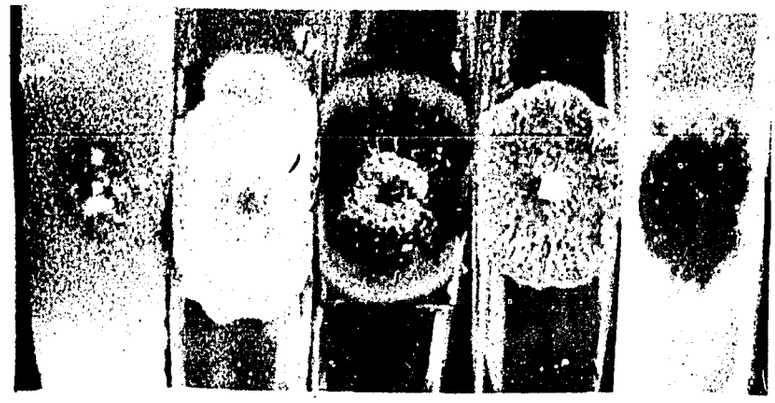

Figure 7. -- Growth of an Iranian isolate of Ascochyta rabiei on various agar media for 16 days at 20°C in the dark. Left to right: Chickpea seed meal agar, 8%; potato-dextrose agar (made with local potatoes); mycological agar; bean pod agar; and potato-dextrose agar (Difco).

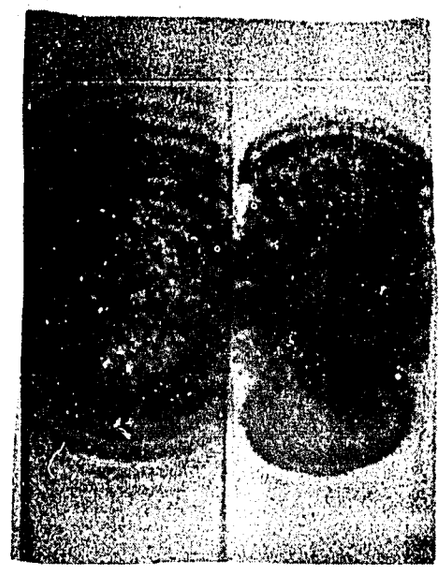

Figure 8. -- Effect of alternating 12-hr light - 12-hr dark (left) and continuous dark (right) on growth of an Iranian isolate of Ascochyta rabiei after 18 days at 20°C on potato-dextrose agar. Zonation occurred in alternating dark and light periods.

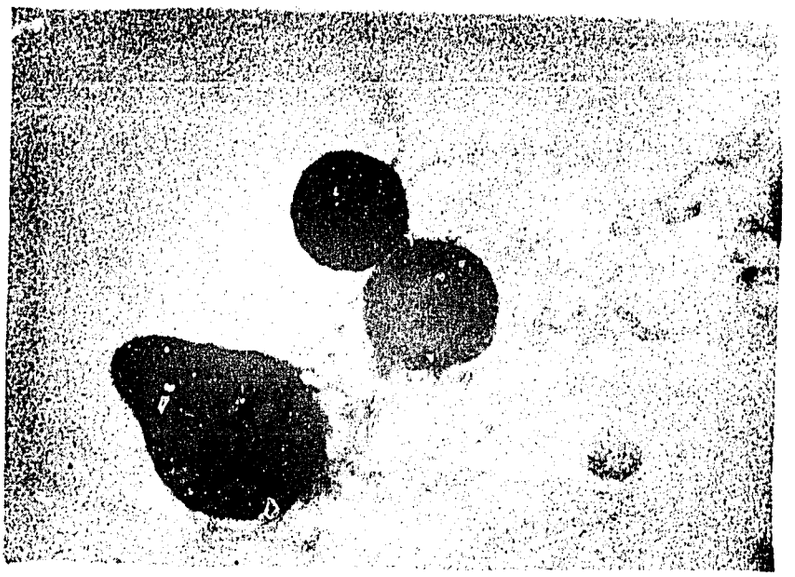

Figure 9. -- Black pycnidia of Ascochyta rabiei. Pycnidia contain spores (conidia) of the fungus.

Figure 10. -- Infection of the stem and foliage of a germinating chickpea seed which had been infected with *Ascochyta rabiei*.

