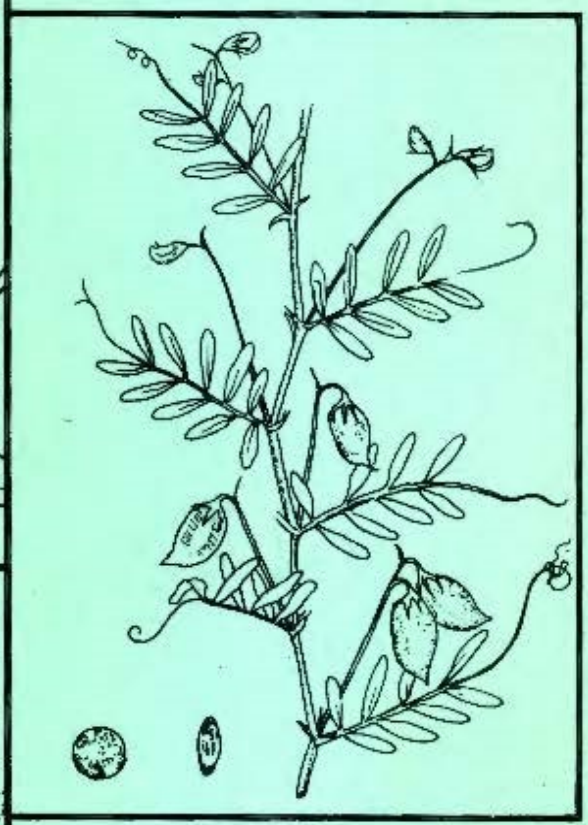
INTERNATIONAL NURSERY REPORT No. 6

FOOD LEGUME NURSERIES

1981/82



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June 1984

INTERNATIONAL NURSERY REPORT No. 6

FOOD LEGUME NURSERIES 1981/82

FOOD LEGUME IMPROVEMENT PROGRAM

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June 1984

PREFACE

A number of trials and nurseries were supplied by the Food Legume Improvement Program (FLIP) of ICARDA to co-operating scientists within and outside the ICARDA region for 1981/82 growing season. Many of these trials and nurseries were also grown at different ICARDA sites in Syria and Lebanon. This report summarises the data returned by the cooperating scientists and those obtained at ICARDA sites from these trials and nurseries.

The report has been prepared by FLIP staff at ICARDA. It is hoped that the results and discussion contained in this report will be of interest and use to the cooperating scientists. Any comments or suggestions on the report would be most welcomed.

FLIP, ICARDA

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1. INTRODUCTION

The international co-operative program on food legume improvement is co-ordinated by the International Center for Agricultural Research in the Dry Areas (ICARDA). The main objective of the program is to provide a mechanism for the multi-location testing of genetic material of kabuli chickpea, faba beans and lentils originating from national and international programs.

The testing aims at evaluating genotypic performance for both seed yield and reaction to biotypes of locally occurring pests and diseases. It is hoped that through such testing, firstly, it will prove possible to identify both superior genotypes which are adapted to specific environments, and genotypes which have a wide adaptation. Secondly, that the performance data from a number of widely differing environments will help the breeder to reduce the number of seasons required for evaluation prior to cultivar release. In addition the program will permit the dissemination of elite germplasm and segregating populations to interested scientists, who can exercise their own selection to develop superior cultivars well adapted to their conditions.

Through the distribution of agronomic trials it is hoped that agronomic research on these legumes will be encouraged and the information on optimum agronomic practices for different agro-ecological conditions would become available.

This report summarises the data received from various international yield trials, screening nurseries, disease nurseries and agronomy trials conducted by the cooperating scientists and ICARDA during 1981/82.

2. ICARDA INTERNATIONAL TRIALS AND NURSERIES FOR THE 1981/82 SEASON

2.1. DESCRIPTION

The following gives a brief account of the trials and nurseries that were distributed by ICARDA, for the three food legumes, faba bean, lentil and kabuli chickpea, during 1981/82.

2.1.1. Adaptation Trials (AT).

The environmental conditions vary greatly both within and between the countries in which the three food legume species are grown. This diversity may hinder the improvement of the crop species by the inability to conduct sufficient breeder's trials in all the relevant countries. However, it may be possible to meaningfully group the different legume growing areas into a few agro-ecological zones. The identification of such zones is of major importance in breeding for wider adaptability, and would also allow ICARDA to serve the national programs better through the development and distribution of locally adapted materials.

Insufficient information is available on the relationship between key agro-ecological variables and legume crop performance to be able to confidently predict such zones. In the absence of this information, it is felt that the best way to characterise the different environments is through the study of a uniform set of diverse genotypes grown in the main legume production areas over several years. This idea was first discussed at the 1978 regional food legume workshop and the first adaptation trials were distributed for 1978/79 season. More genotypes had been added in the trial during 1979/80 to increase the diversity and thus to fulfil the objective of the trial better. Entries in the trial during 1981/82 season were more or less same as in the previous two seasons.

2.1.2. International Yield Trials (IYT).

In order to identify heavy yielding genotypes, with either specific or wide adaptation, it is essential to test genetic material emerging from ICARDA and other national breeding programs in a wide range of environments, encompassing the major production zones in the different countries.

The IYTs are replicated trials which test advanced materials that have previously shown above average performance. These trials permit an assessment of yield performance (G) across a range of environments (E) and provide an estimate of the relative size of G x E interactions in that growing season. They also allow national programs to identify genotypes best adapted to their local conditions, and provide ICARDA with information that will rationalise crosssing programs for different countries.

As in the past there were separate large- and small-seeded trials of lentils, faba beans and kabuli chickpeas during 1981/82.

2.1.3. International Screening Nurseries (ISN).

The ISNs form an adjunct to the IYTs by providing an initial evaluation of a large number of advanced lines (F_5/F_6) and elite germplasm, encompassing a wide range of genetic diversity, in non-replicated trials in the environments utilized for the IYTs. The results thus provide a basis on which genotypes can be advanced to the IYTs and provide national programs with the opportunity to practice selection in a greater range of material than provided in the IYTs. Like IYTs the ISNs were also separated in large and small-seeded sets for faba beans and lentils.

2.1.4. International F_3/F_4 Trials (IF_3T/IF_4T)

Genotypes tested in the IYTs and in the ISNs tend to be relatively advanced breeding material that is approaching homozygosity, so nullifying any chances for re-selection in superior performing genotypes. In contrast the F_3/F_4 bulk trials comprise early generation segregating material, thus permitting breeders in the national programs the chance to practice their own selection in the populations best adapted to the local environment. In addition the trials allow estimates to be made of cross performance and interactions across a range of environments, which will additionally assist in identifying parents to be used in hybridization programs for the different countries.

The F_3Ts for lentils and kabuli chickpeas in 1981/82 season were developed separately for different major environmental conditions. Thus two trials in lentil and three trials in chickpeas were distributed.

2.1.5. International Disease and Pest Nurseries (I-N)

The development of cultivars resistant to pathogens and pests prevalent in the main legume growing areas is essential if stable seed yields are to be achieved. However, there is presently little information available on the incidence and severity of legume diseases and pests in the different areas. The International Disease and Pest Nurseries were formulated to rectify this situation. The aim of these nurseries is to test a relatively large number of genotypes, in an unreplicated design, in a range of locations covering a number of countries. The nursery results thus furnish information on the incidence and severity of the disease pest in differing geographic areas, and provide a means for the identification of resistant genotypes. These together should greatly assist the plant breeder in developing genotypes that combine a heavy seed yield with a stable parasite resistance. The disease

nursery available for distribution in the 1981/82 season was a Chickpea International Ascochyta Blight (CIABN). A Faba Bean International Orobanche Nursery (FBION) was also distributed.

2.1.6. International Agronomy Trials.

In many countries the legume crops tend to be neglected in favour of other crops, resulting in poorer management and fewer agronomic inputs. To combat this trend it is essential to develop suitable agronomic management practices for legumes that, if adopted, would increase both yields, and a farmer's income, and hence improve economic well-being in a country. Also the use of such practices should permit the full benefit to be gained from the cultivation of the potentially heavy yielding cultivars that emerge from plant breeding programs. During 1981/82 three trials were distributed. These included a Weed Control Trial (WCT) in addition to the Fertility-cum-Inoculation Trial (FIT) and Date of planting-cum-Plant Population Trial (DPPT).

2.2. DISTRIBUTION AND LIST OF COOPERATORS

In Table 2.2.1 is given a list of the trials and nurseries distributed from ICARDA to the different countries, in Table 2.2.2 a list of the cooperators, and in Table 2.2.3 details on some of the locations at which the trials were conducted. Weather conditions during the cropping season for some of the locations are given in Fig. 1. In total, 833 sets of trials were distributed to the cooperators. Data were returned on 339 of the trials and nurseries, representing 41% of the number distributed.

Table 2.2.1. Distribution of FLIP international trials and nurseries to the cooperators during 1981/82.

Country	CAT	CIYT	CIYT-W	CIYT-L	CISN	CIF3T-A	CIF3T-B	CIF3T-C	CIABN	CDPPT	CFIT	CWCT	FBAT	FBIYT-L	FBIYT-S	FBISN-L	FBISN-S	FBIF4T	FBION	FBDPPT	FBFIT	FBWCT	LAT	LIYT-L	LIYT-S	LISN-L	LISN-S	LISN-E	LIF3T	LIF3T-E	LDPPT	LFIT	LWCT	TOTAL
Algeria	2	2	3	1	3	1	1	-	3	1	1	4	1	1	-	2	1	-	1	2	-	1	1	1	3	2	-	2	1	1	-	1	4	47
Argentina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-	1	1	1	1	1	-	8
Bangladesh	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	5
Brazil	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	5
Canada	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Chile	1	1	-	2	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	2	-	1	-	-	-	-	-	-	-	10
China	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	4
Cyprus	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Ecuador	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2	1	2	-	-	-	2	-	-	-	-	11
Egypt	1	1	1	1	1	-	1	-	-	-	1	2	1	-	2	2	2	1	3	-	-	3	1	1	2	-	1	1	1	1	-	1	2	34
Ethiopia	1	1	1	-	1	-	-	-	1	1	-	1	1	-	1	1	1	-	-	3	2	2	1	-	1	1	1	1	-	1	-	-	1	25
Ghana	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Honduras	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
India	2	1	1	2	3	1	1	2	3	3	1	-	-	-	-	2	1	-	-	-	-	-	-	1	1	1	1	1	-	1	1	1	-	31
Iran	1	1	3	-	3	-	1	1	1	-	2	2	2	-	-	-	-	-	-	-	-	-	1	3	1	3	1	-	1	-	-	2	2	31
Iraq	2	2	2	1	1	-	-	-	2	2	2	2	1	1	-	3	-	-	-	-	3	3	2	1	3	3	3	2	-	-	2	2	2	47
Italy	2	1	3	2	2	1	2	-	1	-	1	-	-	-	-	1	-	-	-	-	-	-	2	-	1	2	2	-	2	-	-	1	-	26
Jordan	1	2	5	1	2	-	-	-	3	-	-	1	-	1	-	2	2	-	-	-	-	-	1	2	2	3	3	3	-	-	-	-	1	35
Lebanon	2	3	3	-	2	-	-	-	1	2	2	1	1	-	-	2	1	-	-	2	2	1	2	-	3	3	2	1	-	-	2	2	1	41
Mexico	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Morocco	1	2	8	2	-	1	-	-	2	-	-	-	-	1	-	-	-	1	3	-	-	-	-	1	2	-	-	1	1	1	-	-	-	27
Muscat	-	-	1	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	7
Nepal	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1	4
Pakistan	5	3	6	-	5	2	-	4	7	6	4	6	-	-	-	1	1	-	-	-	-	-	10	-	7	1	7	11	-	6	4	1	6	103
Peru	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Saudi Arabia	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Spain	3	1	7	3	2	1	2	-	2	1	1	1	3	-	-	2	3	-	4	1	1	1	1	1	1	1	1	-	2	-	1	1	1	49
Sudan	3	3	2	2	1	-	2	-	-	1	1	-	3	-	2	2	2	1	-	2	2	1	1	-	1	1	1	1	-	1	-	-	-	36
Syria	-	1	7	4	-	-	-	-	3	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	20
Tunisia	3	2	4	3	2	1	1	-	3	1	1	1	1	1	-	3	1	1	-	-	1	1	2	1	-	1	1	-	-	-	-	-	-	38
Turkey	1	1	1	1	3	1	-	-	3	-	-	1	1	-	-	1	1	-	-	-	-	-	2	1	1	6	1	-	1	-	-	1	1	28
USA	4	4	2	2	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-	-	-	-	-	19
West Germany	-	-	2	-	-	-	-	-	2	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Yemen Arab Rep.	2	1	1	1	-	-	-	-	-	1	1	1	1	-	-	1	2	-	-	1	1	1	1	-	1	-	-	-	-	-	1	1	1	20
ICARDA	3	2	5	2	2	1	1	1	3	5	5	6	4	4	4	4	4	4	2	3	2	3	3	3	3	3	3	4	3	1	3	2	3	101
Total	50	37	70	32	39	11	13	8	40	26	27	31	22	9	9	35	24	9	13	14	14	18	40	22	36	35	30	30	15	15	15	17	27	833

Table 2.2.2. List of cooperators for FLIP 1981/82 International Nurseries.

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Table 2.2.3. Latitude, longtitude, altitude and rainfall for some of the locations for 1981/82 season.

Country	Location	Latitude*	Longtitude*	Altitude (m)	Rainfall (mm)
ALGERIA	El Harrach	36° 45' N	3° 07' E		
ARGENTINA	Buenos Aires	34° 40' S	58° 30' W		
BANGLADESH	Mymensingh	24° 46' N	90° 24' E	18	
BRAZIL	Passo Fundo	28° 16' S	52° 20' W		
	Brasilia-DF	16° 13' S	44° 29' W		
CANADA	Saskatoon	52° 10' N	106° 41' W	300	
CHILE	Valdivia	39° 48' N	74° 24' E	12	
	Santiago	50° 46' S	75° 26' W		
	Chillan	36° 58' N	72° 06' E	400	
CHINA	Wu-Han	30° 35' N	114° 19' E		
	Shanghai	31° 13' N	121° 25' E		
CYPRUS	Nicosia	35° 08' N	33° 24' E	150	
ECUADOR	Quito	00° 36' N	77° 50' W	2700	
EGYPT	Giza	30° 45' N	31° 00' E		
	Saka	30° 45' N	31° 00' E	6	
	Sids	31° 00' N	23° 30' E	30	
ETHIOPIA	Addis Ababa	9° 03' N	38° 42' E		
	Debre Zeit	08° 47' N	39° 00' E	1900	557
	Holetta	9° 03' N	38° 31' E	2390	1228
	Kulumsa	7° 40' N	39° 40' E	2200	671
GREECE	Larissa	39° 70' N	22° 05' E	70	
GHANA	Tamale	9° 26' N	0° 49' W		
HONDURAS	Tegucigalpa	14° 05' N	87° 14' W		
INDIA	New Delhi	28° 00' N	77° 00' E	227	
	Kanpur	26° 27' N	80° 14' E		
	Gwaliar	26° 12' N	78° 09' E		
	Ludhiana	30° 56' N	75° 52' E		
	Pantnagar	29° 22' N	79° 26' E		
	Palampur	32° 04' N	76° 29' E		
IRAN	Tehran	35° 40' N	51° 26' E		
	Karaj	36° N	51° E	1300	246

... 2/

Table 2.2.3. ... 2/ Cont'd

Country	Location	Latitude*	Longtitude*	Altitude (m)	Rainfall (cm)
IRAQ	Abu Ghraib (Baghdad)	33° 20' N	44° 25' E	35	
JORDAN	Amman	31° 51' N	35° 56' E		
LEBANON	Tel-Amara Rayak	33° 55' N	35° 28' E	950	
	Beirut	33° 52' N	35° 30' E		
	Terbol	33° 49'	35° 59'	890	
MEXICO	Culican Sinalava	24° 50' N	107° 23' W		
MOROCCO	Rabat	33° 59' N	06° 52' W	25	
	Rabat Chelam	34° 02' N	06° 51' W		
NEPAL	Kathmandul	27° 40' N	85° 20' E	1360	
PAKISTAN	Islamabad	33° 00' N	73° 00 E	683	
	Faisalabad	31° 30' N	73° 10' E	213	
	Lahore	31° 19' N	74° 05 E	225	
	Tarnab (Peshawar)	34° 01' N	71° 40' E		
PERU	Lima	11° 00' N	74° 00 E	3000	
SPAIN	Madrid	40° 32' N	0° 24' E	130	
	Cordoba	37° 51' N	40° 51' W	110	
SUDAN	Ed-Damer	17° 37' N	33° 59' E		
	Khartoum	15° 33' N	32° 35' E		
	Wad Medani	14° 24' N	33° 30' E		
	Hudeiba - Sarraj	17° 35' N	33° 37' E	353	
SULTANATE OF OMAN	Muscat	23° 37' N	38° 38' E		
SAUDI ARABIA	Riyadh				
SYRIA	Tel Hadya	36° 40' N	37° 20' E	392	
	Jinderis				
	Lattakia	35° 40' N	35° 40' E	7	
	Breda				
	Duma - Damascus	33° 30' N	36° 19' E		

...3/

Table 2.2.3. ...3/Cont'd

Country	Location	Latitude*	Longtitude*	Altitude (m)	Rainfall (cm)
TUNISIA	Tunis	36° 50' N	10° 13' E		
TURKEY	Ankara	39° 55' N	32° 40' E	902	
	Izmir	38° 35' N	27° 04' E	10	
USA	Pullman, Washington	46° 46' N	117° 12' W	776	
	San Francisco (California)	38 00' N	122° 00' W	60	
WEST GERMANY	Stuttgart	49° 00' N	09° 00' E	420	
	Bonn	50° 44' N	07° 06' E		
YEMEN ARAB REPUBLIC	Taiz	13° 35' N	44° 02' E		
	Sana	15° 23' N	44° 14' E		

* Source The Times Atlas of the World (Comprehensive Edition). London, The Times Newspapers Ltd Printing House Square, 1967.

2.3. DESIGN, ANALYSIS AND MANAGEMENT

2.3.1. Design and Analysis

The designs used for the individual trials and nurseries are given in the crop reports. For the International Screening Nurseries (ISNs) which included both test and check entries, an augmented design, as proposed by Federer (1956)[1] was used. This design permits some adjustment of seed yields for block differences, and the calculation of standard errors for the comparison of entry means.

Only the data on seed yield have been analysed statistically, and the term 'significant' has been used to denote a probability level (P) equal or less than 0.05. The co-efficients of variation given in the different tables were calculated using an error mean square (EMS) from the relevant analysis of variance. The EMS was also used to calculate the appropriate least significant difference (LSD), which was used to test whether a genotype's performance differed significantly from that of the control (local check). The LSD is not appropriate for testing differences between any pair of genotypes in a trial.

2.3.2. Management

For all except the agronomic trials it was emphasised that the material should be planted at the farmer's normal planting date, and that the locally recommended practices should be used with respect to fertilizer, pesticides, herbicides and irrigation.

For each trial or nursery, observations were requested on plant stand (1-5; rating 1 = perfect), time to 50% flowering, plant height (cm) and yield (kg/ha). Other characters were optional e.g. plant width (cm),

(1) Federer, W.T. (1956). Augmented designs. Hawaiin Planters Record, 55, 191-208, 1956.

plant type (erect, semi-erect or prostrate), height of lowest pods (cm), disease damage rating (1-5; 1 = free from disease), insect damage rating (1-5; 1 = free from insect damage),lodging (1-5; 1 = no lodging), vigour rating a visual estimate of yield potential (1-5; 1 = very vigorous), shattering (1-5; 1 = no shattering),time to maturity, branching (1-5; 1 = very few branches) and virus (1-5; 1 = free of virus).

In addition, cooperators were requested to send information on the altitude, temperature, rainfall, number and dates of irrigations, dates of planting and harvest, herbicides, pesticides and fertilizers applied (indicating type, rate and date of application), names and titles of people conducting the nursery and any other relevant information which could be of value in interpreting the data.

3. CHICKPEA INTERNATIONAL TRIALS AND NURSEREIS

Twelve chickpea international trials and nurseries were available to the cooperators in the 1981/ 82 season. These mainly included breeding nurseries and trials, disease nursery and agronomic trials.

3.1. CHICKPEA ADAPTATION TRIAL (CAT)

Material

The Chickpea Adaptation Trial (CAT) comprised 16 entries , 9 kabuli types and 7 desi types. Most of these entries are the land races and are widely grown in different countries of the region. These land races have been chosen with the idea that these may be diverse and may help in classification of countries into agro-ecological zones.

Methods and Management

The material was suggested to be sown in a randomized complete block design with four replications. The recommended plot size was four rows, each four meter long and with inter- and intra row spacings of0.30 m and 0.10 m, respectively.

Fifty sets of CAT were distributed to the cooperators in 27 countries. The results were returned from 14 locations in 11 countries and were analysed. The agronomic data provided by the cooperators are given in Table 3.1.1.

Results and Discussion

The data on time to flowering, time to maturity,and plant height are given in Tables 3.1.2 , 3.1.3. and 3.1.4,respectively.

The genotypes flowered earliest (40 days) at Highmore in the USA and the other locations which took less time to flower included Hemares in Spain (46 days), Terbol in Lebanon (52 days), and Brookings in USA (53 days). However, the locations taking maximum time to flowering included Tel Hadya (winter sowing) in Syira (129 days) and Riyadh in Saudi Arabia (97 days). The time to flowering across the locations varied from 62 days for ICC 5810 to 74 days for ICC 10136. The time to maturity almost followed the same pattern as that of time to flowering (Table 3.1.3.). The persual of Table 3.1.4. revealed that the plant height of the genotypes was least at Ankara in Turkey (21 cm) and maximum (44 cm) at Hudeiba in Sudan. There were wide genotypic differences across locations, ICC 10136 showing least plant height (29 cm) and ILC 1934 maximum plant height (42 cm).

The data on seed yield of the entries at different locations are given in Table 3.1.5. The co-efficient of variation for the trial varied from 14.2% at Tel Hadya in Syria (during spring season) to 59.5% at Hudeiba in Sudan. The perusal of the table revealed that the mean performance of the entries was lowest at Riyadh in Saudi Arabia (258 kg/ha) and highest at Highmore in USA (3241 kg/ha).

The mean yield for the four years across the locations for the common entries is given in Table 3.1.6. As mentioned in previous year's report the characterization of countries into different agro-ecological zones seems difficult due to absence of similarity between different locations. The genotype ILC 1919 produced the highest yield on an average of four years. The performance of other genotypes in descending order were ILC 1922, ILC 1929, ILC 1932, ILC 1931, ILC 1934 and ILC 519, respectively. The rank average also gave almost similar conclusions.

The correlations between seed yields of different locations are given in Table 3.1.7. It was observed that Tel Hadya(spring sowing) in Syria, the principal research site at ICARDA, exhibited positive and significant association with Rome and Sicily in Italy, Terbol in Lebanon, Tel Hadya (winter sowing) in Syria, and Ankara in Turkey. Similarly Rome in Italy exhibited positive and significant correlation with Sicily in

Italy, Terbol in Lebanon, Hemares in Spain, and Tel Hadya in Syria. Also Highmore in USA was positively correlated with Temuco in Chile, Heredia in Costa Rica and Brookings in USA. The positive associations indicated some similarity between these locations.

Table 3.1.1. Agronomic data for different locations for the CAT during 1981/82.

Country	Location	Planting date	Crop duration * (days)	Fertilizer (kg/ha) N	P_2O_5	K_2O	Irrig.	Insecticide
CHILE	Temuco	16- 9-1982	120	40	50		-	
COSTA RICA	Heredia	16-11-1982	117	30	90	30	1	Lannate, Bactospcinc, Orthocide
INDIA	New Delhi	29-10-1981	NR	15	40		-	Heldan
ITALY	Rome	8- 3-1982	114	56	100		-	
	Sicily	9- 3-1982	NR	-	60		-	
LEBANON	Terbol	NR	91	-	-	-	-	
SPAIN	Hemares	17- 4-1982	89	-	-	-	-	
SAUDI ARABIA	Riyadh	14-12-1981	136		-	-	17	
SUDAN	Hudeiba	26-11-1981	114	40			11	
SYRIA	TH-Winter	8-12-1981	179		50		-	
	TH-Spring	23- 2-1982	112		50		-	
TURKEY	Ankara	NR	106	-	-	-	-	
U.S.A.	Brookings	4- 5-1982	109	-	-	-	-	
	Highmore	28- 5-1982	NR					

* Days from planting to maturity averaged over all entries. NR = Not reported

Table 3.1.2. Time to flowering (days) for entries in the CAT at different locations during 1981/82.