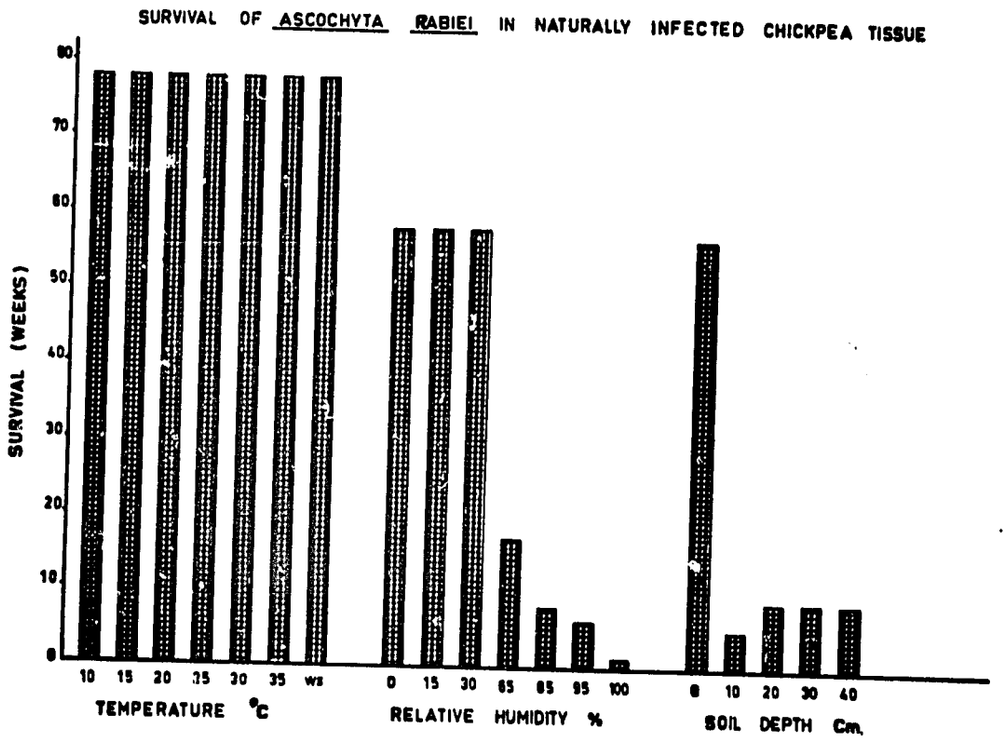

Figure 11. -- Survival of Ascochyta rabiei in naturally infected chickpea tissue at different temperatures, relative humidities, and in soil.

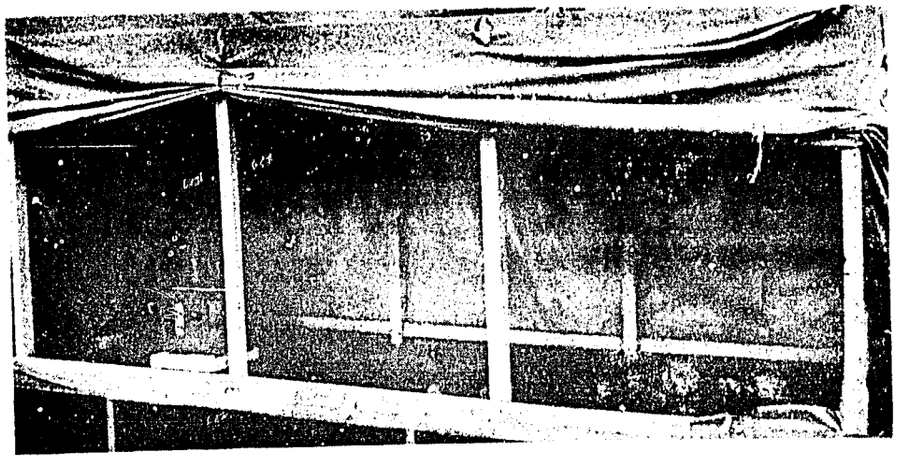

Figure 12. -- Inoculation chamber equipped with a humidifier to maintain a high humidity which was used to screen chickpea lines against isolates of Ascochyta rabiei.

Figure 13. -- Reaction of different chickpea lines inoculated at the same time to infection by Ascochyta rabiei. Plants varied in their reaction from highly resistant (extreme right) to very susceptible (extreme left).

Figure 14. -- Variation in colony appearance and growth rate of Iranian isolates of Ascochyta rabiei grown on potato-dextrose agar for 18 days at 20°C in the dark.

ENTOMOLOGY

S. W. Wilson - USDA/USAID
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K. Kamali - GOI/Plan Organization

SUMMARY

Entomological activities during 1970 were largely directed by Eng. Rassoulian. The American Entomology position was vacant from the departure of Mr. Wilson in May, 1970, until the arrival of Dr. Schalk in March, 1971. Eng. Kamali departed for graduate study in the United States in June, 1970. General supervision of the work was given by Drs. Esmaeli and Morad-Saghi of the Karaj College Pest Control Department.