ENTRY NAME		ORIGIN	CHILE	COSTA RICA	ITALY	LEBANON	SPAIN	SAUDI ARABIA	SUDAN	SYRIA Tel Hadya		TURKEY	U.S.A.		MEAN
			Temuco	Heredia	Rome	Terbol	Hemares	Riyadh	Hudeiba	winter	spring	Ankara	Brookings	Highmore	
ICC	5810	India	65	59	76	44	39	94	35	126	59	63	45	40	62
ICC	4918	India	71	65	75	46	45	94	51	129	66	63	49	40	66
ICC	11524	ICRISAT	70	64	75	52	45	97	51	127	71	69	50	40	68
ICC	11529	ICRISAT	68	63	76	44	42	93	52	129	68	64	50	40	66
ICC	5003	India	71	61	75	54	48	97	60	130	75	69	55	40	69
ICC	4948	India	81	66	78	57	53	101	68	131	82	71	55	40	73
ICC	10136	India	90	68	80	57	46	104	64	139	82	70	55	40	74
ILC	1319	India	76	65	74	51	45	91	61	121	71	64	50	40	68
ILC	3256	Cyprus	74	66	76	54	47	104	72	132	69	64	55	40	72
ILC	519	Egypt	76	65	75	51	44	93	60	131	68	64	50	40	68
ILC	482	Turkey	74	65	74	54	46	92	67	128	71	66	51	40	69
ILC	1934	Iran	80	67	77	57	54	105	76	130	74	66	55	40	73
ILC	1932	Jordan	77	64	74	53	46	97	68	131	69	64	57	40	70
ILC	1922	Morocco	77	65	75	56	50	101	68	129	75	69	56	40	71
ILC	1929	Syria	77	64	75	52	48	93	73	131	67	64	56	40	70
ILC	1931	Turkey	77	63	74	54	45	94	66	123	69	64	51	-	65
Location mean			75	64	76	52	46	97	62	129	71	66	53	40	

Table 3.1.3. Time to maturity (days) for entries in the CAT at different locations during 1981/ 82.

ENTRY NAME		CHILE	COSTA RICA	ITALY	LEBANON	SPAIN	SAUDI ARABIA	SUDAN	SYRIA Tel Hadya		TURKEY	U.S.A.	MEAN
		Temuco	Heredia	Rome	Terbol	Hemares	Riyadh	Hudeiba	Winter	Spring	Ankara	Brookings	
ICC	5810	116	97	112	85	89	126	91	181	110	104	108	111
ICC	4918	113	113	112	85	87	134	115	178	110	104	108	115
ICC	11524	116	114	112	87	87	135	116	177	112	106	108	116
ICC	11529	114	111	114	85	87	134	114	178	113	105	108	115
ICC	5003	122	103	114	91	87	135	112	177	113	107	108	116
ICC	4948	114	118	114	92	95	138	116	179	114	107	108	118
ICC	10136	144	119	118	90	87	137	114	181	113	108	108	120
ILC	1919	124	119	113	88	87	137	115	177	112	105	108	117
ILC	3256	117	124	113	95	95	136	117	178	112	105	108	119
ILC	519	120	122	114	91	92	136	114	181	112	105	108	117
ILC	482	125	116	113	95	87	136	116	177	112	105	128	119
ILC	1934	130	126	116	98	87	139	119	181	113	107	108	121
ILC	1932	124	120	114	94	95	136	117	179	113	106	108	119
ILC	1922	120	122	114	95	95	138	115	177	114	108	108	118
ILC	1929	114	122	115	95	87	136	115	178	111	106	108	117
ILC	1931	114	120	114	92	87	137	118	177	112	105	108	116
Location mean		120	117	114	91	89	136	114	179	112	106	109	

Table 3.1.4.Plant height (cm) of entries in the CAT at different locations during 1981/82.

ENTRY NAME	CHILE	COSTA RICA	ITALY	LEBANON	SPAIN	SAUDI ARABIA	SUDAN	SYRIA Tel Hadya		TURKEY	U.S.A.		MEAN
	Temuco	Heredia	Sicily	Terbol	Hemares	Riyadh	Hudeiba	winter	spring	Ankara	Brookings	Highmore	
ICC 5810	36	35	44	39	32	29	34	23	29	21	42	40	34
ICC 4918	38	34	30	31	26	24	40	29	23	18	30	40	30
ICC 11524	48	31	29	30	30	23	39	30	27	17	29	37	31
ICC 11529	43	35	37	31	38	24	37	31	29	24	36	43	34
ICC 5003	43	32	36	34	30	20	37	32	27	20	33	45	32
ICC 4948	39	34	28	33	20	25	48	28	25	16	29	41	30
ICC 10136	37	32	26	31	25	19	41	29	25	16	35	40	29
ILC 1919	40	32	29	32	34	22	42	32	25	19	40	39	32
ILC 3256	38	40	33	35	37	26	44	33	29	21	35	42	35
ILC 519	48	43	40	41	40	39	49	34	30	25	37	45	39
ILC 482	43	39	39	41	36	31	44	35	30	24	41	45	37
ILC 1934	47	46	42	46	44	38	52	44	34	29	41	43	42
ILC 1932	38	38	39	36	30	30	45	31	28	25	35	43	35
ILC 1922	45	42	39	42	39	32	54	37	29	24	39	49	39
ILC 1929	39	38	38	39	35	32	44	32	27	21	31	44	35
ILC 1931	43	44	38	40	40	27	53	36	31	23	32	-	37
Location mean	42	37	35	36	34	28	44	32	28	21	35	42	

Table 3.1.5. Seed yield (Y = kg/ha) and rank (R) of entries in the CAT at different locations during 1981/82.

ENTRY NAME	CHILE		COSTA RICA		INDIA		ITALY				LEBANON		SPAIN		SAUDI ARABIA		SUDAN		SYRIA				TURKEY		U.S.A.				MEAN	
	Temuco		Heredia		New Delhi		Rome		Sicily		Terbol		Hemares		Riyadh		Hudeiba		Tel Hadya winter		Tel Hadya spring		Ankara		Brookings		Highmore			
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
ICC 5810	1654	14	1125	15	168	16	760	16	666	14	787	16	178	16	318	5	1390	2	527	16	775	15	244	15	636	11	2716	9	853	16
ICC 4318	2904	3	1289	9	890	11	2073	3	1235	11	1199	8	378	11	250	9	1899	1	2631	11	1301	9	308	14	1074	5	3917	5	1525	3
ICC 11524	2563	4	1450	6	1573	5	1854	6	1536	7	1129	13	495	8	135	15	1298	3	2794	9	1102	12	192	16	1650	2	3494	7	1519	4
ICC 11529	3000	1	1624	3	1333	7	1402	12	1565	4	1276	4	558	4	313	6	920	9	2211	12	1196	11	476	8	1070	6	4245	3	1514	5
ICC 5003	2983	2	1495	4	2349	1	1750	8	1377	9	1469	1	500	7	245	10	1268	4	2849	8	1374	8	354	12	818	7	4569	2	1693	2
ICC 4948	1829	10	1243	10	2200	3	1115	15	-	-	1107	14	236	15	151	14	1155	6	2020	13	727	16	335	13	1237	4	4099	4	1343	8
ICC 10136	1363	8	1473	5	2037	4	1169	14	-	-	1083	15	366	13	99	16	875	10	1887	14	989	13	364	11	808	8	3595	6	1286	11
ILC 1919	2150	6	1229	11	2271	2	1745	9	940	13	1175	11	713	1	286	7	1027	7	3217	5	1275	10	411	10	1449	3	2599	11	1463	6
ILC 3256	1217	16	1186	12	523	15	1531	11	1315	10	1386	2	342	14	333	3	402	14	3494	3	1745	3	519	7	358	13	1529	15	1134	15
ILC 519	1896	9	1905	1	743	13	1242	13	1039	12	1188	10	375	12	359	2	1015	8	1600	15	987	14	469	9	748	9	2938	8	1179	14
ILC 482	2021	7	1705	2	908	10	2151	2	1557	5	1275	5	617	3	198	13	619	13	3735	1	1707	4	751	2	2514	1	5306	1	1730	1
ILC 1934	2404	5	1376	8	824	9	1768	7	1617	2	1169	12	530	5	266	8	26	16	3318	4	1493	5	1015	1	651	10	2237	14	1343	8
ILC 1932	1508	15	981	16	1090	8	1721	10	1462	8	1264	6	408	10	208	12	655	12	2663	10	1489	6	586	6	290	15	2408	12	1196	13
ILC 1922	1813	11	1142	13	1531	6	2021	4	1540	6	1331	3	653	2	323	4	1244	5	3049	6	1410	7	610	5	337	14	2651	10	1404	7
ILC 1929	1721	13	1139	14	719	14	2167	1	1677	1	1258	7	422	9	406	1	250	15	2855	7	1832	1	730	3	242	16	2319	13	1267	12
ILC 1931	1754	12	1411	7	840	12	1938	5	1572	3	1195	9	530	5	245	10	872	11	3537	2	1813	2	632	4	427	12	-	-	1290	10
Location mean	2086		1361		1256		1650		1364		1206		456		258		932		2649		1326		500		894		3241			
C.V. %	21.4		31.5		31.7		14.9		20.8		20.1		26.3		39.0		59.5		17.4		14.2		36.7		32.6		21.2			
S.E.	223.6		214.5		199.4		122.8		141.9		121.0		59.9		50.5		277.2		231.0		94.3		91.7		145.8		343.6			

Table 3.1.6. Seed yield (Y = kg/ha) and ranking (R) of common entries in CAT during 1978/79, 1979/80, 1980/81 and 1981/82.

Entry	1978/79		1979/80		1980/81		1981/82		Average		Average Rank	
	Y	R	Y	R	Y	R	Y	R	Y	R	Average	Rank
ILC 519	921	(5)	878	(7)	1652	(5)	1179	(7)	1158	(7)	6.50	(7)
1919	1107	(3)	1199	(1)	1810	(1)	1463	(1)	1395	(1)	1.50	(1)
1922	1157	(1)	1049	(4)	1756	(3)	1404	(2)	1342	(2)	2.50	(2)
1929	1140	(2)	1123	(2)	1758	(2)	1267	(5)	1322	(3)	2.75	(3)
1931	729	(7)	1059	(3)	1699	(4)	1290	(4)	1194	(5)	4.50	(4)
1932	1090	(4)	977	(6)	1611	(6)	1196	(6)	1219	(4)	5.50	(6)
1934	888	(6)	985	(5)	1401	(7)	1343	(3)	1154	(6)	5.25	(5)

Table 3.1.7. Correlations (df = 11) between different locations for the seed yield of entries in the CAT during 1981/ 82.

COUNTRY-LOCATION	COSTA RICA	INDIA	ITALY		LEBANON	SPAIN	SAUDI ARABIA	SUDAN	SYRIA		TURKEY	U.S.A.	
	Heredia	New Delhi	Rome	Sicily	Terbol	Hemares	Riyadh	Hudeiba	TH-winter	TH-spring	Ankara	Brookings	Highmore
CHILE - Temuco	0.44	0.53	0.18	0.19	0.15	0.32	-0.36	0.43	0.03	-0.26	-0.24	0.39	0.67*
COSTA RICA - Heredia		0.09	-0.09	0.06	0.14	0.19	-0.09	0.05	-0.04	-0.23	-0.01	0.55*	0.60*
INDIA - New Delhi			0.34	0.15	0.47	0.73**	-0.35	0.24	0.38	-0.01	-0.20	0.25	0.32
ITALY - Rome				0.71**	0.57*	0.58*	-0.26	-0.15	0.80**	0.72**	0.38	0.25	0.23
Sicily					0.61*	0.43	-0.19	-0.48	0.65*	0.68**	0.57*	0.02	0.17
LEBANON - Terbol						0.46	-0.01	-0.24	0.70**	0.67*	0.28	-0.07	0.17
SPAIN - Hemares							-0.23	-0.13	0.66*	0.30	0.32	0.44	0.29
SAUDIA ARABIA - Riyadh								-0.25	-0.29	0.09	0.21	-0.60*	-0.47
SUDAN - Hudeiba									-0.43	-0.65*	-0.82**	0.19	0.40
SYRIA - TH-winter										0.81**	0.51	0.27	0.06
TH-spring											0.66*	-0.07	-0.11
TURKEY - Ankara												-0.13	-0.20
U.S.A. - Brookings													0.73**

* $P \leq 0.05$

** $P \leq 0.01$

3.2. CHICKPEA INTERNATIONAL YIELD TRIAL (CIYT)

Material

The Chickpea International Yield Trial (CIYT) comprised 23 test entries and one check to be supplied by the cooperators. Among these, 21 entries were derived from the germplasm collections maintained at Tel Hadya which have shown their superior performance either in regional or in international trials conducted by ICARDA in the previous years. Two new entries, namely FLIP 80-2 and FLIP 80-28 developed through the hybridization at ICARDA exhibiting superior performance on the basis of regional yield trials were also included. Cooperators were free to use these entries in their breeding programs or for release as cultivars.

Methods and Managment

The trial design was a randomized complete block with four replications. The suggested plot size was 4 rows, each 4 m long, with an inter-and intra row spacings of 0.30 m and 0.10 m, respectively.

Thirty-seven sets of trial were distributed to the cooperators in 21 countries. Results were received from 15 countries for 19 sets. The yield for only 14 sets were reported and were thus analyzed. The information on the agronomic practices received from the cooperators is given in Table 3.2.1.

Results and Discussion

The data on time to flowering (days), time to maturity (days) and plant height are given in Tables 3.2.2, 3.2.3, and 3.2.4, respectively. The genotypes flowered earliest (42 days) at Tehran in Iran and was followed by Hemares in Spain (47 days), Terbol in Lebanon (54 days) and Brookings in USA (56 days). Nicosia in Cyprus was the location where the genotypes took maximum time to flower (124 days) and Mallawi in Egypt

followed it (81 days). In general, the time to flowering (days) and time to maturity (days) showed a similar pattern with respect to location means. The genotypic means across locations for time to flowering ranged from 66 days for ILC 66, ILC 295, ILC 493 and FLIP 80-28 to 71 days for ILC 237, ILC 262, ILC 263, ILC 464 and ILC 515; and for time to maturity from 111 days for ILC 4, ILC 493, and ILC 1929 to 116 days for ILC 237 and ILC 464. The plant height data revealed that the genotypes were tallest at Debre Zeit in Ethiopia with 50 cm height and shortest at Tehran in Iran with 23 cm height (Table 3.2.4). The genotypic range across locations was 32 to 40 cm. The genotype ILC 237 was tallest.

The seed yield and rank of different genotypes at each location are given in Table 3.2.5. The ANOVA for the design revealed that the differences among the entries were significant at all the locations. The coefficient of variation for the design varied from 14.4% at Tel Hadya in Syria to 78.9% at Brookings in USA with an average of 31.2%. The estimates of least significant differences (LSD) for different locations revealed that 22 genotypes excelled the local check by a significant margin at Hemares in Spain. Similarly, 7, 4, 4, 2, 1, 1, and 1 genotype excelled the local check respectively at Mallawi (Egypt), Tehran (Iran), Tel Hadya (Syria), Izra'a (Syria), Sicily (Italy), Ankara (Turkey), and Pullman (USA). The genotypic mean ranged from 254 kg/ha at Aliab in Sudan to 3416 kg/ha at Pullman in USA. The highest yield of 1508 kg/ha was recorded for ILC 295 which was followed by ILC 463 (1455 kg/ha), ILC 237 (1397 kg/ha), FLIP 80-2 (1384 kg/ha) and ILC 1920 (1373 kg/ha). The lowest yield of 1095 kg/ha was obtained from ILC 262. The five highest yielding entries at each location are given in Table 3.2.6. It is evident from this table that the genotypes ILC 295, ILC 463, ILC 493 and ILC 237 maintained their position among the first five at least at 5 or more locations. At Mallawi in Egypt, a few genotypes ILC 463, ILC 591, FLIP 80-2, ILC 295, ILC 237 and ILC 515, gave more than 75% higher yield than the local check. Similarly almost all the genotypes at Hemares in Spain, a few genotypes at Tehran in Iran, ILC 1102 at Pullman in USA, ILC 35 at Sicily in Italy produced higher yield than the local check.

The results of three years for the common entries in CIYT are given in Table 3.2.7. It was observed that ILC 295, ILC 237 and ILC 493 were the top yielders. These may be extensively used in breeding program.

The correlations between the location means for seed yield are given in Table 3.2.8. Most of these correlations were not significant. This shows that the genotype-environment interactions were well pronounced or the behaviour of different genotypes in different environments was not consistent. However, the positive and significant associations of Hemares in Spain with Mallawi in Egypt, Carahue in Chile, Tehran in Iran, and Brookings in USA; and the positive association of Mallawi in Egypt with Carahue in Chile and Tehran in Iran, revealed that there was much similarity in the performance of the genotypes in these correlated environments.

Table 3.2.1. Agronomic data for different locations for the CIYT during 1981/82.

Country	Location	Planting date	Crop duration* (days)	Fertilizer (kg/ha) N	P_2O_5	K_2O	Irrigation	Insecticide
CHILE	Carahue	21- 9-1982	117	40	50		-	
CYPRUS	Nicosia	8-12-1981	196	23	60		-	
EGYPT	Mallawi	8-12-1981	152	15	15		3	
IRAN	Tehran	7- 4-1982	102	18	46		6	Treflan, Diazinon, Metasystox
ITALY	Sicily	8- 3-1982	NR		60		-	
LEBANON	Terbol	6- 4-1982	95	-	-	-	-	
SPAIN	Hemares	14- 4-1982	89	40	120			
SUDAN	Aliab	15-11-1981	114	40			11	
	Hudeiba	1-12-1981	115	40			11	
SYRIA	Tel Hadya	22-2-1981	112	50			-	
TURKEY	Ankara	22- 3-1982	108	20	60		-	
U.S.A.	Brookings	4- 5-1982	136	-	-	-	-	
	Pullman	6- 5-1982	114	-	-	-	-	Tolban, Premerge Cygon, Imidan

* Days from planting to maturity averaged over all entries, NR = Not reported.

Table 3.2.2. Time to flowering (days) for entries in the CIYT at different locations during 1981/82.

ENTRY	NAME	ORIGIN	CHILE	CYPRUS	EGYPT	ETHIOPIA	IRAN	ITALY	LEBANON	SPAIN	SUDAN	SYRIA	TURKEY	U.S.A		MEAN
			Carahue	Nicosia	Mallawi	Debre Zeit	Tehran	Sicily	Terbol	Hemares	Hudeiba	Tel Hadya	Ankara	Brookings	Pullman	
ILC	4	Jordan	71	126	82	-	45	77	50	44	71	70	67	56	47	67
	35	Syria	68	122	83	80	41	73	54	46	73	69	67	55	50	68
	66	Iraq	75	122	74	80	41	74	47	43	65	70	66	55	47	66
	69	Iraq	75	123	82	87	42	76	54	46	72	69	68	55	49	69
	237	Spain	75	125	80	90	46	77	56	52	83	71	70	56	48	71
	262	Turkey	80	126	83	79	43	76	56	47	84	72	70	56	50	71
	263	Turkey	75	124	82	80	43	76	59	47	84	72	70	59	49	71
	295	Iran	68	122	78	75	39	73	52	47	71	66	67	55	48	66
	463	Turkey	68	123	80	75	41	75	52	46	73	69	69	55	48	67
	464	Turkey	75	123	83	82	43	75	59	49	82	71	70	58	50	71
	480	Turkey	75	123	82	80	43	76	56	47	79	72	70	55	48	70
	493	Turkey	75	123	81	54	39	75	54	44	71	68	67	55	47	66
	515	Turkey	78	126	87	82	45	78	60	47	81	72	70	55	48	71
	591	Egypt	75	126	80	77	42	76	56	47	74	71	70	58	49	69
	610	Tunisia	71	124	82	78	42	74	54	47	76	68	68	55	48	68
	953	Iran	75	124	82	80	42	78	55	47	73	70	70	58	48	69
	1073	Iran	75	123	83	80	42	76	55	46	73	71	69	56	48	69
	1102	Iran	71	122	83	80	42	75	51	44	76	68	70	55	47	68
	1269	Iran	68	124	80	76	40	75	51	46	74	67	65	55	48	67
	1920	India	75	123	83	79	43	76	54	45	72	71	70	55	48	69
FLIP 80-2		ICARDA-Syria	71	123	82	80	40	73	52	45	76	67	67	55	47	68
FLIP 80-28		ICARDA-Syria	65	122	82	80	40	75	48	44	70	67	66	55	46	66
ILC 1929		Syria	71	124	80	-	39	75	52	45	82	67	5	56	47	67
Local check		-	65	125	79	-	40	76	56	57	73	67	69	50	48	
Location mean			73	124	81	79	42	75	54	47	75	69	68	56	48	

Table 3.2.3. Time to maturity (days) for entries in the CIYT at different locations during 1981/82.

ENTRY	NAME	CHILE	EGYPT	ETHIOPIA	IRAN	LEBANON	SPAIN	SUDAN		SYRIA	TURKEY	MEAN
		Carahue	Mallawi	Debre Zeit	Tehran	Terbol	Hemares	Aliab	Hudeiba	Tel Hadya	Ankara	
ILC	4	116	150	-	100	95	92	113	116	112	108	111
	35	119	156	139	99	94	92	113	116	111	108	115
	66	119	150	139	100	86	87	114	114	112	108	113
	69	121	150	145	100	94	92	114	115	112	107	115
	237	119	155	138	104	96	92	117	116	113	108	116
	262	116	149	139	102	95	92	117	116	112	108	115
	263	119	151	139	100	95	92	117	116	112	108	115
	295	119	149	130	102	95	87	112	113	111	108	113
	463	116	156	132	102	95	92	113	115	111	108	114
	464	121	150	140	105	96	92	118	116	115	110	116
	480	116	152	139	99	98	87	118	115	114	110	115
	493	114	150	120	99	95	87	113	114	112	108	111
	515	116	154	140	99	95	87	120	115	112	109	115
	591	116	150	120	100	95	87	115	115	112	109	112
	610	116	156	136	100	95	87	114	116	113	109	114
	953	119	159	139	102	95	87	114	116	112	109	115
	1079	119	155	138	103	95	87	115	116	113	109	115
	1102	114	150	130	105	95	87	114	114	112	109	113
	1269	116	150	135	105	94	87	112	115	111	108	113
	1920	116	150	132	103	95	87	113	114	110	108	113
FLIP	80-2	116	152	135	101	95	87	113	115	112	108	113
FLIP	80-28	119	150	138	101	92	87	112	115	110	108	113
ILC	1929	116	150	-	103	95	87	113	114	111	108	111
Local check		111	149	-	103	96	92	113	113	111	108	
Location mean		117	152	135	102	95	89	114	115	112	108	

Table 3.2.4. Plant height (cm) of entries in the CIYT at different locations during 1981/82.

ENTRY NAME	CHILE	CYPRUS	EGYPT	ETHIOPIA	IRAN	ITALY	LEBANON	SPAIN	SYRIA	TURKEY	U.S.A.		MEAN
	Carahue	Nicosia	Mallawi	Debre Zeit	Tehran	Sicily	Terbol	Hemares	Tel Hadya	Ankara	Brookings	Pullman	
ILC 4	43	41	27	-	19	29	33	35	29	24	39	33	32
35	41	43	29	-	18	34	33	30	31	22	36	32	32
66	41	47	30	-	21	30	33	30	29	24	35	32	31
69	42	46	31	53	23	32	36	38	32	24	44	32	3
237	50	44	28	57	27	36	43	48	35	28	44	42	40
262	37	45	29	51	20	28	36	35	32	23	41	28	34
263	38	48	32	51	23	29	35	35	31	23	35	30	34
295	45	46	31	42	25	36	35	37	33	28	41	37	36
463	44	47	30	56	25	31	40	40	30	25	36	35	37
464	44	48	30	52	27	34	39	47	33	27	40	39	38
480	45	45	25	48	25	31	39	45	31	26	43	36	37
493	46	45	34	47	24	29	38	45	30	24	39	35	36
515	44	43	34	54	24	32	36	42	30	23	39	38	37
591	46	46	35	48	26	33	39	43	30	24	44	45	38
610	44	49	32	49	25	33	36	43	31	23	39	37	37
953	41	47	28	52	21	31	40	45	32	24	43	35	37
1079	45	46	26	54	24	34	43	45	33	26	43	40	38
1102	37	43	26	52	19	25	31	35	29	23	33	34	32
1269	42	46	34	48	21	32	39	43	30	25	40	35	36
1920	37	43	31	40	20	29	31	45	29	22	40	33	33
FLIP 80 - 2	42	42	31	48	24	28	33	43	28	23	37	33	34
FLIP 80 - 28	42	43	31	48	20	30	31	42	31	22	39	31	34
ILC 1929	37	44	27	-	22	29	35	45	31	25	39	33	33
Local check	53	45	35	-	25	34	35	47	31	27	30	40	
Location mean	43	45	30	50	23	31	36	41	31	24	39	35	

Table 3.2.5. Seed yield (Y= kg/ha) and rank (R) of entries in the CIYT at different locations during 1981/82.

ENTRY	NAME	CHILE		CYPRUS		EGYPT		IRAN		ITALY		LEBANON		SPAIN		SUDAN				SYRIA				TURKEY		U.S.A.				MEAN	
		Carahue		Nicosia		Mallawi		Tehran		Sicily		Terbol		Hemares		Aliab		Hudeiba		Izra'a		Tel Hadya		Ankara		Brookings		Pullman			
		Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
ILC	4	2089	15	1040	23	1667	22	624	21	1161	15	1417	14	552	22	390	3	923	1	452	10	1530	10	957	3	427	13	3513	10	1196	20
	35	1542	23	1576	6	1806	21	416	23	1908	1	1942	4	452	23	286	8	640	6	401	14	1721	2	794	7	116	24	3690	7	1239	18
	66	1964	17	1002	24	2514	9	2047	2	-	-	1286	21	1150	1	289	6	756	4	358	18	1210	24	595	19	590	6	2822	22	1276	12
	69	2113	14	1203	19	1833	20	2019	3	1158	16	1215	22	677	16	230	12	432	11	361	16	1463	13	754	10	316	16	3865	5	1260	15
	237	3286	1	1048	22	2958	5	1345	13	1297	10	1904	5	911	7	143	18	211	21	435	13	1558	6	1039	2	622	5	2797	23	1397	3
	262	1077	24	1284	16	2361	14	1179	17	1042	19	1469	12	605	21	118	21	298	16	317	23	1508	11	646	16	182	22	3240	14	1095	23
	263	1798	19	1249	18	2209	15	2057	1	1355	6	1305	20	634	19	163	17	107	24	589	1	1548	7	526	23	233	18	3950	4	1266	14
	295	2595	5	1854	1	2986	4	1659	6	1425	3	1537	10	970	5	345	5	563	8	510	4	1796	1	790	8	514	9	3573	9	1508	1
	463	2649	4	1640	4	3292	1	1817	4	1271	12	1407	15	1011	3	270	11	336	13	520	3	1590	4	750	11	434	11	3380	13	1455	2
	464	2173	12	1827	2	1972	19	339	24	1371	5	1111	24	736	13	83	24	179	22	302	24	1582	5	851	6	293	17	2995	18	1130	22
	480	2173	12	1358	13	2500	10	1536	7	1023	20	1674	7	1039	2	210	13	292	18	445	11	1542	8	569	20	443	10	3475	11	1306	8
	493	2935	3	1580	5	2472	12	1211	16	1261	13	1529	11	1011	4	367	4	298	16	495	5	1533	9	643	17	811	2	2663	24	1344	7
	515	2429	8	1165	20	2792	6	944	19	1508	2	1391	16	716	14	122	20	238	19	396	15	1409	18	688	15	863	1	2923	19	1256	16
	591	2375	9	1469	8	3236	2	1718	5	885	23	1878	6	813	9	193	14	485	9	457	9	1459	14	760	9	229	19	2870	21	1345	6
	610	2518	7	1290	15	2431	13	1474	9	1419	4	1211	23	747	10	169	16	324	15	480	6	1437	17	563	21	517	8	3162	16	1267	13
	953	2250	10	1341	14	2069	16	521	22	1143	17	1387	17	613	20	186	15	714	5	460	7	1453	15	599	18	156	23	3202	15	1150	21
	1079	2536	6	1410	11	1986	17	1429	10	1272	11	1595	8	742	12	140	19	455	10	361	16	1398	19	560	22	420	14	3622	8	1280	11
	1102	1780	20	1522	7	1583	23	811	20	1183	14	1332	18	675	17	114	22	149	23	542	2	1485	12	515	24	431	12	4710	1	1202	19
	1263	1923	18	1389	12	2500	10	1084	18	1317	9	1446	13	944	6	114	22	327	14	352	20	1449	16	892	5	707	4	3457	12	1286	3
	1320	1720	21	1266	17	2694	7	1256	15	1000	21	1982	2	658	18	630	2	860	2	437	12	1394	21	749	12	319	15	4263	2	1373	5
FLIP 80-2		2238	11	1428	10	3056	3	1484	8	1348	7	1975	3	867	8	288	7	235	20	342	22	1336	20	690	14	193	21	3833	6	1384	4
FLIP 80-28		2089	15	1065	21	2611	8	1400	12	1325	8	1312	19	637	15	286	8	783	3	458	8	1257	23	727	13	564	7	2895	20	1248	17
ILC 1929		1577	22	1669	3	1986	17	1404	11	940	22	1560	3	745	11	270	10	417	12	355	19	1658	3	1129	1	212	20	4007	3	1281	10
local check		3006	2	1460	9	1583	23	1268	14	1128	18	2089	1	202	24	688	1	688	7	345	21	1286	22	952	4	734	3	3077	17		
Location mean		2201		1380		2379		1293		1250		1540		757		254		448		424		1486		739		430		3416			
C.V. %		24.1		23.9		33.0		25.3		26.4		26.7		28.3		26.6		54.9		31.6		14.4		15.6		78.9		27.7			
L.S.D. (P=0.5)		748.0		467.0		1107.0		460.5		464.8		580.6		302.2		95.2		346.9		188.5		302.3		162.6		478.8		1334.3			
No. of entries significantly exceeding the local check		0		0		7		4		1		0		22		0		0		2		4		1		0		1			

Seed yield values which are underlined significantly exceeded the local check .

Table 3.2.6. The five heaviest seed yielding entries at the individual locations in the CIYT during 1980/82.

RANK	CHILE	CYPRUS	EGYPT	IRAN	ITALY	LEBANON	SPAIN	SUDAN	
	Carahue	Nicosia	Mallawi	Tehran	Sicily	Terbol	Hemares	Aliab	Hudeiba
1	ILC 237	ILC 295	ILC 463	ILC 263	ILC 35	local check	ILC 66	local check	ILC 4
2	local check	ILC 464	ILC 591	ILC 66	ILC 515	ILC 1920	ILC 480	ILC 1920	1920
3	ILC 493	ILC 1929	FLIP 80-2	ILC 69	ILC 295	FLIP 80-2	ILC 463	ILC 4	FLIP 80-28
4	ILC 463	ILC 463	ILC 295	ILC 463	ILC 610	ILC 35	ILC 493	ILC 493	ILC 66
5	ILC 295	ILC 493	ILC 237	ILC 591	ILC 464	ILC 237	ILC 295	ILC 295	ILC 953

RANK	SYRIA		TURKEY	U.S.A.	
	Izra'a	Tel Hadya	Ankara	Brookings	Pullman
1	ILC 263	ILC 295	ILC 1929	ILC 515	ILC 1102
2	ILC 1102	ILC 35	ILC 237	ILC 493	ILC 1920
3	ILC 463	ILC 1929	ILC 4	local check	ILC 1929
4	ILC 295	ILC 463	Local check	ILC 1269	ILC 263
5	ILC 493	ILC 464	ILC 1269	ILC 237	ILC 69

Table 3.2.7. Performance of common entries (yield kg/ha) in CIYT during the years 1979/80 through 1981/82.

Entry Name	1979/80		1980/81		1981/82		Average	
	Y	R	Y	R	Y	R	Y	R
ILC 4	1124	3	1142	5	1196	9	1154	9
ILC 237	1114	4	1219	1	1397	2	1243	2
ILC 262	994	10	1065	10	1095	10	1051	10
ILC 263	1077	6	1153	4	1266	8	1165	7
ILC 295	1073	7	1179	2	1508	1	1253	1
ILC 480	1094	5	1120	9	1306	5	1173	6
ILC 493	1163	1	1179	2	1344	4	1229	3
ILC 610	1163	1	1128	7	1267	7	1186	4
ILC 1920	1016	9	1128	7	1373	3	1172	5
ILC 1929	1072	8	1139	6	1281	6	1164	8

Table 3.2.8. Correlation (df = 20) between different locations for the seed yield of entries in the CIYT during 1981/82.

COUNTRY-LOCATION	CYPRUS	EGYPT	IRAN	ITALY	LEBANON	SPAIN	SUDAN		SYRIA		TURKEY	U.S.A.	
	Nicosia	Mallawi	Tehran	Sicily	Terbol	Hemares	Aliab	Hudeiba	Izra'a	Tel Hadya	Ankara	Brookings	Pullman
CHILE - Carahue	-0.01	0.47*	0.21	0.13	0.05	0.62**	-0.04	-0.17	0.27	-0.01	-0.02	0.56**	-0.52*
CYPRUS - Nicosia		0.04	-0.10	0.12	-0.01	0.31	-0.02	-0.22	-0.04	0.63**	0.02	-0.25	0.21
EGYPT - Mallawi			0.48*	-0.08	0.04	0.64**	0.15	-0.13	0.14	0.03	-0.16	0.20	-0.30
IRAN - Tehran				-0.30	0.05	0.44*	0.09	-0.25	0.30	-0.21	-0.31	0.13	-0.06
ITALY - Sicily					-0.05	-0.18	-0.14	-0.06	0.03	0.26	0.21	0.15	-0.07
LEBANON - Terbol						0.12	0.43*	0.22	-0.11	0.19	0.01	-0.28	0.20
SPAIN - Hemares							-0.02	-0.41	0.14	0.15	0.01	0.47*	-0.24
SUDAN - Aliab								0.67**	0.20	0.05	0.19	-o.06	0.24
- Hudeiba									0.02	-0.08	0.13	-0.19	0.03
SYRIA - Izra'a										0.13	-0.38	0.18	0.12
- Tel Hadya											0.35	-0.20	0.12
TURKEY - Ankara												0.02	-0.13
U.S.A. - Brookings													-0.42*

* P ≤ 0.05
** P ≤ 0.01

3.3. CHICKPEA INTERNATIONAL YIELD TRIAL TRIAL-WINTER (CIYT-W)

Material

The material for Chickpea International Yield Trial-Winter (CIYT-W) comprised 15 test entries originating from Spain, the USSR, India, Turkey and Afghanistan, and the local check to be supplied by the local cooperator. The test entries were identified as resistant to ascochtya blight and were rated as high yielders in different trials conducted at Tel Hadya (Syria) and Terbol (Lebanon). These genotypes were homozygous and were selected from the germplasm collection. The cooperators were free to use the genotypes in their breeding programs or for release as commerical cultivars.

Methods and Management

The trial design was a randomized complete block with four replications. The suggested plot size was 4 rows of 4 m length with inter and intra row spacing of 0.30 m and 0.10 m, respectively.

Seventy sets of trial were distributed to cooperators in 22 countries. The results were returned from 33 cooperators but results worth consideration were only 29 and these have been reported. The information on the agronomic practices has been supplied by a number of cooperators and is presented in Table 3.3.1.

Results and Discussion

The data pertaining to time to flowering (days), time to maturity (days) and plant height (cm) are presented in Tables 3.3.2, 3.3.3, and 3.3.4, respectively. The location mean for time to flowering ranged from 69 days at Ankara in Turkey to 170 days at Rome in Italy. The mean genotypic values across locations for time to flowering ranged from 121 days for ILC 182 and ILC 484 to 134 for ILC 202. There was a

wide range of variation for time to flowering at Lahore in Pakistan as compared to other locations. The maturity was earliest at Ankara in Turkey (108 days) and latest at Rome in Italy (223 days). The time to maturity almost followed the same pattern as that of time to flowering. The variation for time to maturity among the genotypic means over locations was very little. The genotype ILC 249 matured the earliest in 177 days and the genotype ILC 3279 matured latest in 184 days. The plant height ranged between 27 cm at Ankara in Turkey to 99 cm at Ismailia in Egypt. The genotypes ILC 72, ILC 202 and ILC 3279 possessed more than 60 cm height and were tall.

The data on seed yield for 29 locations are given in Table 3.3.5. The analysis of variance for different locations revealed that the differences between the genotypic means were significant at all the locations. The co-efficient of variation ranged from 13.6% at Nicosia in Cyprus to 67.2% at Hudeiba in Sudan with a mean of 31.4%. There was large variation among the location means, from 140 kg/ha at Breda in Syria to 4094 kg/ha at Al Ghab in Syria with an overall location mean of 1252 kg/ha. The number of entries that were significantly better than the local check were 13 at Merchouch in Morocco, 12 at Tehran in Iran, 10 each at Sidi Kacem and Sidi Laidi in Morocco, 5 at Douyet in Morocco; 4 at Heimo in Syria; two each at Nicosia in Cyprus, Zemamra in Morocco, and Hemares in Spain, and one each at M'Shagar in Jordan and Gelline in Syria. The cultivar ILC 200 on an average gave the highest yield of 1376 kg/ha and was followed by ILC 195 (1372 kg/ha), ILC 484 (1342 kg/ha), ILC 2548 (1285 kg/ha), and ILC 182 (1281 kg/ha). The genotype ILC 72 gave the poorest yield of 1104 kg/ha.

The five highest yielding entries at the individual locations are shown in Table 3.3.6. The first five entries were the entries furnished from Tel Hadya at all the locations except at Sicily in Italy, Islamabad in Pakistan, and Ankara in Turkey where the local check was first; Bari in Italy, Marrow in Jordan and Lahore in Pakistan where local check was second; Kfardan in Lebanon and Hudeiba in Sudan where the local check

was third; and Nicosia in Cyprus and M'Shagar in Jordan, where the local check was fourth in rank. Three entries, namely ILC 482, ILC 484 and ILC 194, seemed to be more promising as these were among the first five ranks more frequently than others.

The correlations between location means for seed yield are given in Table 3.3.7. The mean yields at Tel Hadya showed significant and positive correlation with Merchouch in Morocco, and Al Ghab, Heimo and Homs in Syria. The correlations between Tel Hadya and a few places including Nicosia in Cyprus, Sicily in Italy, Hudeiba in Sudan and Gelline in Syria were, however, negative and significant. Another ICARDA site at Jinderis exhibited positive and significant correlation with Terbol in Lebanon and Nicosia in Cyprus. Therefore, it appears that the performance of genetic stocks at Tel Hadya, in general, may not provide suitable guidelines for predicting their performance at other locations outside Syria.

The average of the common entries in the different years are given in Table 3.3.8. On the basis of three years (1979-82) ILC 482 gave the highest average yield of 1871 kg/ha and was followed by ILC 249 (1734 kg/ha), ILC 195 (1731 kg/ha), ILC 3279 (1697 kg/ha). ILC 202 was the poorest yielder with an average of 1529 kg/ha. On the basis of two year results (1980-82) of the common entries, the genotype ILC 484 was the top yielder and was followed by ILC 482, ILC 195, ILC 194, ILC 200, ILC 2548 and ILC 249 etc. These genotypes need further testing for the confirmation of the results. The mean yield of CIYT-W overall the locations and the genotypes, was higher than the CIYT conducted during spring which confirm the previous year results that seed yields are much higher from winter sowings than from spring sowings.

Table 3.3.1. Agronomic data for different locations for the CIYT-W during 1981/82.

Country	Location	Planting date	Crop duration* (days)	Fertilizer (kg/ha) N	P_2O_5	K_2O	Irrigation
CYPRUS	Nicosia	8-12-1981	196	23	60	-	-
IRAN	Tehran	5-12-1982	186	18	46	-	5
ITALY	Bari	14-11-1981	229	30	105	-	-
	Rome	16-11-1981	223	56	100	-	-
	Sicily	23- 1-1982	166	-	60	-	-
JORDAN	Marrow	23-11-1981	NR	-	-	-	-
	M'Shagar	26- 2-1982	NR	-	-	-	-
LEBANON	Kfardan	15-12-1981	NR	-	-	-	-
	Terbol	28-11-1981	190	-	-	-	-
MOROCCO	Douyet	20-11-1981	NR	30	40	40	-
	Merchouch	17-11-1981	NR	30	40	60	-
	Sidi Kacem	17-11-1981	NR	30	40	60	-
	Sidi Laidi	5-12-1981	NR	30	60	40	-
	Zemamra	10-11-1981	NR	30	50	60	-
PAKISTAN	Islamabad	3-11-1981	173	28	45	-	-
	Lahore	27-10-1981	184	-	-	-	3
SPAIN	Hemares	1-12-1981	205	40	120	-	-
SUDAN	Hudeiba	28-11-1981	117	40		-	11
SYRIA	Hama	25-11-1981	187	33	80	-	-
	Heimo	24-11-1981	220	100	100	-	-
	Homs	16-11-1981	175	30	60	-	-
	Tel Hadya	14-11-1981	206		50	-	-
TURKEY	Ankara	23- 3-1982	108	20	60	-	-

* Days from planting to maturity averaged over-all entries, NR = Not reported

Table 3.3.2. Time to flowering (days) for entries in the CIYT-W at different locations during 1981/82.

ENTRY	NAME	ORIGIN	CYPRUS	IRAN	ITALY			JORDAN		LEBANON	PAKISTAN		SPAIN	SUDAN	SYRIA					TURKEY	MEAN
			Nicosia	Tehran	Bari	Rome	Sicily	Marrow	M'shagar	Terbol	Islamabad	Lahore	Hemares	Hudeiba	Al Ghab	Hama	Heimo	Homs	Tel Hadya	Ankara	
ILC	72	Spain	127	143	153	178	117	145	87	147	140	118	141	84	133	143	154	135	157	69	132
	182	USSR	128	142	153	168	115	146	86	142	128	112	141	69	132	142	156	129	152	69	121
	191	USSR	130	144	155	178	115	147	86	145	137	126	148	80	134	144	159	135	157	75	133
	194	USSR	127	141	150	158	108	145	79	136	131	103	144	74	127	141	145	125	150	69	125
	195	USSR	131	144	154	176	113	145	85	145	139	121	145	78	131	144	158	125	156	75	131
	200	USSR	129	145	152	169	113	145	81	141	137	116	147	78	131	142	153	125	153	72	129
	202	USSR	131	146	158	188	118	146	83	146	140	126	149	84	135	142	155	125	157	74	134
	249	India	125	136	150	173	107	144	75	133	120	86	135	67	125	137	146	125	143	66	122
	482	Turkey	121	143	149	167	107	143	79	133	116	90	138	65	124	135	145	125	146	66	122
	484	Turkey	121	140	149	159	107	143	76	133	112	86	136	62	124	135	145	135	143	63	121
	1407	Afghanistan	121	140	151	162	108	142	78	135	122	91	136	62	125	138	147	129	150	63	122
	2548	Unknown	127	145	150	162	108	144	78	137	120	102	143	69	128	142	146	125	150	68	125
	2555	Unknown	129	144	153	169	113	145	75	141	122	107	146	78	130	142	155	125	156	69	128
	2912	Afghanistan	121	140	151	161	109	143	79	137	122	90	140	61	125	138	148	125	149	63	122
	3279	USSR	130	144	156	190	118	146	83	147	137	132	148	77	136	144	157	125	156	70	133
Local check		-	127	144	150	169	108	144	74	138	116	96	145	61	-	144	158	169	-	67	
Location mean			127	143	152	170	112	145	81	140	127	106	143	72	129	141	152	130	152	69	

Table 3.3.3. . Time to maturity (days) for entries in the CIYT-W at different locations during 1981/82.

ENTRY NAME	IRAN	ITALY	LEBANON	PAKISTAN		SPAIN	SUDAN	SYRIA					TURKEY	MEAN
	Tehran	Rome	Terbol	Islamabad	Lahore	Hemares	Hudeiba	Al Ghab	Hama	Heimo	Homs	Tel Hadya	Ankara	
ILC 72	186	227	192	178	186	211	117	183	191	218	177	206	111	183
182	185	225	191	171	180	210	118	181	185	221	174	204	109	181
191	187	222	191	176	185	207	120	182	189	221	176	207	110	183
194	184	222	188	172	182	206	116	179	183	218	174	202	109	180
195	187	222	192	177	183	212	117	182	188	221	174	208	109	182
200	188	225	191	176	185	204	117	181	186	221	174	204	109	182
202	189	224	192	177	185	211	117	183	189	218	174	206	109	183
249	179	222	188	171	179	196	116	179	189	219	-	-	108	177
482	186	222	188	168	180	196	117	180	187	218	177	207	108	180
484	183	222	187	169	180	196	116	178	183	219	174	207	107	179
1407	187	222	185	171	178	196	116	179	183	219	171	207	107	179
2548	188	222	187	171	185	200	117	178	183	219	171	204	107	179
2555	185	222	188	171	179	207	118	181	190	221	-	208	107	181
2912	183	222	190	171	176	208	116	180	182	221	177	207	107	180
3279	187	226	193	176	187	212	119	184	191	221	177	205	108	184
Local check	187	227	189	167	174	213	117	-	-	221	-	-	107	
Location mean	186	223	190	173	184	205	117	181	187	220	175	206	108	

Table 3.3.4 . Plant height (cm) of entries in the CIYT-W at different locations during 1981/82

ENTRY NAME	CYPRUS	EGYPT	IRAN	ITALY	JORDAN		LEBANON	PAKISTAN		SYRIA					TURKEY	MEAN
	Nicosia	Ismailia	Tehran	Sicily	Marrow	M'shagar	Terbol	Islamabad	Lahore	Al Ghab	Hama	Heimo	Homs	Tel Hadya	Ankara	
ILC 72	61	112	30	66	50	47	64	37	110	70	68	75	75	66	35	68
182	49	103	26	50	35	39	48	35	73	54	51	70	64	46	24	51
191	56	94	34	53	47	42	51	35	98	61	59	62	70	44	36	56
194	46	82	20	47	39	32	49	32	81	59	48	65	60	43	26	49
195	55	99	32	55	43	41	54	36	84	65	60	65	65	45	35	56
200	49	109	35	54	38	39	50	34	83	61	50	63	60	45	26	53
202	60	103	35	64	48	48	61	35	105	70	68	75	75	58	39	63
249	50	98	22	49	40	34	46	35	85	58	50	45	-	-	24	49
482	43	94	19	51	37	31	46	34	80	57	50	50	65	36	21	48
484	47	103	26	49	39	32	46	33	74	56	46	45	65	35	23	48
1407	49	87	25	48	36	33	44	33	88	56	49	43	55	36	21	47
2548	44	112	31	49	36	35	48	35	75	58	50	53	65	39	23	50
2555	48	112	34	54	39	37	52	36	82	62	60	40	-	37	25	51
2912	46	82	36	51	36	33	44	35	77	55	48	45	60	33	18	47
3279	62	101	38	62	47	49	67	33	108	75	66	80	80	61	35	64
Local check	45	90	18	49	40	34	44	34	76	-	-	65	-	-	22	
Location mean	51	99	29	53	41	38	51	35	86	61	55	59	66	45	27	

Table 3.3.5. Seed yield (kg/ha) and rank (R) of entries in the CIYT-W at different locations during 1981/82.

ENTRY	NAME	CYPRUS		EGYPT		IRAN		ITALY						Jordan				LEBANON				MOROCCO							
		Nicosia		Ismailia		Tehran		Bari		Rome		Sicily		Marrow		M'shagar		Kfardan		Terbol		Douyet		Merchouch		Sidi Kacem		Sidi Laidi	
		Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
ILC	72	971	15	2488	10	786	14	1179	8	1021	8	2529	7	581	15	655	6	489	7	2476	7	1509	9	1105	8	1376	14	504	14
	182	1019	9	2000	14	851	12	1274	7	1307	2	2086	14	1308	8	513	12	417	12	2208	15	2004	1	1559	3	1793	7	658	11
	191	925	16	2393	11	954	9	994	15	1536	1	2395	9	1214	10	794	2	592	4	2435	9	1772	4	1641	2	1487	12	702	10
	194	989	14	3262	3	889	11	1357	5	1042	7	1966	15	1526	4	466	14	544	5	2173	16	1272	13	914	10	1367	15	937	4
	195	999	12	2512	9	1321	4	1048	12	1245	3	2909	3	1066	11	561	9	310	16	2256	13	1929	3	1523	5	2656	1	846	8
	200	1163	5	2810	7	1675	1	1036	13	1109	5	2186	13	1450	6	561	9	502	6	2382	10	1989	2	1816	1	1965	3	789	9
	202	994	13	2976	5	955	8	1018	14	1224	4	2335	11	853	14	511	13	341	15	2327	11	1485	10	1379	6	1493	11	553	12
	249	1033	8	3131	4	724	15	1637	3	677	14	2451	8	1411	7	422	15	836	1	2458	8	869	16	0	15	1417	13	519	13
	482	1521	*2	1940	15	1084	5	1095	10	896	13	2539	6	1258	9	605	8	747	2	2732	4	1751	5	793	12	1953	4	955	2
	484	1532	1	2571	8	1412	3	1833	1	974	10	2870	4	2020	1	724	3	443	11	2819	3	1523	8	840	11	1652	10	1069	1
	1407	1330	3	1905	16	965	7	1363	4	432	15	2634	5	934	13	639	7	486	8	2280	12	1468	11	613	13	1709	9	850	7
	2548	1014	11	2893	6	1049	6	899	16	1010	9	1900	16	1779	3	357	16	486	8	2238	14	1643	6	1336	7	1914	6	898	6
	2555	1163	5	3345	1	1438	2	1298	6	917	12	3069	2	950	12	1053	1	405	13	2845	2	1376	12	230	14	1772	8	924	5
	2912	1118	7	3274	2	946	10	1095	10	944	11	2387	10	1525	5	532	11	477	10	2479	5	1267	14	977	9	1949	5	942	3
	3273	1016	10	2179	13	831	13	1137	9	1089	6	2188	12	385	16	687	5	381	14	2917	1	1525	7	1559	3	1985	2	502	15
Local check		1189	4	2274	12	426	16	1768	2	-	-	3242	1	1785	2	704	4	635	3	2478	6	992	15	0	15	996	16	453	16
Location mean		1123		2622		1019		1252		1028		2480		1253		611		506		2469		1523		1018		1718		757	
C.V.%		13.6		44.0		28.1		30.4		26.4		17.1		40.6		33.5		41.8		14.2		34.0		41.5		24.7		21.5	
L.S.D. 5%		216.9		1644.5		408.3		541.3		388.0		602.7		848.8		341.5		300.9		499.4		738.5		601.8		604.1		232.1	
No. of entries sign. exceeding 2 Local check				0		12		0		-		0		0		1		0		0		5		13		10		10	

* Seed yield values which are underlined significantly exceeded the local check.