+ + + + +

Seed corn maggot (Hylemia cilicrura) damage to dry beans was reduced by soil treatment with insecticides (Dieldrin and Diazinon) and by delaying the date of planting.

Leaf miner (Liriomyza congesta) damage to chickpeas was not significantly affected by treatment with Diazinon and Dimethoate.

Treatments with four insecticides (DDT plus Lindane, Sevin, Supracid, and Thiodan) were effective against bollworm (Heliothis armigera) at Varamin and Meshed but not at Karaj.

The chemosterilant, TEPA, produced marked changes in the ovaries of beet army worm (Spodoptera exigua), and preliminary results indicated a marked decrease in the number of eggs and larvae produced.

Nematode control by soil treatment with Mocap (nematocide) was effective for lentils and cowpeas at Karaj and chickpeas at Varamin, while Nemagon and Fumazon were ineffective at Varamin.

Natural resistance is one of the safest, most practical and at the same time most economical approach to biological control. Therefore investigations will be expanded in 1971 for finding resistant plants to insects and nematodes. Dr. Schalk and Mr. Rassoulian will cooperate jointly in these studies.

Control recommendations have been updated for pests of the pulse crops.

Insect Populations, 1970

Field populations were light thus making it difficult to obtain differences in our trials. Light infestations were noted for the seed corn maggot (*Hylemia cilicrura*), bollworm (*Heliothis armigera*), and leaf miner (*Liriomyza congesta*). Infestations of thrips, aphids, and mites were very low, making insecticide trials impractical.

Table 103. -- Effect of date of planting and soil temperatures on seed corn maggot, Hylemia cilicrura, damage on dry beans, Karaj, Iran, 1970.

Date of Planting	Soil Temperature 10 cm. depth (Centigrade) 1/	No. of larvae in 100 young plant roots 2/	% Damage	Seed Yield (tons/ha)
March 28, 1970	12.3	0	15	1.53
April 13, 1970	13.0	0	4	1.87
May 2, 1970	13.4	0	2	1.45
May 17, 1970	16.5	0	0	1.90
LSD, 1%		N.S.	3	N.S.

1/ Soil temperature: Average from 7 days before to 7 days after planting.

2/ Sampling: 100 newly emerged plants pulled from each treatment and number of larvae and damaged plants were counted.

Damage was significantly reduced by later plantings. This is in agreement with previous work. However, no significant differences were found for the number of larvae per seedling and seed yield. This lack of significance was attributed to the low populations.

Table 104. -- **Effect of soil treatment with insecticides on damage to dry beans by seed corn maggot *Hylemia cilicrura*, Karaj, Iran, 1970.**

Insecticide	No of larvae 1/	Plants Damaged %	Seed Yield (tons/ha)
Dieldrin 2 kg/ha	1	15 ++	1.17
Diazinon 2 kg/ha	0	0 ++	1.58
Check	1	35	1.03

1/ Data were taken from 100 newly emerged plant roots.

++ Significant at 1% level.

Based on plants damaged, good control was obtained with Dieldrin and Diazinon at 2 kg/ha. Seed yield differences were not significant because of low infestations.

Table 105. -- Effect of insecticides on damage by leaf miner (*Liriomyza congesta*) to chickpeas, 1970.

Insecticide Treatment	Damaged leaves (%) 1/		Seed Yield (tons/ha)	
	Karaj	Ghazvin	Karaj	Ghazvin
Diazinon, 600 g/ha	2.7	0.3	2.48	1.80
Dimethoate, 400 g/ha	2.4	0.1	1.54	1.85
Check	2.2	0.1	2.76	1.26

No significant difference

1/ Sampling: Leaves from 400 plants from each treatment were examined.

No control of leaf miner was obtained at Karaj and Ghazvin. Again, low infestations were the primary cause for these nonsignificant data. Further testing is needed to determine an effective control for this pest.

Table 106. -- Effect of insecticides on damage by bollworm (*Heliothis armigera*) to chickpeas, 1970.

Insecticide Treatment	Damaged pods (%) 1/			Seed Yield (tons/ha)		
	Karaj	Varamin	Meshed	Karaj	Varamin 2/	Meshed
DDT (2000 g/ha)	---	---	0.1	---	---	1.73
DDT & Lindane (1500 + 450 g/ha)	0.5	1.4	0.5	1.95	0.60	1.67
Sevin (1500 g/ha)	0.1	0.2	0.0	2.23	0.74	1.70
Supracid (600 g/ha)	0.0	1.6	1.4	2.64	0.68	2.02
Thiodan (700 g/ha)	0.1	3.2	0.0	2.01	0.47	1.93
Check	0.8	2.2	5.3	2.64	0.42	1.83
LSD 1%	N.S.	0.7	2.3	N.S.	N.S.	N.S.