Cont'd Table 3.3.5.

MOROCCO		PAKISTAN				SPAIN		SUDAN		SYRIA																TURKEY		MEAN	
Zemamra		Islamabad		Lahore		Hemares		Hudeiba		Al Ghab		Breda		Gelline		Hama		Heimo		Homs		Izra'a		Jinderis		Tel Hadya		Ankara			
Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
293	16	233	7	518	5	135	13	125	15	3881	12	156	6	220	16	3286	13	907	7	2655	3	623	2	1244	6	1957	5	352	15	1104	15
703	4	168	11	448	7	185	9	339	9	4435	3	124	11	405	8	3345	10	1125	3	2577	4	530	7	920	15	2261	2	571	9	1281	5
344	15	45	15	943	1	154	12	128	14	4357	5	127	9	437	6	3417	9	581	11	2298	10	642	1	945	14	753	8	558	11	1226	9
590	8	275	4	280	12	104	15	586	7	4149	9	169	4	452	3	3494	7	1035	5	2482	7	606	3	1182	7	2010	4	746	5	1271	6
391	14	55	14	435	8	254	4	143	13	4173	8	138	7	393	11	3886	3	1332	1	2202	11	485	10	1098	10	660	9	768	4	1372	2
430	12	110	12	278	13	181	10	205	11	4317	6	118	13	369	12	3857	4	1286	2	2732	2	417	16	1073	11	2356	1	739	6	1376	1
504	11	24	16	597	4	190	8	71	16	4625	1	123	12	429	7	3327	11	342	8	2982	1	573	5	1138	8	1792	6	950	2	1148	13
430	12	273	5	411	9	200	6	923	5	3226	14	52	15	310	15	3227	14	168	15	-		455	14	1636	2	-		686	7	1138	14
738	3	231	8	141	16	221	5	411	8	3119	15	165	5	565	1	3607	5	657	10	1613	13	496	9	1452	3	26	13	488	13	1165	11
781	1	250	6	401	10	273	3	1024	4	4095	10	176	3	399	9	3554	6	556	13	2393	8	457	12	1667	1	167	11	451	14	1342	3
758	2	338	2	353	11	196	7	1574	1	3857	13	129	8	440	5	4054	1	524	14	1679	12	479	11	1039	12	255	10	299	16	1158	12
629	7	106	13	618	3	308	2	595	6	4548	2	199	2	399	9	3893	2	1054	4	2567	5	596	4	1112	9	1752	7	529	12	1285	4
637	6	190	10	488	6	442	1	199	12	4268	7	210	1	452	3	3315	12	95	16	-		440	15	1336	5	14	14	670	8	1198	10
559	9	282	3	222	14	171	11	1360	2	3994	11	90	14	476	2	3196	15	580	12	2512	6	554	6	1039	12	150	12	567	10	1230	8
660	5	206	9	221	15	117	14	317	10	4369	4	127	9	345	14	3452	8	919	6	2369	9	457	12	1445	4	2153	3	902	3	1252	7
543	10	1164	1	684	2	63	16	1057	3	-		-		369	12	-		750	9	-		501	8	-		-		1080	1		
562		247		440		200		566		4094		140		404		3527		821		2389		519		1222		1165		647			
25.2		46.3		61.1		63.4		67.2		15.4		41.1		31.9		15.6		25.8		21.7		30.8		18.7		18.9		16.3			
201.8		162.7		382.3		210.9		542.0		900.0		82.4		183.1		785.6		302.9		744.7		227.9		326.8		314.8		149.9			
2		0		0		2		0		-		-		1		-		4		-		0		-		-		0			

Table 3.3.6. The five heaviest seed yielding entries at the individual locations in the CIYT-W during 1981/82.

RANK	CYPRUS	EGYPT	IRAN	ITALY			JORDAN		LEBANON		MOROCCO				
	Nicosia	Ismailia	Tehran	Bari	Rome	Sicily	Marrow	M'shagar	Kfardan	Terbol	Douyet	Merchouch	Sidi Kacem	Sidi Laidi	Zemamra
1	ILC 484	ILC 2555	ILC 200	ILC 484	ILC 191	Local check	ILC 484	ILC 2555	ILC 249	ILC 3279	ILC 182	ILC 200	ILC 195	ILC 484	ILC 484
2	482	2912	2555	Local check	182	ILC 2555	local check	191	482	2555	200	191	(1) 3279	482	1407
3	1407	194	484	249	195	195	2548	484	Local check	484	195	182	200	2912	482
4	Local check	249	195	1407	202	484	194	Local check	191	482	191	3279	482	194	182
5	200	202	482	194	200	1407	2912	3279	194	2912	482	195	2912	2555	3279

RANK	PAKISTAN		SPAIN	SUDAN	SYRIA									TURKEY
	Islamabad	Lahore	Hemares	Hudeiba	Al-Ghab	Breda	Gelline	Hama	Heimo	Homs	Izra'a	Jinderis	Tel Hadya	Ankara
1	Local check	ILC 191	ILC 2555	ILC 1407	ILC 202	ILC 2555	ILC 482	ILC 1407	ILC 195	ILC 202	ILC 191	ILC 484	ILC 200	Local check
2	ILC 1407	Local check	2548	2912	2548	2548	2912	2548	200	200	72	249	182	ILC 202
3	2912	2548	484	Local check	182	484	194	195	182	72	194	482	3279	3279
4	194	202	195	484	3279	194	2555	200	2548	182	2548	3279	134	135
5	249	72	482	249	191	482	1407	482	194	2548	202	2555	72	194

(1) the brackets indicate entries having the same rank.

Table 3.3.7. . . Correlations (df = 11) between the seed yield of entries in the CIYT-W at different locations during 1981/82.

COUNTRY-	LOCATION	EGYPT	IRAN	ITALY			JORDAN		LEBANON		MOROCCO				
		Ismailia	Tehran	Bari	Rome	Sicily	Marrow	M'shagar	Kfardan	Terbol	Douyet	Merchouch	Sidi Kacem	Sidi Laidi	Zemamra
CYPRUS	- Nicosia	-0.35	0.42	0.57*	-0.59*	0.49	0.38	0.25	0.42	0.50	-0.04	-0.62*	0.09	0.50	0.67*
EGYPT	- Ismailia		0.13	-0.14	0.17	-0.32	0.39	-0.48	-0.18	-0.30	-0.46	0.06	-0.16	-0.21	-0.32
IRAN	- Tehran			0.13	0.01	0.32	0.49	0.03	-0.04	0.08	0.47	0.22	0.44	0.48	-0.03
ITALY	- Bari				-0.35	0.39	0.32	0.34	-0.05	0.30	-0.28	-0.55*	-0.28	0.40	0.53
	- Rome					-0.20	-0.02	0.10	-0.18	-0.10	0.46	0.78**	0.02	-0.18	-0.55*
	- Sicily						-0.08	0.58*	-0.12	0.33	0.06	-0.33	0.29	0.17	-0.04
JORDAN	- Marrow							-0.30	0.25	-0.16	0.03	-0.19	0.01	0.50	0.32
	- M'shagar								0.15	0.61*	0.05	-0.03	-0.17	-0.03	-0.12
LEBANON	- Kfardan									0.18	-0.02	-0.37	-0.29	0.29	0.14
	- Terbol										-0.14	-0.14	0.05	-0.06	0.28
MOROCCO	- Douyet											0.65*	0.48	0.26	-0.18
	- Merchouch												0.28	-0.25	-0.53
	- Sidi Kacem													0.06	0.03
	- Sidi Laidi														0.38
	- Zemamra														
PAKISTAN	- Islamabad														
	- Lahore														
SPAIN	- Hemares														
SUDAN	- Hudeiba														
SYRIA	- Al-Ghab														
	- Breda														
	- Gelline														
	- Hama														
	- Heimo														
	- Homs														
	- Izra'a														
	- Jinderis														
	- Tel Hadya														

* P ≤ 0.05, ** P ≤ 0.01.

Cont'd Table 3.3.7.

PAKISTAN		SPAIN	SUDAN	SYRIA									TURKEY
Islamabad	Lahore	Hemares	Hudeiba	Al-Ghab	Breda	Gelline	Hama	Heimo	Homs	Izra'a	Jinderis	Tel Hadya	Ankara
0.05	-0.49	0.41	0.51	-0.66*	0.22	0.45	0.29	-0.49	-0.59*	-0.58*	0.61*	-0.63*	-0.45
-0.14	0.04	-0.06	0.03	0.38	-0.01	-0.02	-0.25	0.18	0.64*	0.34	-0.12	0.19	0.37
-0.25	-0.16	0.49	-0.03	-0.01	0.05	0.06	0.53	0.29	0.02	-0.64*	0.18	-0.14	0.09
0.59*	-0.26	0.05	0.48	-0.20	0.21	-0.03	-0.04	-0.36	-0.17	-0.31	0.54	-0.27	-0.35
-0.78**	0.56*	-0.14	-0.77**	0.52	-0.15	-0.15	-0.44	0.38	0.52	0.34	-0.26	0.37	0.50
0.10	-0.04	0.30	0.19	-0.45	-0.09	-0.01	0.16	-0.33	-0.43	-0.33	0.35	-0.71**	-0.31
0.06	0.01	0.55*	0.36	0.02	0.36	0.40	0.17	-0.07	0.05	-0.03	0.07	-0.28	-0.24
0.10	0.18	-0.27	-0.02	-0.26	-0.24	-0.15	-0.17	-0.52	-0.33	-0.16	0.32	-0.36	-0.23
0.31	-0.12	-0.10	0.10	-0.68**	0.28	0.49	0.01	-0.40	-0.51	0.19	0.12	-0.31	-0.47
0.24	-0.32	-0.05	0.04	-0.35	0.02	-0.02	-0.24	-0.43	-0.24	-0.40	0.81**	-0.28	-0.01
-0.57*	0.20	0.32	-0.53	0.12	-0.05	-0.06	0.33	0.54	-0.04	-0.33	-0.26	0.19	0.07
-0.79**	0.39	-0.10	-0.72**	0.67*	-0.30	-0.35	-0.06	0.64*	0.54	-0.03	-0.39	0.61*	0.58*
-0.23	-0.32	0.46	-0.03	-0.07	-0.15	0.14	0.46	0.43	-0.27	-0.56*	-0.03	-0.22	0.23
0.02	-0.01	0.50	0.05	-0.21	0.71**	0.27	0.64*	0.08	-0.41	-0.25	0.34	-0.20	-0.22
0.54	-0.49	0.30	0.60*	-0.25	0.24	0.49	0.20	-0.35	-0.44	-0.44	0.41	-0.29	-0.20
	-0.63*	-0.24	0.75**	-0.58*	0.06	0.10	-0.08	-0.46	-0.45	-0.17	0.32	-0.31	-0.54
		0.13	-0.36	0.52	0.10	-0.24	-0.10	-0.07	0.30	0.63*	-0.41	0.10	-0.07
			0.17	0.06	0.45	0.20	0.52	0.04	-0.16	-0.24	0.16	-0.39	-0.25
				-0.29	-0.08	0.33	0.21	-0.58*	-0.41	-0.21	0.07	-0.57*	-0.52
					-0.14	-0.38	-0.08	0.11	0.75**	0.17	-0.38	0.60*	0.53
						-0.06	0.32	0.08	-0.14	0.20	0.46	0.03	-0.27
							0.10	-0.37	-0.50	-0.08	-0.03	-0.56*	0.03
								0.25	-0.45	-0.46	-0.05	-0.15	-0.17
									0.42	-0.15	-0.27	0.69**	0.49
										0.28	-0.20	0.68**	0.49
											-0.37	0.13	-0.13
												-0.23	-0.02
													0.47

Table 3.3.8. The mean yield (Y = kg/ha) and rank (R) of the common entries in CIYT-W during 19879-82

Entry	1979/80		1980/82		1981/82		Average 1980-82		Average 1979-82	
	Y	R	Y	R	Y	R	Y	R	Y	R
ILC 195	1967	6	1855	5	1372	2	1614	3	1731	3
202	1792	7	1646	17	1148	13	1397	14	1529	5
249	2079	2	1986	3	1138	14	1562	7	1734	2
482	2323	1	2124	2	1165	11	1645	2	1871	1
3279	2058	3	1726	14	1252	7	1489	11	1679	4
72	1721	15	1104	15	1413	13	-	-	-	-
182	-	-	1808	10	1281	5	1545	8	-	-
191	-	-	1814	8	1226	9	1520	10	-	-
194	-	-	1932	4	1271	6	1602	4	-	-
200	-	-	1804	11	1376	1	1590	5	-	-
484	-	-	2147	1	1342	3	1744	1	-	-
1407	-	-	1924	3	1158	12	1541	9	-	-
2548	-	-	1867	1	1285	4	1576	6	-	-
2555	-	-	1739	12	1198	10	1469	12	-	-
2912	-	-	1812	9	1230	8	1521	10	-	-

3.4. CHICKPEA INTERNATIONAL YIELD TRIAL-LARGE SEEDED(CIYT-L)

Material

The Chickpea International Yield Trial-Large Seeded(CIYT-L) comprised 19 test entries which performed well in different ICARDA trials and one local check to be used by the cooperator . These test entries were derived from the germplasm collections maintained at Tel Hadya which have shown superior performance either in regional or in international trials conducted by ICARDA. The cooperators were free to use these entries in their breeding programs or for release as cultivars.

Methods and Management

The trial design was randomized complete block with four replications. The recommended plot size was 4 rows, each 4 m long with an inter- and intra row spacing of 0.30 and 0.10 m respectively.

Thirty-two sets of trial were distributed to the cooperators in 19 countries. Results were received from 18 sets covering 13 countries, but worth analysis were only 17 sets. Information on the agronomic practices supplied from a number of locations is given in Table 3.4.1.

Results and Discussion

The data on time to flowering, time to maturity and plant height received from the cooperators are given in Tables3.4.2 ,3.4.3 and 3.4.4, respectively. The genotypes flowered earliest at Pullman in Spain in 49 days, and latest at Heimo in Syria in 177 days. The time to maturity also followed almost the same pattern as time to flowering.

The average plant height at Ankara in Turkey was the least (25 cm) and at Carahue in Chile was the maximum (50 cm). The plant height across the locations ranged from 35 cm for ILC 35 to 45 cm for ILC 112.

The seed yield in kg/ha alongwith the rank of genotypes for each location are given in Table 3.4.5. The ANOVA of different locations revealed that the differences among genotypes were significant. The coefficient of variation generally ranged from 13.4% at Tel Hadya in Syria to 44.8% at Izra'a in Syria. But at Hudeiba (Sudan) it was exceptionally high (82.4%). The mean genotypic yield was lowest at Izra'a in Syria (200 kg/ha) and highest at Pullman in USA (3751 kg/ha) with an over-all location mean of 1328 kg/ha. A few locations, viz, Carahue in Chile, Sicily in Italy, Terbol in Lebanon, Karia Tissa and Merchouch in Morocco, Al-Ghab and Tel Hadya in Syria, and Pullman in USA exhibited above average yields. However, a few locations including Izra'a and Heimo in Syria, Hudeiba in Sudan, Ankara in Turkey, and Hemares in Spain were the poor yielding locations. The LSD at different locations revealed that 16, 10, 5, 4, 1, 1, and 1 entries at Hemares in Spain, Nicosia in Cyprus, Terbol in Lebanon, Tel Hadya in Syria, Bari in Italy, Karia Tissa in Morocco and Hudebia in Sudan, respectively showed superiority over the local check by a significant margin. At other locations none of the entries was statistically superior to the local check. So these lines with superior performance could be usefully exploited by the national programs at these locations. The genotype ILC 116, on anaverage over all the locations, was the best yielder with a yield of 1427 kg/ha and was followed by ILC 171 (1380 kg/ha), ILC 451 (1373 kg/ha), ILC 165 (1362 kg/ha), ILC 620 (1352 kg/ha). However, the genotypes ILC 135, ILC 83 and ILC 112 with average yields of 1245, 1274, and 1275 kg/ha were among the poor yielders.

The five highest yielding entries at individual locations are shown in Table 3.4.6. The first five entries at most of the locations including Nicosia in Cyprus, Bari in Italy, Terbol in Lebanon, Karia Tissa and Merchouch in Morocco, Hemares in Spain, Tel Hadya in Syria, and Pullman in USA, were the entries furnished from Tel Hadya.

However, at other locations, the local check was among the top five entries. Three entries namely, ILC 116, ILC 134 and ILC 165 seem to be more promising as these were among the top five ranks more frequently than others.

The performance of the common entries during the last two years (1980-1982) is given in Table 3.4.7. Among the common entries ILC 464 was the top yielder but its ranking during the two years (1980/81 and 1981/82) varied greatly. However, the genotypes ILC 451, ILC 165 and ILC 620 exhibited almost similar ranking and were also among the top yielders and thus needed special consideration from adaptation point of view.

The correlations among different locations for mean seed yield are given in Table 3.4.8. The mean yields at Tel Hadya showed significant and positive correlation with those of at M'Shagar in Jordan and Hemares in Spain. Most of the other correlations were not significant which revealed that the evaluations of the material at one locations may not necessarily help in predicting the performance at other locations.

Table 3.4.1. Agronomic data for different locations for the CIYT-L during 1981/82.

Country	Location	Planting date	Crop duration * (days)	Fertilizer (kg/ha)			Irrigation	Insecticide
				N	P_2O_5	K_2O		
CHILE	Carahue	21. 9.1982	126	40	-	-	-	
CYPRUS	Nicosia	8.12.1981	196	23	60	-	-	
ITALY	Bari	9. 2.1982	154	30	105	-	-	
	Sicily	9. 3.1982	121	-	60	-	-	
LEBANON	Terbol	9. 4.1982	99	-	-	-	-	
MOROCCO	Karia Tissa	26. 3.1982	NR	30	40	40	-	
	Merchouch	5. 2.1982	NR	30	40	60	-	
SPAIN	Hemares	14. 4.1982	90	40	120	-	-	
SUDAN	Hudeiba	1.12.1981	115	40	-	-	11	
SYRIA	Heimo	24.11.1981	229	-	-	-	-	
	Tel Hadya	22. 2.1982	113	-	50	-	-	
TURKEY	Ankara	23. 3.1982	107	20	60	-	-	
U.S.A.	Pullman	6. 5.1982	1T4	-	-	-	-	Tolban, Premerge Cygon, Imidan

* Days from planting to maturitv averaged over all entries , NR = Not reported

Table 3.4.2 . Time to flowering (days) for entries in the CIYT-L at different locations during 1981/82.

ENTRY NAME	ORIGIN	CHILE	CYPRUS	ITALY		JORDAN	LEBANON	SPAIN	SUDAN	SYRIA			TURKEY	U.S.A.	MEAN
		Carahue	Nicosia	Bari	Sicily	M'shagar	Terbol	Hemares	Hudeiba	Al-Ghab	Heimo	Tel Hadya	Ankara	Pullman	
ILC 35	Syria	68	125	99	72	52	53	47	73	58	173	67	68	49	77
83	Spain	75	127	99	72	59	59	51	79	60	179	72	69	48	81
112	Spain	75	129	101	74	58	64	56	86	66	173	72	69	50	83
116	Spain	75	127	99	72	54	57	47	74	58	179	72	68	48	79
132	Spain	71	126	99	73	54	60	50	73	60	178	73	72	49	80
134	Spain	71	127	99	72	55	60	50	73	60	177	72	69	48	79
135	Spain	71	127	99	73	57	61	49	83	60	179	71	69	48	81
136	Spain	75	128	99	71	54	59	48	81	57	177	69	69	48	80
155	Greece	71	124	100	72	53	59	49	73	58	178	72	69	50	79
165	Tunisia	78	124	99	69	57	57	48	72	56	177	70	69	48	79
171	Tunisia	75	130	100	74	64	62	53	85	63	177	73	69	48	83
451	Turkey	71	128	100	73	62	54	45	74	57	174	70	63	47	78
464	Turkey	71	127	100	74	58	63	53	80	64	179	71	69	49	81
496	Turkey	75	129	100	73	60	62	56	84	63	179	72	69	49	82
596	Algeria	75	126	100	74	58	62	49	77	62	175	71	68	50	81
613	Tunisia	75	128	99	73	52	59	55	79	63	179	72	68	50	81
620	Tunisia	80	128	101	75	54	62	53	82	65	172	72	69	49	82
629	Tunisia	80	129	101	74	60	61	56	85	63	175	72	69	48	83
2587	Turkey	68	126	100	73	65	54	47	71	55	177	68	68	49	79
Local check		68	128	101	73	58	54	56	76	58	174	67	67	48	
Location mean		73	127	100	73	57	59	51	78	60	177	71	69	49	

Table 3.4.3.. Time to maturity (days) for entries in the CIYT-L at different locations during 1981/82.

ENTRY NAME	CHILE	LEBANON	SPAIN	SUDAN	SYRIA			TURKEY	MEAN
	Carahue	Terbol	Hemares	Hudei-ba	Al-Ghab	Heimo	Tel Hadya	Ankara	
ILC 35	123	92	87	113	98	226	111	106	120
83	132	98	91	114	99	230	114	107	123
112	129	101	87	116	103	227	113	107	123
116	129	98	87	114	101	229	113	107	122
132	129	100	88	114	103	229	114	107	123
134	131	99	87	115	104	229	112	107	123
135	129	100	87	113	105	230	113	107	123
136	126	100	87	114	105	229	114	107	123
155	126	99	90	114	103	229	113	107	123
165	126	99	87	114	104	229	113	107	123
171	129	100	87	115	104	229	114	106	123
451	123	95	87	115	103	227	110	105	121
464	123	100	88	115	104	230	113	107	123
496	129	101	90	117	103	230		107	125
596	126	100	87	115	104	228	114	107	123
613	126	99	90	115	102	230	113	107	123
620	126	100	90	116	104	226	115	107	123
629	123	100	88	117	104	228	114	107	123
2587	119	95	87	114	104	229	112	106	121
Local check	123	94	92	113	100	227	111	105	
Location mean	126	99	90	115	103	229	113	107	

Table 3.4.4. Plant height (cm) of entries in the CIYT-L at different locations during 1981/82.

ENTRY	NAME	CHILE	CYPRUS	ITALY	LEBANON	SPAIN	SYRIA			TURKEY	U.S.A.	MEAN
		Carahue	Nicosia	Sicily	Terbol	Hemares	Al-Ghab	Heimo	Tel Hadya	Ankara	Pullman	
ILC	35	42	38	38	39	43	32	38	32	17	29	35
	83	50	45	43	38	46	42	35	35	24	37	40
	112	50	46	45	47	48	50	35	35	23	34	45
	116	52	47	44	46	46	47	33	35	27	41	42
	132	49	46	42	44	45	49	36	35	24	37	41
	134	48	44	44	45	47	46	33	35	26	38	41
	135	53	43	43	46	45	47	32	35	26	41	41
	136	50	50	47	44	47	49	33	34	25	39	42
	155	44	40	40	44	41	42	36	35	23	32	38
	165	47	45	41	43	46	43	38	33	21	33	39
	171	50	48	45	47	47	51	38	35	25	34	42
	451	45	47	44	43	45	43	35	33	24	37	40
	464	47	49	41	40	44	47	38	35	23	36	40
	496	47	46	42	43	45	48	36	34	26	39	41
	596	49	46	41	44	47	49	33	35	27	40	41
	613	55	43	42	46	46	45	35	33	26	38	41
	620	57	46	43	43	47	46	32	34	27	40	42
	629	54	43	43	41	47	46	34	33	28	38	41
	2587	48	42	39	40	48	43	36	32	26	38	39
Local check		56	43	43	36	46	41	35	30	22	31	
Location mean		50	45	43	43	46	45	35	34	25	37	

Table 3.4.5 . Seed yield (Y=kg/ha) and rank (R) of entries in the CIYT-L at different locations during 1981/82.

ENTRY NAME	CHILE Carahue		CYPRUS Nicosia		EGYPT Al-Sharkia		ITALY Bari		ITALY Sicily		JORDAN M'shagar		LEBANON Terbol		MOROCCO Karia Tissa		MOROCCO Mer-chouch		SPAIN Hemares		SUDAN Hudeiba		SYRIA Al-Ghab		SYRIA Heimo		SYRIA Izra'a		SYRIA Tel Hadya		TURKEY Ankara		U.S.A. Pullman		Mean	
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
ILC 35	1816	18	985	16	1024	6	1149	13	1706	6	1408	1	1503	9	1563	18	1148	20	689	2	354	8	1016	20	702	8	217	8	2048	1	433	15	4912	1	1334	8
83	2179	11	921	17	1131	4	1149	13	1384	20	1044	6	1396	11	1758	11	1250	18	580	8	405	5	1432	19	538	19	148	17	1719	10	640	7	3980	8	1274	18
112	2488	4	987	15	869	15	1167	7	1868	2	1013	9	1389	12	1719	14	1344	16	530	15	182	17	1760	12	565	17	195	12	1670	13	504	13	3425	14	1275	17
116	2452	6	1163*	4	976	9	1327	2	1630	9	1044	6	1242	13	1758	11	1695	6	672	4	405	5	2010	7	565	17	275	1	1973	2	770	1	4295	5	1427	1
132	2113	13	1157	5	893	13	1125	16	1599	10	886	14	1241	14	1836	7	1504	10	575	10	417	4	1630	16	521	20	239	4	1824	4	558	10	4535	3	1333	9
134	2485	5	1265	1	1071	5	1167	7	1529	13	1039	8	1161	16	1641	16	2027	2	653	5	362	7	2203	4	613	12	199	11	1960	3	558	10	2847	19	1340	6
135	2446	7	1046	11	857	16	1202	6	1524	14	744	18	878	20	1914	6	1281	17	545	13	40	20	1932	10	613	12	151	16	1613	15	655	6	3717	10	1245	19
136	1685	20	1056	10	857	16	1155	10	1966	1	907	13	2083	2	2031	2	1699	5	708	1	277	13	1833	11	574	16	226	7	1620	14	340	20	3012	18	1296	15
155	2556	2	1183	2	952	11	1155	10	1415	19	1258	3	1507	8	2031	2	1191	19	364	19	348	9	1693	14	577	15	239	4	1521	19	349	18	4130	7	1339	7
165	2095	14	1179	3	798	20	1226	4	1815	3	848	16	2061	3	2031	2	1422	13	589	7	542	2	2005	8	583	14	175	15	1754	6	387	17	3640	12	1362	4
171	1946	16	1138	7	893	13	1369	1	1659	8	638	19	1919	5	1992	5	1457	11	516	16	70	18	2276	2	811	6	177	14	1555	17	343	19	4708	2	1380	2
451	2196	10	1010	13	976	9	1131	15	1734	5	1326	2	1465	10	2344	1	1574	8	452	17	262	15	1745	13	851	4	251	2	1738	8	599	8	3682	11	1373	3
464	2131	12	1157	5	988	8	1321	3	1661	7	952	11	2722	1	1836	7	1516	9	536	14	336	11	1464	18	857	3	146	18	1746	7	490	14	2520	20	1316	12
496	2548	3	992	14	1012	7	1167	7	1495	15	863	15	987	19	1484	20	1455	12	564	12	342	10	1651	15	863	2	142	19	1730	9	561	9	4268	6	1301	14
596	1810	19	1088	9	940	12	1060	19	1465	17	1005	10	1958	4	1797	10	1816	4	577	9	295	12	1615	17	708	7	210	9	1758	5	667	5	3378	15	1303	13
613	2357	9	815	19	1226	2	1220	5	1596	11	843	17	1652	7	1836	7	1895	3	683	3	226	16	2052	6	935	1	138	20	1523	18	514	12	3040	17	1327	11
620	2393	8	1115	8	821	19	1071	18	1542	12	1128	5	1875	6	1719	14	1379	15	575	10	268	14	2359	1	643	11	190	13	1685	11	681	3	3535	13	1352	5
629	1875	17	1036	12	845	18	1107	17	1470	16	916	12	1219	15	1523	19	2129	1	648	6	54	19	2224	3	687	10	201	10	1675	12	675	4	4330	4	1330	10
2587	1976	15	852	18	1190	3	1155	10	1424	18	624	20	1018	18	1758	11	1402	14	434	18	1155	1	2005	8	702	8	237	6	1556	16	396	16	3953	9	1285	16
Local check	3321	1	648	20	1964	1	1024	20	1778	4	1228	4	1085	17	1641	16	1650	7	270	20	497	3	2109	5	821	5	242	3	1456	20	687	2	3110	16		
Location mean	2243		1040		1014		1172		1613		986		1518		1811		1542		558		342		1851		687		200		1706		540		3751			
C.V. %	31.2		27.6		17.7		19.1		19.9		42.9		38.4		21.8		25.4		27.1		82.4		31.2		41.2		44.8		13.4		30 7		36.7			
L.S.D. 5%	991.1		407.2		254.5		317.8		453.8		697.5		823.6		557.2		553.9		214.6		398.9		818.8		400.3		126.9		324.7		235 2		1951 4			
No. of entries exceeding local check by a significant margin	0		10		0		1		0		0		5		1		0		16		1		0		0		0		4		0		0			

* Seed yield values which are underlined significantly exceeded the local check.

Table 3.4.6. The five heaviest seed yielding entries at the individual locations in the CIYT-L during 1981/82.

Rank	CHILE	CYPRUS	EGYPT	ITALY		JORDAN	LEBANON	MOROCCO		
	Carahue	Nicosia	Al-Sharkia	Bari	Sicily	M'shagar	Terbol	Karia	Tissa	Merchouch
1	Local check	ILC 134	Local check	ILC 171	ILC 136	ILC 35	ILC 464	ILC 451		ILC 629
2	ILC 155	ILC 155	ILC 613	ILC 116	ILC 112	ILC 451	ILC 136	ILC 136	[1]	ILC 134
3	ILC 496	ILC 165	ILC 2587	ILC 464	ILC 165	ILC 155	ILC 165	ILC 155		ILC 613
4	ILC 112	ILC 116	ILC 83	ILC 165	Local check	Local check	ILC 596	ILC 165		ILC 596
5	ILC 134	ILC 132	ILC 134	ILC 613	ILC 451	ILC 620	ILC 171	ILC 171		ILC 136

Rank	SPAIN	SUDAN	SYRIA				TURKEY	U.S.A.
	Hemares	Hudeiba	Al-Ghab	Heimo	Izra'a	Tel Hadya	Ankara	Pullman
1	ILC 136	ILC 2587	ILC 620	ILC 613	ILC 116	ILC 35	ILC 116	ILC 35
2	ILC 35	ILC 165	ILC 171	ILC 496	ILC 451	ILC 116	Local check	ILC 171
3	ILC 613	Local check	ILC 629	ILC 464	Local check	ILC 134	ILC 620	ILC 132
4	ILC 116	ILC 132	ILC 134	ILC 451	ILC 132	ILC 132	ILC 629	ILC 629
5	ILC 134	ILC 83 116	Local check	Local check	ILC 155	ILC 596	ILC 596	ILC 116

(1) The brackets indicate entries having the same yield.

Table 3.4.7. Yield in kg/ha and rank of the common entries in CIYT-L during 1979/80 and 1981/82.

ENTRY NAME	1980/81		1981/82		MEAN	
	Y	R	Y	R	Y	R
ILC 35	967	9	1334	7	1152	7
83	1007	5	1274	12	1141	8
134	976	8	1340	5	1158	6
135	1006	6	1245	13	1126	10
136	960	10	1296	11	1128	9
155	888	13	1339	6	1114	12
165	1099	2	1362	3	1231	2
171	981	7	1380	1	1181	5
451	1068	3	1373	2	1221	3
464	1187	1	1316	8	1252	1
496	929	11	1301	10	1115	11
596	908	12	1303	9	1106	13
620	1018	4	1352	4	1185	4
Mean	1000		1234		1161	

Table 3.4.8. Correlations (df = 17) between different locations for the seed yield of entries in the CIYT-L during 1981/82.

COUNTRY	LOCATION	CYPRUS	EGYPT	ITALY		JORDAN	LEBANON	MOROCCO		SPAIN	SUDAN	SYRIA				TURKEY	U.S.A.
		Nicosia	Al-Sharkia	Bari	Sicily	M'shagar	Terbol	Karia Tissa	Merchouch	Hemares	Hudeiba	Al-Ghab	Heimo	Izra'a	Tel Hadya	Ankara	Pullman
CHILE	- Carahue	0.14	0.12	0.12	-0.25	0.11	-0.39	-0.09	-0.16	-0.27	-0.11	0.20	-0.05	-0.18	-0.03	0.31	-0.06
CYPRUS	- Nicosia		-0.57*	0.21	0.11	0.15	0.27	0.14	0.11	-0.02	-0.21	0.19	-0.37	0.25	0.37	0.03	0.20
EGYPT	- Al-Sharkia			0.67**	-0.42	-0.02	-0.24	-0.19	0.08	-0.01	0.47*	-0.22	0.39	-0.13	-0.01	-0.04	-0.26
ITALY	- Bari				0.25	-0.37	0.27	0.18	-0.06	0.03	-0.09	0.14	0.25	-0.18	-0.02	-0.25	0.22
	- Sicily					0.08	0.43	0.37	-0.02	0.31	-0.20	-0.06	-0.04	0.14	0.12	-0.40	0.04
JORDAN	- M'shagar						0.07	0.06	-0.18	0.02	-0.17	-0.48*	-0.11	0.37	0.49*	0.19	0.10
LEBANON	- Terbol							0.34	0.02	0.08	-0.13	-0.10	0.23	-0.19	-0.10	-0.34	0.19
MOROCCO	- Karia Tissa								-0.16	-0.42	-0.05	0.07	0.04	0.25	-0.36	-0.31	-0.28
	- Merchouch									0.48*	-0.20	0.47*	0.22	0.06	0.09	0.31	-0.36
SPAIN	- Hemares										-0.27	0.02	-0.07	-0.13	0.49*	0.23	0.26
SUDAN	- Hudeiba											-0.11	-0.12	0.30	0.05	-0.27	-0.02
SYRIA	- Al-Ghab												0.01	-0.01	-0.36	0.12	-0.22
	- Heimo													-0.38	-0.23	-0.10	-0.26
	- Izra'a														0.29	0.03	-0.11
	- Tel Hadya															0.35	0.35
TURKEY	- Ankara																0.05

* P ≤ 0.05
** P ≤ 0.01

3.5. CHICKPEA INTERNATIONAL SCREENING NURSERY (CISN)

Material

The material for Chickpea International Screening Nursery (CISN) comprised 102 test entries. These included 42 germplasm lines originating from 13 countries, 46 developed through hybridization at ICARDA's principal research station at Tel Hadya in Syria and 14 developed by ICRISAT Center in India. The trial also included three checks, ILC 480, ILC 1929, and one local check to be supplied by the cooperator. All these entries were homozygous and had shown superior performance in ICARDA's regional trials. Cooperators were free to use any of these materials for their use in breeding programs.

Methods and Management

Each of the test entry and the check was grown in unreplicated single row plot of 4m length. The three checks were sown repeatedly in a block of 20 entries. The spacings of 0.30 to 0.60 m between rows and 0.10 m, within rows were suggested.

Thirty-nine sets of trial were distributed to cooperators in 19 countries. The results were received from 19 locations in 14 countries. However, only ten sets were worth analysis and are presented. The details with respect to agronomic practices were received from some locations and are given in Table 3.5.1.

Results and Discussion

The data on time to flowering, time to maturity, and plant height are given in Table 3.5.2. The genotypic values across locations ranged from 65 to 82 days for time to flowering, 116 to 128 days for time to maturity, and 29 to 43 cm for plant height.

The yield performance and ranking of different entries in the trial at each locationare given in Table 3.5.3. The co-efficient of variation ranged from 13.0% at Rome in Italy to 72.7% at Hudeiba in Sudan. The mean yields were lowest at Hemares in Spain (474 kg/ha) and highest at Rome in Italy (1845 kg/ha). The standard errors at each location when compared with the entry yield in kg/ha revealed that 8, 12, 1, 10, 29, and 26 entries exceeded the local check by a significant margin at Shandweel in Egypt, Tehran in Iran, Terbol in Lebanon, Hemares in Spain, Hudeiba in Sudan, and Brookings in USA, respectively. This suggests that these superior genotypes could be utilized by the national programs for further exploitation in breeding program.

On the basis of over-all performance across locations, FLIP 81-47 was the highest yielder (1493 kg/ha) and was followed by ICCL 80024 (1491 kg/ha), ILC 1290 (1483 kg/ha), ILC 1973 (1463 kg/ha), ILC 2434 (1450 kg/ha) , The genotypes ILC 598, ILC 604, ILC 653 and ILC 860 were poor with 577, 598, 619 and 656 kg/ha yield, respectively. The five highest yielding entries at different locations are given in Table 3.5.4. and the six entries with the highest seed yield across locations expressed as percentage of the location mean are given in Table 3.5.5. Except at Carahue in Chile, Rome in Italy and Tel Hadya in Syria where the local check was first, third and fifth, respectively, the top five entries were the entries supplied from Tel Hadya. In general, there was no co-herence in the performance of genotypes across locations. The genotype ILC 1973, however, maintained its superior performance among the first five at three locations and the genotypes ICCl 80024 ,ILC 289, ILC 1290, ILC 2493, FLIP 81-42 and FLIP 81-65 at two locations. Further, it was noted that as high as 294% of the location mean yield was attained at Hudeiba in Sudan and 255% at Terbol in Lebanon (Table 3.5.5.).

Table 3.5.1. Agronomic data for different locations for the CISN during 1981/ 82.

Country	Location	Planting date	Crop* duration (days)	Fertilizer kg/ha N	P205	K20	Irrig.	Insecticide
CHILE	Carahue	21. 9. 1982	136	40	50			
EGYPT	Shandweel	NR	NR	-	-	-		
IRAN	Tehran	NR	NR	-	-	-		
ITALY	Rome	8. 3. 1982	156	56	100			
ITALY	Sicily	10. 3. 1982	121	-	60			
LEBANON	Terbol	9. 4. 1982	98	-	-	-		
SPAIN	Hemares	14. 4. 1982	103	40	120			
SUDAN	Hudeiba	29.11. 1981	123	40				
SYRIA	Tel Hadya	23. 2. 1982	118	-	-	-		
U.S.A.	Brookings	4. 5. 1982	111	-	-	-		

* Days from planting to maturity averaged over all locations, NR = Not reported

Table 3.5.2. Mean time to flowering (days), time to maturity (days) and plant height (cm) for different entries in CISN during 1981/82.

Entry Name	Country of origin	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
ILC 29	Jordan	81	126	32
ILC 45	Iraq	76	126	35
ILC 231	U.S.A.	75	125	36
ILC 289	Iran	74	126	35
ILC 391	Unknown	77	127	39
ILC 456	Turkey	78	126	38
ILC 475	Turkey	80	126	40
ILC 523	Egypt	78	126	38
ILC 570	Lebanon	75	120	32
ILC 596	Algeria	76	132	34
ILC 598	Algeria	72	126	37
ILC 604	Algeria	75	126	36
ILC 608	India	75	126	36
ILC 624	Tunisia	75	125	35
ILC 653	Iran	82	127	38
ILC 860	Iran	78	125	35
ILC 936	Iran	72	125	35
ILC 1164	Iran	75	126	34
ILC 1201	Iran	78	125	34
ILC 1247	Morocco	75	126	32
ILC 1290	Turkey	80	126	37
ILC 1885	India	71	125	34
ILC 1273	India	78	126	35
ILC 1987	Unknown	76	125	33
ILC 1998	Iran	74	125	35
ILC 2206	Iran	72	125	40
ILC 2208	Iran	75	127	40

..2/..

Cont'd Table 3.5.2.

Entry Name	Country of origin	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
ILC 81-34	ICARDA-Syria	72	124	35
ILC 81-35	"	70	123	35
FLIP 81-36	"	70	124	33
FLIP 81-37	"	72	125	34
FLIP 81-38	"	65	124	31
FLIP 81-39	"	78	126	34
FLIP 81-40	"	72	126	31
FLIP 81-41	"	69	124	30
FLIP 81-42	"	80	127	35
FLIP 81-43	"	78	127	41
FLIP 81-44	"	82	128	38
FLIP 81-45	"	80	126	33
FLIP 81-46	"	73	126	34
FLIP 81-47	"	74	124	34
FLIP 81-48	"	78	123	33
FLIP 81-49	"	79	126	35
FLIP 81-50	"	79	126	37
FLIP 81-51	"	76	125	33
FLIP 81-52	"	74	125	35
FLIP 81-53	"	72	123	31
FLIP 81-54	"	78	123	34
FLIP 81-55	"	79	125	32
FLIP 81-56	"	76	122	33
FLIP 81-57	"	82	124	41
FLIP 81-58	"	79	124	36
FLIP 81-59	"	74	123	36
FLIP 81-60	"	76	124	43
FLIP 81-61	"	78	124	37
FLIP 81-62	"	80	125	38
FLIP 81-63	"	72	123	32

..3/..

Cont'd Table 3.5.2.

Entry Name	Country of origin	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
ILC 2306	Iran	70	124	38
ILC 2400	Turkey	66	124	36
ILC 2423	India	78	125	39
ILC 2431	India	68	125	39
ILC 2433	India	69	123	35
ILC 2434	India	71	122	35
ILC 2493	India	77	124	35
ILC 2501	India	74	122	36
ILC 2531	India	77	122	35
ILC 2543	U.S.A.	78	123	35
ILC 2556	Ethiopia	76	123	39
ILC 2658	U.S.S.R.	66	121	35
ILC 3108	Turkey	71	122	34
ILC 3129	Turkey	72	123	35
ILC 3200	Turkey	69	124	37
FLIP 80- 1	ICARDA-Syria	72	123	33
FLIP 80- 3	"	70	122	36
FLIP 80- 5	"	71	123	37
FLIP 80- 6	"	70	123	33
FLIP 80- 7	"	73	123	32
FLIP 80-10	"	72	124	33
FLIP 80-14	"	80	125	33
FLIP 80-15	"	72	123	31
FLIP 80-18	"	70	123	31
FLIP 80-19	"	74	124	40
FLIP 80-30	"	71	122	34
FLIP 81-31	"	75	123	34
FLIP 81-32	"	75	122	32
FLIP 81-33	"	76	122	33

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Cont'd Table 3.5.2.

Entry Name	Country of origin	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
FLIP 81-64	ICARDA-Syria	73	123	30
FLIP 81-65	"	72	117	33
FLIP 80007	ICRISAT-India	71	121	31
ICCL 80008	"	72	121	30
ICCL 80009	"	78	124	31
ICCL 80010	"	71	118	29
ICCL 80011	"	73	118	32
ICCL 80012	"	73	116	31
ICCL 80014	"	66	120	33
ICCL 80015	"	74	124	32
ICCL 80016	"	71	122	29
ICCL 80020	"	72	123	34
ICCL 80021	"	74	119	32
ICCL 80022	"	76	121	33
ICCL 80023	"	75	121	32
ICCL 80024	"	68	123	32
ILC 480 (Mean)	Turkey	78	124	37
ILC 1929 (Mean)	Syria	75	125	35

Table 3.5.3. Seed yield (Y=kg/ha) and rank (R) of entries in the CISN at different locations during 1981/82.

ENTRY NAME	CHILE		EGYPT		IRAN		ITALY				LEBANON		SPAIN		SUDAN		SYRIA		U.S.A.		MEAN	
	Carahue		Shandweel		Tehran		Rome		Sicily		Terbol		Hemares		Hudeiba		Tel Hadya		Brookings			
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
ILC 29	347	98	1707	42	606	21	1979	51	1145	26	73	92	339	82	403	58	697	190	-	-	811	92
45	283	100	1107	86	395	91	2479	14	1769	2	0	93	489	48	444	54	1349	26	-	-	924	84
231	251	101	2751	2	363	100	2229	36	1257	20	173	91	439	62	299	71	1007	71	-	-	974	80
289	0	103	2166	14	520	47	2396	21	1549	5	-	-	889	3	299	71	1267	35	-	-	1136	52
391	758	86	2077	17	515	50	2063	47	1452	9	-	-	264	94	132	93	938	80	0	90	911	85
456	663	90	1426	64	235	105	2188	42	1287	18	2062	9	164	99	69	101	925	82	37	89	906	86
475	505	96	1966	22	455	75	2438	18	1141	28	1173	78	289	91	65	102	1450	16	0	90	948	83
523	694	88	677	98	506	55	2021	49	1270	19	0	93	164	99	444	54	1185	46	106	85	707	97
570	30	102	722	96	363	100	1646	79	652	69	1395	61	0	105	778	25	887	89	106	85	658	100
596	-	-	0	104	263	103	2354	25	651	70	-	-	589	24	153	91	1109	59	287	88	676	98
598	378	97	0	104	389	92	-	-	1243	22	-	-	339	82	715	32	1210	41	343	75	577	104
604	789	85	574	100	377	97	1021	96	352	91	745	88	439	62	257	77	1337	28	93	88	598	103
608	0	103	1085	88	400	87	1938	55	965	39	284	90	139	101	486	50	1020	70	426	73	674	99
624	536	95	151	103	455	75	2646	8	943	42	728	89	239	96	278	75	1083	61	106	85	717	95
653	1169	71	514	101	369	99	1771	68	762	62	0	93	589	24	0	104	729	97	287	81	619	102
860	315	99	914	94	492	59	2104	46	677	66	0	93	139	101	403	58	539	105	981	53	656	101
936	853	82	514	101	449	79	2479	14	782	59	0	93	539	36	953	14	1033	69	120	84	772	93
1164	694	88	1981	21	488	63	2743	4	1341	14	2185	6	64	104	1078	9	1807	1	1296	32	1368	10
1201	1264	69	1292	76	482	68	1577	82	828	53	-	-	189	98	57	103	1117	57	782	62	843	90
1247	568	94	2374	9	491	60	1868	60	776	61	1365	62	114	103	1182	7	1225	39	-	-	1107	60
1290	2625	7	1885	29	554	33	2952	1	1256	21	-	-	664	15	182	86	1725	2	1505	26	1483	3
1885	663	90	1737	39	542	40	2410	19	1206	24	1691	33	564	29	307	69	1491	11	1060	46	1167	44
1973	1960	31	1959	23	517	48	2743	4	1129	29	2247	5	689	8	869	18	1674	4	838	60	1463	4
1987	1232	70	1929	25	599	22	2618	9	924	44	2025	11	289	91	390	60	1484	13	1782	17	1327	15
1998	1865	35	1033	92	494	58	2202	38	918	45	1625	40	414	66	349	67	573	104	1157	38	1063	68
2206	1549	50	1063	89	482	68	2327	29	1463	8	1707	32	314	87	807	26	1396	21	1657	22	1277	23
2208	1992	28	1440	61	479	71	2243	33	1222	23	2136	7	489	48	307	69	1491	11	2435	5	1423	6

Cont'd ./...2/

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Table 3.5.3 . Seed yield (Y=kg/ha) and rank (R) of entries in the CISN at different locations during 1981/82.