1/ Sampling: 400 pods from each treatment were examined for damage.

2/ Generally low yield caused by lack of sufficient irrigation.

Insect populations were low making it difficult to obtain maximum differences between treatments. However, low damage ratings were obtained for all the materials tested in Meshed. DDT and Lindane and Sevin, tested at Varamin, were also effective in reducing damage. Seed yields were not significant. Pulse straw used for animal fodder should be treated with Sevin whenever possible because of it's nonpersistance in animal tissue.

Table 107. -- Effect of TEPA chemosterilant on beet army worm *Spodoptera exigua*.

Dosage 1/ of TEPA	Number of eggs 2/	Unhatched eggs %	Number of larvae
25/1000	140 ++	60 ++	96 ++
25/1000	300 ++	81 ++	10 ++
50/1000	1420 ++	87 ++	21 ++
50/1000	1765 ++	98 ++	22 ++
Check	3745	13	945
Check	5270	16	844

1/ 4 ml of TEPA in 10% sucrose solution for 24 hours feeding at concentrations given.

2/ Eggs produced by 5 male and 5 female adults.

++ Significant at 1% level.

All treatments with TEPA reduced egg viability. When dosages were doubled (from 25 to 50/1000) increased egg laying resulted. However, the viability of the eggs with the increased dosages decreased.

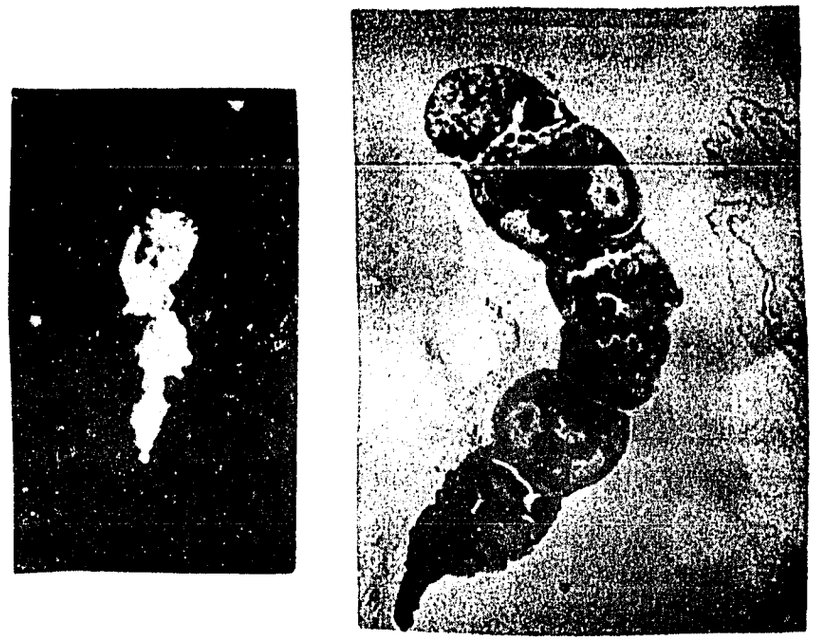

Figure 15. -- The effects of TEPA on the ovaries and oocytes of the beet army worm. TEPA caused atrophy of the oocytes and hypertrophy of the nutritive cells.