ENTRY NAME	CHILE		EGYPT		IRAN		ITALY				LEBANON		SPAIN		SUDAN		SYRIA		U.S.A.		MEAN	
	Carahue		Shandweel		Tehran		Rome		Sicily		Terbol		Hemares		Hudeiba		Tel Hadya		Brookings			
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
ILC 2306	2024	26	885	95	497	57	2452	16	989	35	1225	74	314	87	765	27	1421	19	1685	21	1226	33
2400	1929	33	974	93	459	74	1868	60	866	50	1956	16	339	82	453	51	1472	15	1046	49	1136	52
2423	2530	10	1351	71	442	80	1993	50	556	80	2358	2	414	66	432	56	1332	29	949	54	1236	30
2431	663	90	700	97	442	80	2035	48	1114	30	1269	73	489	48	390	60	1199	42	1324	29	963	82
2433	821	84	663	99	382	95	2493	13	1316	16	2025	11	314	87	157	90	1503	9	2130	9	1180	43
2434	2530	10	2300	11	511	52	1368	84	1387	12	1418	59	514	40	682	34	1003	72	2782	3	1450	5
2493	663	90	1477	58	485	64	2910	2	1654	3	1728	30	414	66	57	103	1301	34	1657	22	1235	31
2501	1348	63	1492	57	596	25	2729	6	512	83	1283	71	481	55	138	92	1569	7	2028	11	1218	35
2531	2076	22	1477	58	618	19	1813	66	641	73	1638	38	481	55	575	40	1417	20	2764	4	1350	12
2543	1602	47	1677	43	638	16	1938	55	1050	33	1357	64	506	43	367	65	1569	7	1778	18	1248	27
2556	1507	55	1944	24	553	36	2521	12	1393	11	1727	31	931	1	221	81	1322	30	1722	20	1384	8
2658	1380	62	1440	61	598	24	1854	62	700	64	1828	22	781	6	658	37	1164	51	1875	12	1228	32
3108	1285	67	1366	70	696	10	2313	30	1073	32	1670	34	656	16	513	46	777	94	1042	50	1139	50
3129	2045	25	1107	86	630	17	2354	25	1144	27	-	-	556	30	1242	4	1081	62	1139	40	1255	26
3200	2140	19	1337	74	741	5	2354	25	835	52	1135	81	231	97	763	28	1094	60	2083	10	1271	24
FLIP 80- 1	1760	39	1233	81	653	15	1938	55	874	48	1589	46	281	93	1296	3	638	102	2167	6	1243	28
FLIP 80- 3	1665	44	1255	79	667	14	1854	62	694	65	1440	56	256	95	508	47	1214	40	-	-	1061	69
FLIP 80- 5	2013	27	1396	67	516	49	1604	81	609	75	1357	64	531	39	679	35	980	75	-	-	1076	65
FLIP 80- 6	1538	52	1440	61	538	43	1979	51	419	89	1802	25	481	55	492	49	1138	53	-	-	1092	63
FLIP 80- 7	1665	44	1648	46	716	7	1938	55	610	74	2112	8	731	7	1242	4	1588	6	875	58	1313	19
FLIP 80-10	1159	72	1722	40	690	12	1854	62	0	97	1224	75	381	77	450	52	1195	45	1819	14	1049	73
FLIP 80-14	1665	44	1677	43	676	13	1771	68	10	96	1468	53	556	30	121	97	847	92	3028	1	1182	42
FLIP 80-15	1475	56	2411	8	547	39	1313	86	-	-	1449	54	406	70	1013	11	708	99	889	56	1135	54
FLIP 80-18	969	81	1907	26	553	36	1396	83	-	-	1061	84	506	43	1054	10	885	90	1194	37	1058	71
FLIP 80-19	1391	60	1495	55	483	67	2118	44	958	41	1038	85	572	28	92	99	742	96	-	-	988	79
FLIP 80-30	1422	58	1495	55	417	84	1743	74	441	88	1442	55	497	46	1150	8	729	97	1250	33	1059	70
FLIP 80-31	1549	50	1161	84	455	75	2202	38	458	86	1544	49	372	78	633	38	1121	55	542	70	1004	78

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Table 3.5.3 . Seed yield (Y=kg/ha) and rank (R) of entries in the CISN at different locations during 1981/82.

ENTRY NAME	CHILE Carahue		EGYPT Shandweel		IRAN Tehran		ITALY Rome		ITALY Sicily		LEBANON Terbol		SPAIN Hemares		SUDAN Hudeiba		SYRIA Tel Hadya		U.S.A. Brookings		MEAN	
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
FLIP 81-32	2055	23	1117	85	383	94	2368	23	876	47	1608	42	322	86	717	31	1311	32	875	58	1163	45
FLIP 81-33	1074	76	1606	49	512	51	2243	33	647	71	1294	69	372	78	383	62	1387	23	-	-	1058	71
FLIP 81-34	1960	31	1532	53	526	46	1952	54	97	94	1544	49	397	73	279	74	748	95	2153	7	1119	57
FLIP 81-35	2403	14	1539	52	549	38	2118	44	38	95	1766	26	472	58	363	66	906	86	1764	19	1192	39
FLIP 81-36	1770	38	1391	69	506	55	2202	38	483	85	1924	18	497	46	383	62	963	77	1444	28	1156	46
FLIP 81-37	1391	60	1450	60	475	72	2202	38	449	87	1738	28	672	11	550	43	1077	63	1083	42	1109	58
FLIP 81-38	1454	57	1658	45	397	90	2410	19	131	93	2056	10	922	2	738	29	830	93	931	55	1153	47
FLIP 81-39	1327	64	1265	78	555	32	1785	67	676	67	1294	69	547	35	175	88	691	101	681	65	900	87
FLIP 81-40	1106	74	1806	31	769	3	2702	7	308	92	1605	43	472	58	708	33	1153	52	639	68	1127	55
FLIP 81-41	853	82	1532	53	903	2	2618	9	514	82	1561	48	672	11	779	24	1039	68	1014	51	1149	48
FLIP 81-42	1011	79	1280	77	989	1	2452	16	543	81	2294	4	672	11	92	99	950	78	1861	13	1214	37
FLIP 81-43	2087	21	2154	15	692	11	2243	33	658	68	1576	47	672	11	233	79	900	88	2139	8	1335	14
FLIP 81-44	1074	76	1717	41	749	4	2577	11	558	79	1627	39	422	65	446	53	969	76	1250	33	1139	50
FLIP 81-45	1707	40	2250	12	389	92	-	-	372	90	1516	51	447	61	338	68	1723	3	667	66	1045	75
FLIP 81-46	2688	6	2700	3	485	64	1763	70	975	38	-	-	681	10	664	36	1349	26	1236	35	1393	7
FLIP 81-47	2435	13	2033	20	508	54	2263	32	872	49	3754	1	556	30	997	13	1071	65	444	72	1493	1
FLIP 81-48	2973	2	1351	71	702	8	1846	65	511	84	1655	36	606	22	518	45	1166	50	1319	30	1265	25
FLIP 81-49	2815	4	1403	66	557	30	2221	37	842	51	1813	23	656	16	185	83	1368	24	1222	36	1308	20
FLIP 81-50	1707	40	2048	18	577	27	1917	53	1314	17	1902	19	556	30	726	30	1305	33	1056	47	1316	18
FLIP 81-51	1992	28	2463	7	614	20	2304	31	642	72	1592	45	656	16	560	42	1178	47	1806	15	1381	9
FLIP 81-52	2973	2	1618	47	697	9	2388	22	977	37	1813	23	406	70	247	78	1077	63	1472	27	1367	11
FLIP 81-53	1992	28	1581	51	557	30	929	99	798	55	1655	36	406	70	893	17	906	86	986	52	1070	67
FLIP 81-54	2498	12	1618	47	562	29	1763	70	1183	25	2320	3	331	85	226	80	1197	43	1528	25	1323	16
FLIP 81-55	2783	5	1048	90	625	18	2179	43	989	35	1117	82	356	80	185	83	1476	14	667	66	1143	49
FLIP 81-56	2625	7	1907	26	565	28	-	-	-	-	1754	27	306	90	1226	6	1121	55	1069	44	1322	17
FLIP 81-57	2593	9	2048	18	465	73	1679	76	893	46	1624	41	431	64	168	89	1355	25	1583	24	1284	22
FLIP 81-58	2340	15	2611	5	399	88	638	100	606	76	1339	67	506	43	289	73	925	82	1153	39	1081	64

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Table 3.5.3. Seed yield (Y=kg/ha) and rank (R) of entries in the CISN at different locations during 1981/82.

ENTRY NAME	CHILE		EGYPT		IRAN		ITALY				LEBANON		SPAIN		SUDAN		SYRIA		U.S.A.		MEAN	
	Carahue		Shandweel		Tehran		Rome		Sicily		Terbol		Hemares		Hudeiba		Tel Hadya		Brookings			
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
FLIP 81-59	1675	43	2122	16	414	85	1096	93	926	43	2014	13	806	4	206	82	1128	54	833	61	1122	56
FLIP 81-60	1327	64	2196	13	425	83	1304	87	758	63	1434	57	556	30	176	87	1235	37	1069	44	1048	74
FLIP 81-61	2055	23	2366	10	599	22	1721	75	1770	1	1972	15	606	22	268	76	1172	48	889	56	1342	13
FLIP 81-62	2245	16	2648	4	379	96	1013	97	1319	15	1977	14	631	21	185	83	1318	31	417	74	1213	38
FLIP 81-63	1412	59	2470	6	454	78	1679	76	964	40	916	87	489	48	126	94	1444	18	-	-	1106	61
FLIP 81-64	1855	36	1781	34	542	40	1638	80	1098	31	1662	35	639	19	126	94	1450	16	292	79	1108	59
FLIP 81-65	2108	20	1048	90	734	6	1888	59	1584	4	1472	52	789	5	522	44	1501	10	569	69	1222	34
ICCL 80007	1570	49	1744	38	482	68	1054	94	1355	13	966	86	589	24	856	19	988	74	2819	2	1242	29
80008	1791	37	1426	64	534	45	1679	76	998	34	1599	44	639	19	918	16	1172	48	1083	42	1184	41
80009	716	87	1877	30	377	97	388	102	586	77	1360	63	514	40	126	94	855	91	278	83	708	96
80010	1159	72	1781	34	554	33	1138	91	780	60	1156	79	539	36	856	19	944	79	764	63	967	81
80011	1285	67	1396	67	485	64	1054	94	-	-	1175	77	489	48	814	21	1001	73	292	79	888	88
80012	1095	75	1218	82	511	52	1763	70	-	-	1286	72	489	48	1001	12	1197	43	500	71	1007	77
80014	1918	34	1788	33	439	82	1346	85	784	58	1331	68	414	66	1439	2	1229	38	-	-	1188	40
80015	1538	52	1588	50	411	86	1138	91	794	56	1731	29	689	8	939	15	1045	66	-	-	1097	62
80016	1317	66	1766	36	491	60	1763	70	787	57	1434	57	489	48	564	41	1045	66	1056	47	1071	56
80020	2171	17	1181	83	542	40	1304	87	568	78	1138	80	539	36	793	23	919	84	-	-	1071	76
80021	1697	42	1344	73	257	104	1221	89	814	54	1213	76	389	74	376	64	331	81	306	77	855	89
80022	1032	78	1240	80	399	88	471	101	-	-	1064	83	514	40	772	26	912	85	306	77	746	94
80023	1000	80	1907	26	357	102	971	98	-	-	1397	60	389	74	501	48	615	103	333	76	830	91
80024	1602	47	3396	1	491	60	1221	89	-	-	1852	21	389	74	1543	1	1115	58	1806	15	1491	2
ILC 480 mean	2168	18	1748	37	554	33	2333	28	1517	6	1352	66	533	27	99	98	1249	36	1306	31	1291	21
ILC 1929 mean	1519	54	1315	75	535	44	2355	24	1429	10	1882	20	458	60	592	39	1390	22	699	64	1218	35
Local check mean	3112	1	1806	31	590	26	2875	3	1487	7	1948	17	350	81	404	57	1630	5	1134	41	-	-
Location mean	1518		1561		521		1945		892		1472		474		525		1147		1120			
C.V. %	24.9		29.9		13.1		13.0		35.2		33.3		56.1		72.7		20.6		26.3			
SE for checks	325.5		279.8		42.5		207.1		300.4		332.4		150.1		153.1		169.4		224.4			
SE for checks VS test entries	703.1		604.4		91.8		414.1		648.9		718.1		324.4		330.8		366.0		366.5			
No. of entries significantly exceeding the local check	0		8		12		0		0		1		10		29		0		26			

Table 3.5.4 . The five heaviest seed yielding entries at the individual locations in the CISN during 1981/82.

RANK	CHILE	EGYPT	IRAN	ITALY		LEBANON	SPAIN	SUDAN
	Carahue	Shandweel	Tehran	Rome	Sicily	Terbol	Hemares	Hudeiba
1	Local check	ICCL 80024	FLIP 81-42	ILC 1290	FLIP 81-61	FLIP 81-47	ILC 2556	ICCL 80024
2	FLIP 81 -48 (1)	ILC 231	FLIP 81-41	ILC 2493	ILC 45	ILC 2423	FLIP 81-38	ICCL 80014
3	FLIP 81 -52	FLIP 81-46	FLIP 81-40	Local check	ILC 2493	FLIP 81-54	ILC 289	FLIP 80-1
4	FLIP 81 -49	FLIP 81-62	FLIP 81-44	ILC 1164	FLIP 81-65	FLIP 81-42	FLIP 81-59	ILC 3129
5	FLIP 81 -55	FLIP 81-58	ILC 3200	ILC 1973	ILC 289	ILC 1973	FLIP 81-65	FLIP 80-7

RANK	SYRIA	U.S.A.
	Tel Hadya	Brookings
1	ILC 1164	FLIP 80-14
2	ILC 1290	ICCL 80007
3	FLIP 81-45	ILC 2434
4	ILC 1973	ILC 2531
5	Local check	ILC 2208

(1) The brackets indicate entries having the same rank.

Table 3.5.5. Seed yield, expressed as a % of the location mean, of the six entries with the heaviest seed yield across locations in the CISN during 1981/82.

Entry Name	Location (1)									
	1	2	3	4	5	6	7	8	9	10
FLIP 81-47	160	130	98	116	98	255	117	190	93	40
ICCL 80024	105	218	94	63	-	126	82	294	97	161
ILC 1290	173	121	106	152	141	-	140	35	150	134
ILC 1973	129	125	99	141	127	153	145	166	146	75
ILC 2434	167	147	98	70	155	96	108	130	87	248
ILC 2208	131	92	92	115	137	145	103	58	130	217

(1) Locations 1 to 10 are in the same order as those in Table 3.5.4.

3.6. CHICKPEA INTERNATIONAL F_3 TRIAL-A(CIF3T-A)

Material

The material for the Chickpea International F_3-Trial (CIF_3T-A) comprised 11 F_3 populations derived from 10 different crosses and one local check to be supplied by the local cooperator. The material was assumed to provide a wide range of variation with which the cooperators were free to practice their own selection.

Methods and Management

The trial design was a randomised complete block with three replications. The recommended plot size was four rows, each 4 m long with an inter-and intra row spacing of 0.50 m and 0.15 m, respectively.

Eleven sets of the trial were distributed to the cooperators in ten countries. Results were received from six sets covering five countries. But only five sets were worth analysing and are reported. The data from Rome in Italy were based on one replication and were thus not analysed for ANOVA. Agronomic data provided by cooperators are summarised in Table 3.6.1.

Results and Discussion

The data on mean time to flowering, time to maturity,and plant height are given in Table 3.6.2. The range for time to flowering and time to maturity was 92 to 103 days and 132 to 137 days, respectively and for plant height from 33 to 42 cm.

The data on seed yield for the 11 populations alongwith the check are given in Table 3.6.3. The ANOVA revealed that the populations differed with respect to their mean seed yields. The co-efficient of variation ranged from 18.9% at Merchouch in Morocco to 40.3% at Ankara in Turkey.

At Tel Hadya in Syria, 6 populations exceeded the local check by a significant margin, whereas at other locations none of the populations exhibited statistical superiority over the local check. However, numerically, 5 populations at New Delhi in India and 6 populations at Merchouch in Morocco exceeded the local check. The selections in these populations could be useful in these countries. On the overall location basis, the population X80TH50 was the highest yielder and was followed by X80TH46, X80TH150, and X80TH256, and the population X80TH64 was the poorest yielder. None of the correlation values between the location means for yields of the populations was significant (Table 3.6.4.)

Table 3.6.1. Agronomic data for different locations for the CIF_3T-A during 1981/82.

Country	Location	Planting date	Crop* duration (days)	Fertilizer (kg/ha) N	P_2O_5	K_2O	Irrig.	Insecticide
INDIA	New Delhi	16-11-1981	176	15	40			Endosulfan
ITALY	Sicily	8- 3-1982	116	56	100			
MOROCCO	Merchouch	NR	NR	-	-	-		
SYRIA	Tel Hadya	15-11-1981	217		50			
TURKEY	Ankara	23- 3-1982	106	-	-	-		

* Days from planting to maturity averaged over all entries , NR = Not reported.

Table 3.6.2. Mean values for three agronomic characters for entries in the CIF_3T-A during 1981/82.

Entry		Time to flowering (days)	Time to maturity (days)	Plant height (cm)
X 80 TH	46	102	137	33
	47	101	137	39
	50	103	137	42
	64	100	135	34
	72	102	134	37
	73	101	135	39
	111	100	134	37
	143	96	132	33
	144	101	134	38
	150	98	136	36
	258	92	135	39

Table 3.6.3. Seed yield (Y = kg/ha) and rank (R) of entries in the CIF_3T-A at different locations during 1981/82.

Cross No. X 80 TH	Pedigree	INDIA New Delhi Y	R	ITALY Sicily Y	R	MOROCCO Merchouch Y	R	SYRIA Tel Hadya Y	R	TURKEY Ankara Y	R	MEAN Y	R
46	ILC 1922 X ILC 183	1517	9	2125	8	5381	3	1111	5	532	3	2133	2
47	ILC 190 X ILC 183	1533	8	2219	7	4587	7	865	6	493	4	1939	7
50	ILC 517 X ILC 200	1716	3	2073	9	5397	2	1222	4	542	2	2190	1
64	ILC 1920 X ILC 482	1711	4	1438	10	4349	8	292	9	321	12	1622	11
72	ILC 190 X ILC 194	1929	1	1052	12	3857	12	1338	2	359	9	1707	8
73	ILC 190 X ILC 183	1568	7	1167	11	3937	11	1232	3	349	10	1651	10
111	ILC 493 X ILC 194	1370	12	2729	4	4127	10	1494	1	372	8	2018	5
143	ILC 482 X ILC 1281	1449	10	2406	5	4175	9	35	12	411	7	1695	9
144	ILC 482 X ILC 876	1446	11	2354	6	5714	1	86	11	336	11	1987	6
150	ILC 482 X ILC 190	1851	2	2760	3	5143	4	252	10	421	6	2085	3
258	(ILC 1922 X ILC 1919) X ILC 482	1703	5	3000	1	4746	6	452	7	469	5	2074	4
Local check		1597	6	3000	1	4841	5	346	8	673	1		
Location mean		1616		2194		4688		727		440			
C.V. %		23.1				18.9		19.7		40.3			
L.S.D. 5%		631.9				1501.7		243.1		300.1			
No. of entries significantly exceeding local check		0				0		6		0			

1) Seed yield values underlined, significantly exceeded the local check.

Table 3.6.4. Correlations (df = 9) between different locations for the seed yield of entries in the CIF_3T-A during 1981/ 82.

Country - Location	ITALY Rome	MOROCCO Merchouch	SYRIA Tel Hadya	TURKEY Ankara
INDIA - New Delhi	-0.33	-0.07	0.03	0.02
ITALY - Sicily		0.45	-0.36	0.38
MOROCCO - Merchouch			-0.31	0.47
SYRIA - Tel Hadya				0.21

3.7. CHICKPEA INTERNATIONAL F_3 TRIAL - B (CIF_3T-B)

Material

The material for the Chickpea International F_3 Trial-B comprised 15 populations derived from 14 different crosses involving 18 divergent parents and one local check to be supplied by the local cooperator. The material was assumed to provide a wide range of variation within which the cooperators were free to practice their own selection.

Methods and Management

The trail was conducted using randomized complete block design with three replications. The recommended plot size was 14 rows of 4 m length with inter- and intra row spacings of 0.30 m and 0.10 m, respectively.

Thirteen sets of trials were distributed to the cooperators in eleven countries and the results were received from eight trials and were analysed. The agronomic data for different locations are given in Table 3.7.1. The data from Rome and Sicily in Italy were based on one replication only, so ANOVA was not done.

Results and Discussion

The data on the mean vlaues for time to flowering, time to maturity and plant height are given in Table 3.7.2. The range for these characters was of the order of 65 to 73 days for time to flowering, 110 to 113 days for time to maturity, and 31 to 39 cm for plant height. The data of seed yield alongwith co-efficient of variation (CV) and least significant differences (LSD) for different locations are given in Table 3.7.3. The CV in different locations ranged form 8.7% at Tel Hadya in Syria to 34.4% at Hemares in Spain.

The location mean was the lowest at Hemares in Spain (375 kg/ha) and highest at New Delhi in India (2162 kg/ha). The LSD estimates

revealed that 14 populations at Hemares in Spain and one at Shandweel in Egypt excelled the local check in yield by a significant margin. Whereas at other locations either local check was the best or some of the populations were superior in performance only numerically. The single plants from these superior populations could be of use in the breeding program. On an average of all locations, four populations X80TH131, X80TH137, X80TH136 and X80TH214, were the top yielders.

The correlation of mean seed yields between Tel Hadya in Syria and Hemares in Spain was significant and negative (Table 3.7.4.), whereas, all other correlations were non-significant.

Table 3.7.1. Agronomic data for different locations for the CIF_3T-B during 1981/82.

Country	Location	Planting date	Crop duration * (days)	Fertilizer (kg/ha) N	P_2O_5	K_2O	Irrig.	Insecticide
EGYPT	Shandweel	NR	136					
INDIA	New Delhi	16-11-1981	177	15	40			Endosulfan
IRAN	Tehran	5-12-1981	97	18	46		5	
ITALY	Rome	8- 3-1982	117	56	100			
	Sicily	8- 3-1982	93		60			
SPAIN	Hemares	14- 4-1982	90	40	120			
SUDAN	Hudeiba	28-11-1981	115	40			12	
SYRIA	Tel Hadya	23- 2-1982	114		50			

* Days from planting to maturity averaged over all entries, NT = Not reported.

Table 3.7.2. Mean values for three agronomic characters for entries in the CIF_3T-B during 1981/82.

Entry	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
X 80TH 43	70	111	31
62	67	110	33
63	67	112	32
75	72	113	34
114	65	112	33
116	67	112	33
129	66	111	35
131	69	112	32
136	67	112	37
137	68	111	36
140	67	110	34
147	67	111	35
179	65	113	39
207	69	112	33
214	73	113	35

Table 3.7.3. Seed yield (Y = kg/ha) and rank (R) of entries in the CIF$_3$T-B at different locations during 1981/82.

Cross No.	Pedigree	EGYPT		INDIA		IRAN		ITALY				SPAIN		SUDAN		SYRIA		MEAN	
		Shandweel		New Delhi		Tehran		Rome		Sicily		Hemares		Hudeiba		Tel Hadya			
X80 TH		Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
43	ILC 1929 X ILC 974	1704	2	2063	10	1234	13	1375	16	500	14	400	7	857	13	1449	15	1198	15
62	ILC 517 X ILC 2582	1193	7	2421	3	1725	1	2432	2	396	16	371	11	1214	8	1606	13	1420	8
63	ILC 523 X ILC 2582	1048	12	2460	2	1194	15	2500	1	625	13	425	6	1413	4	1729	8	1424	6
75	ILC 1922 X ILC 244	1235	6	2341	4	1360	10	2146	8	479	15	469	2	770	14	1695	10	1312	13
114	ILC 673 X ILC 215	1170	9	1746	16	1479	7	2313	4	938	11	446	5	1452	3	1760	6	1413	10
116	ILC 517 X ILC 2582	1187	8	2262	7	1328	12	1896	11	906	12	308	14	1726	1	1756	7	1421	7
129	ILC 248 X ILC 1126	1046	13	2302	5	1231	14	1792	15	1104	8	369	12	889	12	1789	4	1315	12
131	ILC 249 X ILC 1920	1950	1	2222	8	1423	8	1979	9	1010	9	360	13	1536	2	1786	5	1533	1
136	ILC 190 X ILC 1922	996	15	1944	14	1680	2	2156	7	1677	3	398	8	1361	5	1698	9	1489	3
137	ILC 190 X ILC 237	1039	14	2302	5	1603	5	2271	6	1563	4	454	4	1147	9	1662	11	1505	2
140	ILC 215 X ILC 1023	1561	3	1905	15	1330	11	2313	4	979	10	492	1	1111	10	1653	12	1418	9
147	ILC 190 X ILC 974	1104	10	1965	13	1398	9	1964	10	1313	7	467	3	611	16	1411	16	1279	14
179	ILC 2952 X ILC 1920	961	16	2095	9	1154	16	1818	13	1500	5	388	9	1341	6	1552	14	1351	11
207	ILC 190 X ILC 263	1081	11	1984	11	1643	4	1896	11	1938	2	217	15	734	15	2011	2	1438	5
214	ILC 1920 X ILC 137	1289	5	1984	11	1668	3	2333	3	1375	6	381	10	1016	11	1800	3	1481	4
Local check		1333	4	2602	1	1585	6	1865	14	2427	1	54	16	1242	7	2041	1		
Location mean		1244		2162		1440		2066		1171		375		1151		1712			
C.V. %		24.8		29.7		12.9		-		-		34.4		30.5		8.7			
L.S.D. 5%		515.0		1074.4		309.3		-		-		214.8		584.9		248.4			
No. of entries significantly exceeding local check		1		0		0						14		0		0			

(1) Seed yield values underlined, significantly exceeded the local check.

Table 3.7.4. Correlations (df = 13) between different locations for seed yield in the CIF_3T-B during 1981/82.

COUNTRY -LOCATION	INDIA	IRAN	ITALY		SPAIN	SUDAN	SYRIA
	New Delhi	Tehran	Rome	Sicily	Hemares	Hudeiba	Tel Hadya
EGYPT - Shandweel	-0.08	-0.12	-0.25	-0.39	0.06	0.08	-0.09
INDIA - New Delhi		-0.19	0.13	-0.46	-0.08	0.13	0.01
IRAN - Tehran			0.44	0.35	-0.23	-0.06	0.33
ITALY - Rome				-0.09	0.34	0.27	0.24
- Sicily					-0.34	-0.12	0.34
SPAIN - Hemares						-0.10	-0.61*
SUDAN - Hudeiba							0.18

* $P \leq 0.05$

3.8. CHICKPEA INTERNATIONAL F_3 TRIAL-C (CIF_3T-C)

Material

The Chickpea International F_3 Trial - C comprised 11 populations and one local check to be supplied by the local cooperator. The F_3 populations were derived from ten crosses involving 12 diverse parents. The material was assumed to provide a wide range of variation within which the cooperators were free to practice their own selection.

Methods and Management

The design used for the trial was randomized complete block with three replications. The suggested plot size was 4 rows of 4 m length with an inter-and intra row spacings of 0.30 m and 0.10 m, respectively.

Eight sets of trail were distributed to the cooperators in four countries and the results were received from five and only two were analyzable. The agronomic data for different locations are given in Table 3.8.1.

Results and Discussion

The data on mean values for time to flowering, time to maturity and plant height are given in Table 3.8.2. The mean for time to flowering, time to maturity, and plant height ranged from 113 to 122 days, 189 to 198 days, and 53 to 64 cm, respectively.

The data on seed yield for the two locations are given in Table 3.8.3. The mean yield level at New Delhi in India was very high (2451 kg/ha) as compared to Tel Hadya (623 kg/ha). The ANOVA for these locations showed significant differences among the means of the populations at both the locations. The LSD estimates, however, revealed that four populations exceeded the local check by a significant margin at Tel Hadya in Syria. These four populations are expected to give superior

plants for future use in breeding program. At New Delhi in India none of the populations was found statistically superior to local check, but four populations were numerically superior to the local check and were expected to yield better selections.

Table 3.8.1. Agronomic data for different locations for the CIF_3T-C during 1981/82.

Country	Location	Planting date	Crop duration * (days)	Fertilizer (kg/ha) N	P_2O_5	K_2O	Irrig.	Insecticide
INDIA	New Delhi	16-11-1981	176	15	40			Endosulfan
SYRIA	Tel Hadya	15-11-1981	214		50			

* Days from planting to maturity averaged over all entries.

Table 3.8.2. Mean values for three agronomic characters for entries in the CIF_3T-C during 1981/82.

Entry	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
X 80 TH 16	115	190	57
17	119	190	58
18	122	190	64
27	119	191	53
28	113	189	53
29	118	197	54
99	118	198	56
100	118	192	59
103	115	194	54
107	117	196	58
217	119	197	58

Table 3.8.3. Seed yield (Y = kg/ha) and rank (R) of entries in the CIF_3T-C at different locations during 1981/82.

Cross No. X 80 TH	Pedigree	INDIA New Delhi Y	R	SYRIA Tel Hadya Y	R	MEAN Y	R
16	ILC 1920 X NEC 138-2	2383	7	776	5	1580	6
17	ILC 190 X NEC 138-2	1151	12	984	3	1068	11
18	ILC 1922 X NEC 138-2	1389	11	992	2	1191	10
27	ILC 1929 X ICC 7513	2341	9	76	11	1209	9
28	ILC 1919 X ICC 7513	3435	1	373	9	1904	2
29	ILC 263 X ICC 7513	2563	6	60	12	1312	7
99	ILC 1920 X ICC 7513	2957	4	886	4	1922	1
100	ILC 673 X NEC 138-2	3076	2	608	6	1842	3
103	ILC 517 X ICC 7513	2362	8	217	10	1290	8
107	ILC 1108 X ICC 7513	3016	3	583	7	1800	4
217	(ILC 130 X ICC 7513)XILC 1920	2143	10	1370	1	1757	5
Local check	-	2599	5	549	8		
Location mean		2451		623			
C.V. %		32.4		30.8			
L.S.D. 5%		1359.0		325.1			
No. of entries significantly exceeding local check		0		4			

1) Seed yield values underlined, significantly exceeded the local check.

3.9. CHICKPEA INTERNATIONAL ASCOCHYTA BLIGHT NURSERY (CIABN-82)

Material

The nursery comprised of 60 entries. These included both dèsi (ICC) and Kabuli (ILC) germplasm accessions that were identified blight resistant at ICARDA. A few lines,such as ICC-4935, G-543 and G-549 from India, which are considered to have some blight tolerance were also included. The lines included in the nursery originated from Afghanistan, India, Iran, Morocco, Spain, Turkey, the USSR, ICARDA (Syria) and ICRISAT (India). The susceptible check used was ILC 1929, the Syrian local land race. Forty sets of the nursery were distributed in 15 countries.

Methods and Management

Each entry was sown in two replications. The plot size was one row of 4 m length. For each plot, 40 seeds were sown. The susceptible check was repeatedly sown after every two test rows to serve as an indicator-cum-spreader row. The cooperators in the Mediterranean region were advised to sow the nursery in the winter season instead of the usual spring season to get higher disease pressure. Otherwise the nurseries were managed as per the local agronomic practices.

Whenever possible the cooperators were also advised to do artificial inoculation of the nursery with the blight disease either by scattering the diseased debris collected from the previous season or supplementing the natural infection by spraying the spore suspension prepared from the freshly infected plants in the fields. A 1-9 scale was recommended for scoring the disease severity at least two times, first in the vegetative stage and the second at podding stage. The scale recommended is 1 = highly resistant; 3= resistant; 5 = tolerant; 7= susceptible; and 9= highly susceptible. The data on some of the important agronomic characters such as time to flowering and yield were also recorded by some cooperators.

Results and Discussion

The results from 16 locations in 7 countries (Syria, Lebanon, Pakistan, India, Turkey, Tunisia and Morocco) were reported (Table 3.9.1). At New Delhi in India, the screening was done in the greenhouse by artificial inoculation, but all the entries were not tested. Similarly at Ludhiana in India all the entries were not tested. There the screening was done both under field and greenhouse conditions. The disease pressure at all the other locations was high and the susceptible check showed uniformly 9 rating.

The performance of the entries in each of the 7 countries is as follows:

Syria

The nursery was grown at four locations; Tel Hadya (ICARDA's main research center), Lattakia (ICARDA's coastal site), Homs and Jable (both Syria Ministry of Agriculture Research Stations). The disease pressure was high at all the four locations. At Tel Hadya, the infection on pods was also taken into consideration in scoring the lines (0 = highly resistant; 1-5% = resistant; 6-15% = moderately resistant; 16-40% = tolerant; above 40% = susceptible). Twenty lines showed resistance at all the four locations, and these were ILC 72, ILC 182, ILC 195, ILC 196, ILC 202, ILC 2956, ILC 3346, ICC 607, ICC 1467, ICC 1772, ICC 3606, ICC 3918, ICC 3919, ICC 3921, ICC 3940, ICC 4107, ICC 4192, ICC 5127, Pch 15 and Pch 128.

Lebanon

The nursery was grown at ICARDA's station at Terbol in the Beqa'a valley, and AUB in Beirut. Except ILC 3001, ICC 7514 and ICC 7520 which showed tolerant reaction, all others showed resistant or moderately resistant (rating 4) reaction at Terbol. Also at AUB, almost all the lines showed resistant or moderately resistant reaction except ILC 482, ILC 484, ILC 1695, ILC 1757, ILC 3001, and ILC 3400 which showed 6 rating and more, and ILC 236 and ILC 641 had a 5 rating.

Pakistan

Of the three locations where the nursery was grown the disease pressure was high only at Islamabad. Only four lines, ILC 72, ILC 3279, ILC 3346 and Pch 128, showed moderately resistant reaction and these were Kabuli types. All other lines showed susceptibility.

India

Of the entries tested both at Ludhiana and New Delhi only six lines ILC 191, ILC 2380, ICC 76, ICC 1467, ICC 1468 and ICC 2160 were resistant or moderately resistant.

Turkey

The nursery was grown at Hymana near Ankara. All the lines tested showed resistant or tolerant reaction.

Tunisia

The nursery was grown at three locations, Mateur, Alkef and Beja. The disease pressure was high at all the three locations. At Beja, an unknown virus complex also affected the nursery and hence the results to be viewed with caution. Ten lines, ILC 182, ILC 183, ILC 187, ILC 200, ILC 201, ILC 2380, NEC 138-2, ICC 1069, ICC 2160, and Pch 128 showed resistant to moderately resistant reaction at all the three locations.

Morocco

The nursery was grown at Merchouch. Except ILC 236, ILC 1695, ILC 1757, ILC 3001, ILC 3340, ILC 3342, ILC 3400, ICC 1591, ICC 4475, ICC 4935, ICC 7513, ICC 7514, ICC 7520, G-543 and G-549 which showed susceptibility, all others showed resistant to tolerant reaction.

None of the lines was resistant at all the 16 locations where the nursery was grown. ILC 3346 showed resistant or moderately resistant reaction at 13 locations and at the 14th location at Beja in Tunisia it was rated 6. But in each of the 16 locations where the nursery was grown a few to several lines were found resistant.

The isolates from Pakistan and India were the most virulent. In general, the 20 lines that showed resistance in Syria were resistant in most of the other locations also.

Table 3.9.1. Reaction of chickpea entries to Ascochyta blight in CIABM, during 1981/82 season.

ENTRY	ORIGIN	DESI/KABULI	SYRIA				LEBANON		PAKISTAN			INDIA		TURKEY	TUNISIA			MOROCCO
			Tel-Hadya	Lattakia	Homs	Jable	Terbol	AUB	Islam-abad	Lahore	Islam-abad-Univ.	New Delhi	Ludhiana	Hymana	Mateur	Alkef	Rela	March-ouch
ILC 72	Spain	K	2	1	2	4	2	2	4	1	1	6	3	2	1	2	7	2
182	USSR	K	3	3	3	4	3	3	6	1	1	7	3	3	1	4	3	2
183	"	K	4	5	3	4	3	3	6	1	1	7	3	3	1	4	3	3
187	"	K	4	3	3	5	3	2	6	1	1	-	-	3	1	3	4	3
191	"	K	4	5	3	5	2	2	6	1	1	4	3	3	6	3	3	3
194	"	K	4	5	3	6	2	4	8	1	1	7	3	5	1	5	1	3
195	"	K	4	3	3	3	2	3	8	1	1	5	5	4	2	5	1	3
196	"	K	2	3	3	3	2	3	8	1	1	-	5	2	1	4	5	3
200	"	K	4	5	3	3	2	2	8	1	1	5	3	3	2	4	2	3
201	"	K	3	5	3	4	2	3	8	1	1	7	3	2	1	3	3	3
202	"	K	2	3	2	3	2	2	6	1	1	7	5	3	1	2	5	3
236	Afghanistan	K	5	5	7	5	3	5	8	1	1	-	5	5	6	6	6	6
482	Turkey	K	6	1	8	6	3	7	9	1	1	9	7	5	5	6	5	4
484	"	K	6	5	7	5	3	6	9	1	1	9	7	5	1	6	1	5
1695	Afghanistan	K	5	5	7	6	3	7	9	1	1	-	7	5	1	7	5	6
1757	"	K	5	5	7	6	4	6	9	1	1	-	7	5	1	7	8	7
2380	USSR	K	3	3	5	4	3	3	8	1	1	3	3	3	1	3	1	3
2506	"	K	4	3	3	5	2	4	8	1	1	-	-	2*	6	3	3	4
2548	"	K	4	3	3	5	3	3	8	1	1	7	7	3	1	5	3	4
2956	"	K	2	1	2	3	2	2	6	1	1	5	3	3	5	3	5	3
3001	Afghanistan	K	6	5	8	5	5	8	9	1	1	-	-	5	6	6	7	6
3279	USSR	K	2	3	5	3	2	2	4	1	1	6	7	2	1	3	5	-
3340	India	K	5	3	9	5	3	3	8	1	1	-	-	5	7	4	5	7
3342	Afghanistan	K	6	5	6	5	4	4	9	1	1	-	-	5	7	6	5	7
3346	USSR	K	3	3	3	3	2	2	4	1	1	-	-	2	1	3	6	3
3400	ICARDA	K	4	7	5	5	2	7	8	1	1	-	-	5	7	6	5	6
NEC-138-2	USSR	D	4	3	5	3	3	3	6	1	1	-	3	3	3	4	4	3
ICC 76	India	D	4	1	4	5	2	4	8	1	1	2	2	4	7	6	4	2
607	-	D	3	1	4	4	2	3	9	1	1	3	5	4	7	3	1	3
641	India	D	3	3	4	5	2	5	9	1	1	4	-	4	6	5	3	3
1069	Iran	D	4	3	3	5	2	3	6	2	1	-	5	4	4	3	4	-
1121	"	D	5	3	7	6	4	4	9	1	1	-	-	5	7	6	3	-
1467	India	D	3	3	4	3	2	3	8	1	1	3	2	3	6	4	1	4
1468	"	D	3	3	3	5	2	3	9	1	1	3	2	3	6	5	1	4
1591	"	D	4	3	5	3	3	4	8	1	1	-	4	5	7	6	3	7
1772	"	D	4	1	3	4	2	4	8	1	1	5	-	5	7	6	4	3
1903	ICRISAT	D	5	3	3	4	3	4	6	1	1	-	3	5	7	5	1	5
2160	"	D	3	3	6	5	2	4	8	1	1	2	3	2	1	4	1	3
3606	-	D	4	1	3	4	2	4	8	1	1	-	5	4	7	4	2	5
3912	Iran	D	3	1	5	3	2	3	8	1	1	-	5	3	7	4	1	5
3916	"	D	4	3	6	4	2	3	6	1	1	-	5	4	8	4	3	5
3918	"	D	3	1	4	3	2	3	8	1	1	-	5	2	7	4	2	5
3919	"	D	3	1	3	4	2	4	8	1	1	-	5	4	7	5	1	4
3921	"	D	3	1	3	3	2	4	6	1	1	-	5	4	7	5	1	4
3932	"	D	3	3	5	4	2	3	7	1	1	-	5	4	8	4	1	-
3940	"	D	4	1	4	4	1	4	6	1	1	-	5	5	7	5	1	3
3996		D	3	3	6	5	2	4	6	1	1	-	5	4	7	3	3	5
ICC 4107	Iran	D	3	1	4	4	2	3	9	1	1	-	1	4	7	4	1	5
4192	"	D	3	3	3	3	2	2	9	1	1	-	5	3	5	3	1	5
4472	"	D	3	1	5	4	2	3	9	1	1	-	5	5	8	5	3	5
4475	"	D	5	3	4	3	2	3	9	1	1	-	5	5	7	4	1	6
4935	India	D	5	7	3	5	2	3	9	1	1	7	9	5	6	7	7	6
5127	-	D	3	1	4	3	2	3	6	1	1	7	7	4	6	4	8	5
7513	Iran	D	5	5	5	4	3	-	8	1	1	-	5	5	7	4	7	6
7514	-	D	5	5	5	4	5	4	8	1	1	-	5	3	7	5	3	7
7520	-	D	5	7	9	5	5	4	9	1	1	-	3	4	3	6	3	7
G 543	Punjab India	D	6	5	5	5	4	5	8	1	1	-	7	5	3	-	4	7
549	"	D	5	3	5	4	2	5	8	1	1	-	5	5	1	7	4	7
Rch 15	Morocco	D	3	3	4	3	2	3	6	1	1	-	7	4	1	4	5	3
128	"	K	4	1	2	4	3	3	4	1	1	-	7	3	1	3	3	4
ILC 1929	Syria	K	9	9	9	9	9	9	9	7	1-9	9	9	9	9	9	9	9

4. FABA BEAN INTERNATIONAL TRIALS AND NURSERIES

Introduction:

Six international trials or nurseries of faba bean were available to cooperators in 1981/82. These were the Adaptation Trial (FBAT), the International Yield Trial-Large seeded (FBIYT-L), the International Yield Trial-Small seeded (FBIYT-S), the International Screening Nursery-Large seeded (FBISN-L), the International Screening Nursery-Small seeded (FBISN-S) and the International F_4 Trial ($FBIF_4T$). Results of entries which were planted in more than one year were summarized to examine their stability performance. The results reported by co-operators are presented in the following pages.

4.1. FABA BEAN ADAPTATION TRIAL (FBAT)

Material

The twelve entries in the 1981/82 FBAT are listed below:

Entry	Variety	Origin	Year entered	Type	Remarks
ILB 460	Hudeiba 72	Sudan	1979/80	Minor	Released cultivar
1266	Aquadulce	Spain	1978/79	Major	" "
1269	New Mammoth	UK	1980/81	Major	" "
1811	Syr. Loc. Small	Syria	1978/79	Minor	Local, mass-selected
1814	Syr. Loc. Large	Syria	1978/79	Major	" " "
1816	Lebanese Small	Lebanon	1978/79	Minor	" " "
1817	Lebanese Large	Lebanon	1978/79	Major	" " "
1818	Jordan Local	Jordan	1978/79	Major	" " "
1819	Giza 3	Egypt	1978/79	Minor	Released cultivar
1820	Giza 4	Egypt	1978/79	Minor	" "
1821	Turkish local	Turkey	1978/79	Major	Local, mass-selected
1822	Violette di Policora	Italy	1979/80	Major	Released cultivar

These test entries in the FBAT originated from nine different countries, and are either local mass-selected populations or released cultivars. In both cases these cultivars are widely grown in their country of origin. Five, out of the twelve entries, are var. minor and seven are var. major types. The assumption was made that such a choice of genotypes will provide a range of diversity needed for the classification of countries into agro-ecological zones.

Methods and Management

The design of the trial was a randomized complete block with four replicates. The recommended plot size was four rows, each four meters long with inter-and intra row spacings of 0.05 and 0.15 m, respectively.

Twenty-two sets of the trial were distributed to cooperators in fourteen countries. Results were returned from 12 locations from 9 countries. Agronomic data provided by cooperators are summarized in Table 4.1.1.

Results and Discussion

Mean time to flowering (days) for the different entries at different locations is given in Table 4.1.2. The location mean varied from 48 days at Pullman in USA to 116 days at Terbol in Lebanon. Across all the twelve test entries, Hudeiba 72 and Jordan Local were the earliest to flower with 85 days, while the entries Syrian Local Large and Giza 4 were the latest with 93 days. However, Giza 4 was early to flower in Egypt and Sudan (59 and 50 days respectively). On the contrary, Syrian Local Large (ILB 1814) was late at all locations.

The data on time to maturity (days) for the entries at different locations are presented in Table 4.1.3. As with time to flowering time to maturity was earliest at Pullman in USA (120 days) and latest at Terbol in Lebanon (190 days). The differences among the genotypes for time to maturity at different locations were in general very small. Jordan Local (ILB 1818) was the earliest in maturity in three locations (Sids in Egypt, Tehran in Iran and at Cordoba in Spain), and also earliest across locations and was followed by Hudeiba 72 (ILB 460). However, Syrian Local Large (ILB 1814) and Turkish Local (ILB 1821) were the latest in maturity. The data on plant height across 8 locations are listed in Table 4.1.4. Plant height varied from 141 cm for Syrian Local Large (ILB 1814) at Beja in Tunisia to 45 cm for Hudeiba 72 (ILB 460) and Syrian Local Small (ILB 1811) at

Tel Hadya in Syria rainfed. Across locations, plant height varied from 50 cm at Tel Hadya rainfed in Syria to 120 cm at Sids in Egypt.

The mean seed yield and rank of entries at different locations are given in Table 4.1.5. Seed yield varied greatly from 727 kg/ha at Hudeiba in Sudan to 5055 kg/ha at Tehran in Iran. The precision of the trials vaired considerably from a coefficient of variation of 8.4% at Cordoba in Spain to 43.1% at Pullman in USA. New Mammoth (ILB 1269), a released cultivar from UK, yielded the heaviest across all the locations. This cultivar ranked first at three sites followed by the Egyptian cultivar Giza 3 (ILB 1819) which ranked first at two sites, and between 2nd and 4th at five sites. These data may suggest that the two faba bean cultivars, New Mammoth and Giza 3, might possess genes for wide adaptation.

Average seed yields and rank of the twelve test entries over several locations for one, two, three and four year periods from 1978/79 through 1981/82 are presented in Table 4.1.6, and for the two years 1980-82 is summarized in Table 4.1.7. These data clearly show that the two entries, New Mammoth and Violette di Policoro have maintained their high yielding ability across different growing seasons, though they were tested for few years. However, Hudeiba 72 had mostly low yields across years.

The correlations between locations for seed yields for the 1981/82 are given in Table 4.1.8 and for the two years (1980-82) in Table 4.1.9. The most striking features of the correlation matrix is the similarity in the performance of entries at locations in Iran, Spain, Syria-rainfed and Tunisia with the respective correlations being generally significant, positive and large. On the other hand, Sudan (Hudeiba) correlated negatively and significantly with Syria (Tel Hadya) and Tunisia (El-Kef). Results also show that Egypt correlated positively only with Sudan, probably, this was due to the similarity in environments among these countries.

Correlations among three agronomic characters and seed yield for entries in the FBAT at different locations during 1981/ are presented in Table 4.1.10. Time to maturity (days) correlated positively and significantly with time to flowering (0.88) and also with seed yield (0.29). However, plant height correlated positively with seed yield (0.49), but negatively with time to flowering(-0.38).

Table 4.1.1. Agronomic data for different locations for the FBAT during 1981/82.

Country	Location	Planting date	Crop duration[1] (days)	Fertilizer (kg/ha) N	P_2O_5	K_2O	Irrig.	Herb	Insec.
EGYPT	Sids	10-11-1981	161	37.5	75		5		
IRAN	Tehran	10-12-1981	181	18	46		1		
LEBANON	Terbol	3-12-1981	190	-	-		-		
SPAIN	Cordoba	4-12-1981	153	-	98		-		Ekatin
	Madrid	26-11-1981	163	40	120		-		Ambja
SUDAN	Hudeiba	3-11-1981	131	-	-		10		
SYRIA	TH-Irrig.	22-11-1981	175	-	50		-		
	TH-Rainf.	22-11-1981	173	-	50		-		
TURKEY	Ankara	2- 2-1982	153	20	60		-		
U.S.A.	Pullman	6- 5-1982	120	-	-		9	Treflan	

(1) Days from planting to Maturity.

Table 4.1.2. Time to flowering (days) for entries in the FBAT at the different locations during 1981/82.

ENTRY		ORIGIN	EGYPT	IRAN	LEBANON	SPAIN		SUDAN	SYRIA		TURKEY	U.S.A.	MEAN
ILB	Selection		Sids	Tehran	Terbol	Cordoba	Madrid	Hudeiba	Tel Hadya Irrig.	Tel Hadya Rainf.	Ankara	Pullman	
ILB 460	Hudeiba 72	Sudan	51	94	115	77	113	49	104	106	97	43	85
1266	Aguadulce	Spain	68	106	115	79	116	54	108	111	100	50	91
1269	New Mammoth	U.K.	65	106	113	79	115	51	107	112	100	50	90
1811	Syr.Loc.Small	Syria	60	100	115	77	114	50	102	104	99	45	87
1814	Syr.Loc.Large	"	70	106	120	87	117	61	108	112	101	50	93
1816	Lebanese Small	Lebanon	68	100	119	81	115	55	106	109	101	50	90
1817	Lebanese Large	"	68	106	115	88	115	52	106	111	100	50	90
1818	Jordan Local	Jordan	58	94	111	77	113	54	103	104	97	43	85
1819	Giza 3	Egypt	60	100	118	77	114	50	104	109	99	45	88
1820	Giza 4	Egypt	59	161	116	77	114	50	105	104	100	45	93
1821	Turkish Local	Turkey	66	106	119	79	116	66	108	112	101	50	92
1822	Violette di Policoro	Italy	64	106	118	77	115	52	106	112	101	50	90
	Location mean		63	107	116	80	115	54	106	109	100	48	

Table 4.1.3. Time to maturity (days) for entries in the FBAT at different locations during 1981/82.