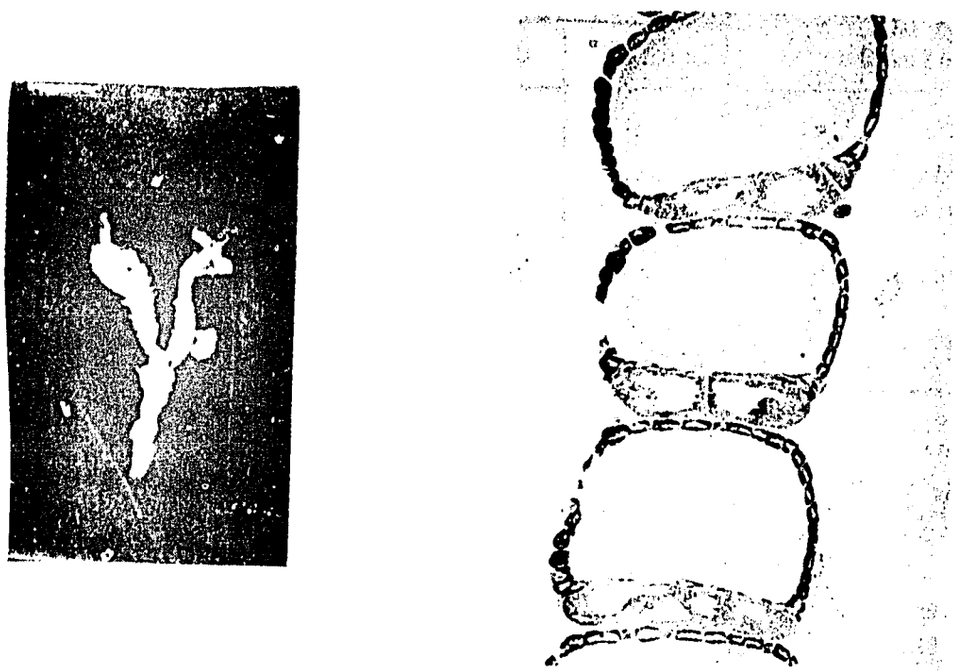

Figure 16. -- The normal condition of the ovaries and oocytes in the beet army worm not treated with TEPA.

Because of the extreme toxicity of chemosterilents its use for insect control in agriculture should be limited. A practical solution would be to utilize some insect attractant or hormone with the chemosterilent. This procedure would obtain maximum results with minimum usage of the toxic substance.

Table 108. -- Effect of time of application to soil of Mocap nematocide on root-knot nematodes, Karaj, Iran, 1970.

Time of Application	Number of nematodes in 2.5 g of roots			
	Lentil	Cowpea	Eggplant	Tomato
15 days before planting	1 ++	10 +	6 ++	3 +
At planting	12 ++	26 +	35 ++	60 +
Check	651	880	220	640

\+ Significant at 5% level.

++ Significant at 1% level.

Mocap pre-planting treatment and treatment at planting time were almost equally effective in the control of root-knot nematodes.

Table 109. -- Effect of rate of application of Mocap nematocide on root-knot nematodes, Varamin, Iran, 1970.

Application Rates	Number of nematodes in 2.5 g of roots	
	Beans	Chickpeas
50 ppm	72	98
100 ppm	35	34
360 ppm	10	14
Check	54	190
LSD, 1%	N.S.	79

All treatment rates were effective in chickpeas for the control of root-knot nematodes. No effective control was obtained in beans.

Table 110. -- Effect of nematocides on root-knot nematodes, Varamin, Iran, 1970.

Treatment 1/	Damaged plants, percent			
	Bean	Mungbean	Cowpea	Eggplant
Nemagon, 7 g/m ^{2}	19	12	14	--
Fumazon, 7 g/m ^{2}	20	13	19	5
Check	16	17	27	10

No significant difference.

1/ Nematocides were applied to the soil before planting.

The materials tested did not control root-knot nematodes in these crops. Apparently, infestations were too low to express an effective control.

Control recommendations for 1971.

Crop	Pest	Pesticide	Rate	Remarks
Chickpea	Bollworm	Superacide Sevin Thiodan	600 g/ha 2 kg/ha 1 kg/ha	
	Aphids	Diazinon Malathion Dimethoate	600 g/ha 1 kg/ha 500/ha	Do not feed treated plants to livestock
	Leaf miner	Supracide Diazinon	600 g/ha 600 g/ha	
	Seed corn maggot	Diazinon	2 kg/ha	Soil treatment
Cowpea	Bean butterfly	Dimethoate Sevin Diazinon Supracid	500 g/ha 2 kg/ha 600 g/ha 600 g/ha	
	Cowpea weevil	Diazinon	600 g/ha	
	Beet army worm	Sevin Supracid	2 kg/ha 600 g/ha	
Dry beans	Mites	Thiodan Kelthane Morocide	500 g/ha 1 kg/ha 500 g/ha	Do not feed treated plants to livestock
Lentils	Thrips	Malathion Diazinon	1 kg/ha 500 g/ha	
	Lentil weevil	Diazinon	500 g/ha	

Crop	Pest	Pesticide	Rate	Remarks
Mungbean	Beet army worm	Sevin	2 kg/ha	
		Supracid	600 g/ha	
	Mites	Thiodan	500 g/ha	Do not feed treated plants to livestock
		Kelthane	1 kg/ha	
		Morocide	500 g/ha	
	Aphids	Diazinon	600 g/ha	
		Malathion	1 kg/ha	
		Dimethoate	500 g/ha	Do not feed treated plants to livestock
Pulses	Root-knot nematodes	Fumazon	6 g/m^2	
		Nemagon	6 g/m^2	
		Mocap	7 g/m^2	
Storage Pests	Cowpea Weevil			
	Lentil Weevil	Methyl btomide	453 $g/33m^3$	