ENTRY		EGYPT	IRAN	LEBANON	SPAIN		SUDAN	SYRIA		TURKEY	USA	MEAN
ILB	Selection	Sids	Tehran	Terbol	Cordoba	Madrid	Hudeiba	Tel Hadya Irrig.	Tel Hadya Rainf.	Ankara	Pullman	
ILB 460	Hudeiba 72	156	179	190	150	177	128	176	173	153	120	160
1266	Aquadulce	165	182	191	155	177	132	174	173	153	121	162
1269	New Mammoth	161	182	190	150	177	130	172	173	153	121	161
1811	Syr.Loc.S.	159	180	190	153	177	130	175	173	153	120	161
1814	Syr.Loc.L.	165	182	193	158	179	132	177	174	153	121	163
1816	Lebanese S.	158	180	187	150	178	131	176	174	153	120	161
1817	Lebanese L.	163	182	190	153	177	132	173	174	153	121	162
1818	Jordan Local	153	179	190	150	177	129	173	173	153	116	159
1819	Giza 3	159	180	190	153	177	130	176	173	153	115	161
1820	Giza 4	159	181	190	155	177	130	176	172	153	121	161
1821	Turkish L.	163	182	192	158	178	133	175	171	153	121	163
1822	Violette di Policoro	160	182	190	153	178	131	174	173	153	121	162
Location mean		161	181	190	153	177	131	175	173	153	120	

Table 4.1.4. Plant height (cm) of entries in the FBAT at different locations during 1981/82.

ENTRY		EGYPT	IRAN	LEBANON	SYRIA Tel-Hadya		TURKEY	TUNISIA	U.S.A.	MEAN
ILB	Selection	Sids	Tehran	Terbol	Irrig.	Rainf.	Ankara	Beja	Pullman	
ILB 460	Hudeiba 72	118	80	64	47	45	55	104	62	72
1266	Aquadulce	123	85	67	56	49	51	120	64	77
1269	New Mammoth	115	80	63	52	53	57	114	53	73
1811	Syr.Loc.Small	119	75	58	51	45	50	108	61	71
1814	Syr.Loc.Large	134	90	63	50	55	58	141	63	82
1816	Lebanese Small	114	80	60	51	51	51	95	60	70
1817	Lebanese Large	121	100	62	51	54	49	123	63	78
1818	Jordan Local	105	70	58	46	49	49	87	47	64
1819	Giza 3	119	90	67	53	50	51	121	65	77
1820	Giza 4	123	80	65	59	46	55	119	63	76
1821	Turkish Local	125	100	69	61	56	56	129	62	82
1822	Violette di Policoro	119	75	64	54	51	50	118	54	73
	Location mean	120	84	62	53	50	53	115	60	

Table 4.1.5. Seed yield (Y = kg/ha) and rank (R) of entries in the FBAT at different locations during 1981/82.

ENTRY		EGYPT Sids		IRAN Tehran		LEBANON Terbol		SPAIN Cordoba		SPAIN Madrid		SUDAN Hudeiba		SYRIA - TH Irrigated		SYRIA - TH Rainfed		TURKEY Ankara		TUNISIA Beja		TUNISIA El-Kef		U.S.A. Pullman		MEAN	
ILB	Selection	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
ILB 460	Hudeiba 72	6070	2	4180	11	2236	8	3272	11	1403	12	2418	1	1231	10	532	12	1568	7	657	10	655	12	1665	3	2157	9
1266	Aquadulce	4104	9	5568	4	2583	2	4761	1	1850	9	303	8	1463	7	1167	9	1765	1	1178	3	2646	3	1528	4	2410	6
1269	New Mammoth	5417	6	5911	1	2139	9	4420	5	2173	2	713	6	1639	6	1440	5	1700	5	2164	1	3099	1	700	11	2626	1
1811	Syr.Loc.Small	5660	4	4250	10	2287	6	3690	9	1784	11	931	4	1185	11	1245	7	1535	7	316	12	1184	11	1455	8	2127	10
1814	Syr.Loc.Large	3806	11	5305	5	2856	1	4509	3	2091	5	77	12	2181	1	1611	2	1627	2	845	9	2450	4	905	5	2355	7
1816	Lebanese S.	4049	10	4805	8	2259	7	3594	10	1981	7	224	9	1782	4	1375	6	1223	6	1042	5	1701	7	1268	8	2109	11
1817	Lebanese L.	5431	5	5664	3	1995	10	4140	7	2064	6	195	10	1463	7	1827	1	1592	1	1002	7	2244	5	1511	5	2427	5
1818	Jordan Local	3792	12	4109	12	1458	12	2970	12	1803	10	557	7	1259	9	1042	11	1485	11	529	11	1566	9	642	12	1768	12
1819	Giza 3	6872	1	5039	7	2528	3	4260	6	2128	4	1184	2	1171	12	1444	4	1629	4	960	8	1599	8	2227	1	2587	2
1820	Giza 4	4993	7	4802	9	2384	5	3732	8	1952	8	1084	3	1750	5	1065	10	1409	10	1037	6	1353	10	1852	2	2284	8
1821	Turkish Local	4486	8	5885	2	2398	4	4480	4	2130	3	130	11	2181	1	1583	3	1732	3	1065	4	1987	6	1479	6	2461	4
1822	Violette di Policoro	5792	3	5143	6	1648	11	4620	2	2198	1	908	5	1921	3	1231	8	1375	8	1254	2	2880	2	1144	9	2510	3
Location mean		5039		5055		2231		4038		1963		727		1602		1297		1553		1004		1947		1365			
C.V.%		28.0		3.3		19.8		8.4		32.5		33.9		26.6		21.3		12.1		25.5		22.9		43.1			
S.E.± entry		705.7		234.2		221.3		170.1		319.1		123.4		212.9		138.2		93.0		192.2		324.7		294.2			

Table 4.1.6. Average seed yield (Y = kg/ha) and rank (R) of entries in the FBAT over several locations for one, two, three and four years period (1978 to 1982).

ENTRY			One year								Two years (18)*		Three years (27)*		Four years (39)*	
			1978 / 79 (7)*		1979 / 80 (11)*		1980 / 81 (9)*		1981 - 82 (12)*		1978 - 80		1978 - 81		1978 - 82	
ILB		Selection	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
ILB	460	Hudeiba 72	-	-	894	11	1863	12	2157	9	-	-	1330	12	1640	12
	1266	Aquadulce	2238	5	2630	3	2633	4	2410	6	2478	2	2529	3	2493	3
	1269	New Mammoth	-	-	-	-	3087	1	2626	1	-	-	3087	1	2824	1
	1811	Syrian L.S.	2129	6	1887	10	2544	6	2127	10	1981	9	2169	8	2156	9
	1814	Syrian L.L.	1507	8	2313	5	2536	7	2355	7	2000	8	2178	7	2235	7
	1816	Lebanese L.S.	2259	3	1950	9	2185	10	2109	11	2070	5	2108	9	2109	10
	1817	Lebanese L.L.	2245	4	2670	2	2499	8	2427	5	2505	1	2503	4	2479	4
	1818	Jordan Local	2117	7	1997	7	2221	9	1768	12	2044	6	2103	10	2000	11
	1819	Giza 3	2523	1	1991	8	2628	5	2587	2	2198	4	2341	6	2417	5
	1820	Giza 4	2483	2	2074	6	2638	3	2284	8	2233	3	2368	5	2342	6
	1821	Turkish Local	1295	9	2506	4	2161	11	2461	4	2035	7	2077	11	2195	8
	1822	Violette di Policoro	-	-	2751	1	2930	2	2510	3	-	-	2832	2	2711	2

* No. of locations reported.

Table 4.1.7. Mean seed yield (Y = kg/ha) and rank (R) of entries in the FBAT at different locations for two years (1980-82).

ENTRY		EGYPT Sids		LEBANON Terbol		SPAIN Cordoba		SYRIA-TH Irrig.		SYRIA-TH Rainf.		MEAN	
ILB	Selection	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
ILB 460	Hudeiba 72	5440	6	1908	12	2264	11	1550	12	752	12	2383	12
1266	Aquadulce	4084	9	2620	3	3609	4	2834	6	1912	5	3012	6
1269	New Mammoth	5447	5	2447	6	3709	2	3279	2	2011	3	3379	1
1811	Syrian L.S.	4983	2	2128	10	2835	7	2023	11	1373	11	2868	9
1814	Syrian L.L	3959	10	2764	1	3747	1	3457	2	2287	1	3243	3
1816	Lebanese L.S.	3893	11	2412	7	2302	10	2959	4	1803	6	2673	10
1817	Lebanese L.L.	5244	7	2454	5	3375	5	2739	8	2073	2	3177	4
1818	Jordan Local	4485	8	1972	11	1899	12	2245	10	1667	9	2454	11
1819	Giza 3	6328	1	2530	4	2812	8	2272	9	1718	8	3132	5
1820	Giza 4	5452	4	2377	8	2676	9	2785	7	1637	10	2985	7
1821	Turkish Local	3686	12	2676	2	3123	6	2903	5	1982	4	2874	8
1822	Violette di Policoro	5822	3	2199	9	3629	3	2981	3	1766	7	3279	2

Table 4.1.8. Correlations (df = 10) among different locations for seed yield in the FBAT during 1981/82.

LOCATION	IRAN Tehran	LEBANON Terbol	SPAIN Cordoba	SPAIN Madrid	SUDAN Hudeiba	SYRIA Tel Hadya irrigated	SYRIA Tel Hadya Rainfed	TURKEY Ankara	TUNISIA Beja	TUNISIA El-Kef	U.S.A. Pullman
EGYPT - Sids	-0.09	-0.06	0.05	-0.02	0.67*	-0.47	-0.14	0.06	0.06	-0.22	0.57
IRAN - Tehran		0.30	0.85**	0.72**	-0.57	0.55	0.71**	0.53	0.74**	0.78**	-0.06
LEBANON - Terbol			0.42	0.05	-0.11	0.25	0.21	0.41	0.02	-0.04	0.42
SPAIN - Cordoba				0.68*	0.43	0.51	0.57	0.50	0.57	0.79**	0.06
" - Madrid					0.63*	0.57	0.81**	0.06	0.58*	0.74**	-0.15
SUDAN - Hudeiba						-0.53	-0.79**	-0.10	-0.20	-0.59*	0.39
SYRIA - TH-Irrig.							0.43	-0.04	0.35	0.49	-0.30
" - TH-Rainf.								0.22	0.30	0.56	-0.11
TURKEY - Ankara									0.23	0.29	0.06
TUNISIA - Beja										0.75**	-0.24
" - El-Kef											-0.48

* $P \leq 0.05$, ** $P \leq 0.01$.

Table 4.1.9. Correlations (df = 10) among different locations for seed yield in the FBAT during 1980-82.

LOCATION	LEBANON Terbol	SPAIN Cordoba	SYRIA Tel Hadya	
			Irrigated	Rainfed
EGYPT-Sids	-0.44	- 0.02	-0.44	-0.44
LEBANON-Terbol		0.65*	0.74**	0.81**
SPAIN- Cordoba			0.69*	0.64*
SYRIA- TH-Irrigated				0.89**

* $P \leq 0.05$, ** $P \leq 0.01$.

Table 4.1.10. Correlations among three agronomic characters and seed yield for entries in the FBAT across different locations during 1981/82.

Trait	Time to maturity	Plant height	Seed yield
Time to flowering	0.88**(1)	-0.38**(3)	0.01(1)
Time to maturity		0.05(3)	0.29**(1)
Plant height			0.49**(2)

** P ≤ 0.01, (1) df = 118, (2) df = 94, (3) df = 82.

4.2. FABA BEAN INTERNATIONAL YIELD TRIAL LARGE-SEEDED (FBIYT-L)

Material

The Faba Bean International Yield Trial Large-seeded (FBIYT-L) comprised 16 entries consisting of eleven elite lines from ICARDA advanced yield tests, four released cultivars and one local check (to be added by the cooperator). The material of the trial could be used by the cooperator either directly and/or indirectly.

Methods and Management

The trial design was a 4x4 lattice, although the results have been anyalysed as a randomized complete block. The recommended plot size was four rows, each 4 m long, with inter-and intra row spacing of 0.50 - and 0.10 m, respectively. Nine sets of the trial were distributed to cooperators in 7 countries. The results were returned from 6 locations from four countries. The details with respect to agronomic practices were received from some locations and are given in Table 4.2.1.

Results and Discussion

The data on time to flowering, time to maturity and plant height are presented in Tables 4.2.2.,4.2.3. and 4.2.4. respectively. Flowering was earlier in Syria(Tel Hadya-both irrigated and rainfed) than in Lebanon (Terbol) with a difference of eight to nine days. Over-all locations the entries Elegant 5MCI (ILB 1805) and New Mammoth (ILB 1269) were the earliest to flower with 108 days, while the entry Syrian Local Large was the latest (114 days). At different locations, however, 78S 49694 (ILB 605) was the earliest to flower in Syria (103 days) and 76TA 56246(ILB 398) was the latest in Lebanon (121 days). For time to maturity the location mean ranged from 171 days at Tel Hadya (rainfed) in Syria to 192 days at Terbol in Lebanon. However, the differences between the sixteen test entries for days to maturity overall locations was only two days. Plant height varied

from 54 cm on average at Tel Hadya (rainfed) in Syria to 116 cm at Beja in Tunisia. 78S 49907 (ILB 10) was the shortest (49 cm) at Tel Hadya (rainfed) in Syria and Syrian Local Large (ILB 1814) was the tallest (134 cm) at Beja in Tunisia. Overall locations, Sevilla Giant (ILB 1270) was the shortest(69 cm) and the Syrian Local Large (ILB 1814) the tallest (80 cm) cultivar.

Mean seed yield and rank of entries at different locations are given in Table 4.2.5., and the five heavist yielding genotypes at each location are listed in Table 4.2.6. The location means varied greatly with the extremes represented by 785 kg/ha at Beja in Tunisia and 3182 kg/ha at Terbol in Lebanon. The low performance of the test genotypes at Beja in Tunisia could be due to the unadaptation and/or the poor environment . None of the test entries significantly outyielded the local check at any location. The precision of the trials varied considerably from a coefficient of variation of 13.7% at Terbol in Lebanon to 68.0% at Beja in Tunisia. Over-all locations, the entry 76TA 56246 (ILB 398) had the highest seed yield (2289 kg/ha) and the entry Sevilla Giant (ILB 1270) had the lowest (1682 kg/ha). Among the five heaviest yielding genotypes at each location (Table 4.2.6) the entry 76TA 56246 (ILB 398) appeared more frequently (4 times) than any other entry. The two entries, Lebanese Local Large (ILB 1817) and 74TA 63 (ILB 24) ranked 2nd and 3rd in seed yield, respectively (Table 4.2.5.), although they appeared only two times in Table 4.2.6.

Indeed the high yield of the local checks in all locations indicates the difficulty in selecting genotypes superior to the locally grown cultivars. Mean seed yield and rank of entries at different locations for two years (1980/81 and 1981/82) are given in Table 4.2.7. The two entries Elegant 5MCI and 74TA 63 ranked 1st and 2nd in seed yield, respectively. These two genotypes and others which have performed well at each individual location could be of practical value in national breeding programs.

Correlations among different locations for 1981/82 and during two years 1980/81 and 1981/82 for seed yield are given in Tables 4.2.8. and 4.2.9. respectively. The unadaptation of the tested genotypes across environments may account for the low and non-significant correlations obtained except between Tel Hadya (irrigated) in Syria and Douyet in Morocco in 1981/82 (Table 4.2.8). Correlations among three agronomic characters and seed yield based on mean values of each environment during 1981/82 are shown in Table 4.2.10. These results clearly show that seed yield correlated positively and significantly with time to flowering, time to maturity and plant height . Also the correlations among all the three agronomic characters viz, time to flowering, time to maturtiy and plant height were positive and significant.

Table 4.2.1. Agronomic data for different locations for the FBIYT-L during 1981/82.

Country	Location	Planting date	Crop[1] duration (days)	Fertilizer kg/ha		
				N	P_2O_5	K_2O
LEBANON	Terbol	3-12-1981	192		50	
MOROCCO	Douyet	3-12-1981	NR	30	60	70
SYRIA	TH-Irrigated	21-11-1981	177		50	
	TH-Rainfed	21-11-1981	171		50	

(1) Days from planting to maturity.
NR= Not reported.

Table 4.2.2: Time to flowering (days) for entries in the FBIYT-L at different locations during 1981/82.

ENTRY		Selection	ORIGIN	LEBANON	SYRIA		MEAN
				Terbol	Tel Hadya		
ILB					Irrig.	Rainf.	
ILB	10	78S 49907	Jordan	118	109	110	112
	12	74TA 12	Syria	116	105	105	109
	17	78S 49044	Syria	116	106	106	109
	22	74TA 59	Syria	118	107	106	110
	24	74TA 63	Iraq	116	107	108	110
	34	78S 49841	Iraq	116	106	107	110
	398	76TA 56246	Tunisia	121	108	111	113
	605	78S 49694	Canada	118	103	105	109
	1269	New Mammoth	U.K.	110	107	107	108
	1270	Sevilla Giant	U.K.	113	111	113	112
	1799	39 MB	Syria	116	105	105	109
	1805	Elegant 5 MCI	Syria	115	104	106	108
	1814	Syr. Loc. Large	Syria	120	108	113	114
	1817	Lebanese Loc. Large	Lebanon	113	106	107	109
	1817	76TA 56809	Lebanon	118	106	107	110
		Local check	-	113	110	113	-
		Location mean		116	107	108	

Table 4.2.3. Time to maturity (days) for entries in the FBIYT-L at different locations during 1981/82.

ENTRY			LEBANON	SYRIA		MEAN
			Terbol	Tel Hadya		
ILB		Selection		Irrig.	Rainf.	
ILB	10	78S 49907	193	178	171	181
	12	74TA 12	192	178	171	180
	17	78S 49044	193	176	171	180
	22	74TA 59	192	180	171	181
	24	74TA 63	193	176	172	180
	34	78S 49841	193	177	172	181
	398	76TA 56246	193	177	171	180
	605	78S 49694	193	178	171	181
	1269	New Mammoth	191	175	171	179
	1270	Sevilla Giant	191	175	170	179
	1799	39 MB	191	177	171	180
	1805	Elegant 5 MCI	191	176	172	180
	1814	Syr.Loc. Large	193	178	171	181
	1817	Lebanese Loc. Large	191	177	171	180
	1817	76TA 56809	193	176	171	180
		Local check	193	178	172	-
		Location mean	192	177	171	

Table 4.2.4. Plant height (cm) of entries in the FBIYT-L at different locations during 1981/82.

ENTRY			LEBANON	SYRIA		TUNISIA	MEAN
			Terbol	Tel Hadya		Beja	
ILB		Selection		Irrig.	Rainf.		
ILB	10	78S 49907	73	56	49	121	75
	12	74TA 12	71	64	55	117	77
	17	78S 49044	68	58	59	119	76
	22	74TA 59	67	62	54	121	76
	24	74TA 63	74	58	54	107	73
	34	78S 49841	69	62	56	114	75
	398	76TA 56246	69	64	56	124	78
	605	78S 49694	69	58	53	119	75
	1269	New Mammoth	67	58	55	118	75
	1270	Sevilla Giant	68	55	50	101	69
	1799	39 MB	70	54	50	108	71
	1805	Elegant 5 MCI	67	53	54	108	71
	1814	Syr. Loc. Large	69	61	55	134	80
	1817	Lebanese Loc. Large	73	59	58	115	76
	1817	76TA 56809	74	54	53	111	73
		Local check	74	63	55	-	-
		Location mean	70	59	54	116	

Table 4.2.5. Seed yield (Y = kg/ha) and rank (R) of entries in the FBIYT-L at different locations during 1981/82.

ENTRY			LEBANON Terbol		MOROCCO Douyet		SYRIA Tel Hadya				TUNISIA				MEAN	
							Irrigated		Rainfed		Beja		El-Kef			
ILB		Selection	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
ILB	10	78S 49907	3481	3	3188	6	1963	13	1852	9	292	16	1620	7	2066	10
	12	74TA 12	3167	9	3313	5	2593	2	1685	14	391	12	1624	6	2129	7
	17	78S 49044	3398	5	3531	2	2648	1	1926	6	604	8	1147	15	2209	4
	22	74TA 59	3194	7	3125	8	2519	6	1833	10	545	11	632	16	1975	14
	24	74TA 63	3061	11	3563	1	2481	7	1711	13	308	15	2303	1	2238	3
	34	78S 49841	3292	6	2750	13	1907	14	1593	15	736	7	1994	5	2045	12
	398	76TA 56246	3574	1	3188	6	2537	4	1981	3	1173	4	1279	14	2289	1
	605	78S 49694	3005	12	2969	11	2222	11	2037	1	962	6	1312	12	2085	9
	1269	New Mammoth	2981	14	2219	15	2259	10	1785	11	1593	1	2023	4	2143	6
	1270	Sevilla Giant	3169	8	2031	16	1444	16	1494	16	373	14	1581	8	1682	15
	1799	39 MB	2769	15	3344	4	2167	12	1870	8	1169	5	1281	13	2100	8
	1805	Elegant 5 MCI	3537	2	3094	9	1870	15	2000	2	583	10	2047	3	2189	5
	1814	Syr. Loc. Large	2769	15	2750	13	2593	2	1981	3	391	12	1503	11	1998	13
	1817	Lebanese Loc. Large	3106	10	2875	12	2444	8	1863	5	1553	2	1571	9	2252	2
	1817	76TA 56809	2991	13	3063	10	2278	9	1889	7	603	9	1506	10	2055	11
		Local check	3417	4	3438	3	2537	4	1778	12	1280	3	2068	2		
		Location mean	3182		3027		2279		1836		785		1593			
		C.V.%	13.7		18.0		21.1		15.3		68.0		37.6			
		L.S.D. 5%	622.1		776.8		686.0		400.8		1093.7		1215.3			
		No. of entries significantly exceeding local check	0		0		0		0		0		0			

Table 4.2.6. The five heaviest seed yielding entries at the individual locations in the FBIYT-L during 1981/ 82:

RANK	LEBANON Terbol		MOROCCO Douyet		SYRIA Tel Hadya				TUNISIA			
					Irrigated		Rainfed		Beja		El-Kef	
	Selection	ILB	Selection	ILB	Selection	ILB	Selection	ILB	Selection	ILB	Selection	ILB
1	76TA 56246	398	74TA 63	24	78S 49044	17	78S 49694	605	New Mammoth	1269	74TA 63	24
2	Elegant 5MCI	1805	78S 49044	17	74TA	12*	Elegant 5 MCI	1805	Leb. L. L.	1817	Local check	-
3	78S 49907	10	Local check		Syr.L.L.	1814	76TA 56246	398	Local check	-	Elegant 5MCI	1805
4	Local check		39 MB	1799	76TA 56246	398	Syr. L.L.	1814	76TA 56246	398	New Mammoth	1269
5	78S 49044	17	74TA 12	12	Local check		Leb. L.L.	1817	39 MB	1799	78S 49841	34

* The brackets indicate entries having the same rank.

Table 4.2.7. Mean seed yield (Y=kg/ha) and rank(R) of entries in the FBIYT-L at different locations over two years(1980 through 1982).

ENTRY			LEBANON Terbol		SYRIA Tel Hadya				MEAN	
					Irrigated		Rainfed			
ILB		Selection	Y	R	Y	R	Y	R	Y	R
ILB	22	74TA 59	3320	3	3860	3	3160	6	3450	3
	24	74TA 63	3420	2	3930	1	3310	2	3550	2
	1269	New Mammoth	2860	8	3430	7	2160	8	2820	8
	1270	Sevilla Giant	3180	5	3350	8	3190	5	3240	7
	1799	39 MB	2940	7	3630	6	3260	4	3280	6
	1805	Elegant 5 MCI	3600	1	3910	2	3310	3	3610	1
	1814	Syr. Loc. Large	2980	6	3850	4	3340	1	3390	5
	1817	Lebanese Loc.Large	3300	4	3820	5	3070	7	3400	4

Table 4.2.8. Correlations (df = 13) among different locations for seed yield in the FBIYT-L during 1981/82.

LOCATION	MOROCCO Douyet	SYRIA Tel Hadya		TUNISIA	
		Irrigated	Rainfed	Beja	El-Kef
LEBANON- Terbol	0.21	-0.17	0.03	-0.17	0.03
MOROCCO- Douyet		0.57*	0.38	-0.25	-0.18
SYRIA-TH-Irrigated			0.47	0.13	-0.33
TH-Rainfed				0.32	-0.32
TUNISIA-Beja					-0.03

* $P < 0.05$

Table 4.2.9. Correlations(df = 6) among different locations for seed yield in the FBIYT-L during two years 1980-82.

LOCATION	SYRIA Tel Hadya	
	Irrigated	Rainfed
LEBANON- Terbol	0.61	0.51
SYRIA-TH-Irrigated		0.56

Table 4.2.10. Correlations (df = 43) among three agronomic characters and seed yield for entries in the FBIYT-L during 1981/82.

Trait	Time to maturity	Plant height	Seed yield
Time to flowering	0.81**	0.74**	0.70**
Time to maturity		0.93**	0.92**
Plant height			0.88**

** $P \leq 0.01$

4.3. FABA BEAN INTERNATIONAL YIELD TRIAL SMALL-SEEDED (FBIYT-S)

Material

The Faba Bean International Yield Trial-Small seeded (FBIYT-S) comprised 15 test entries, 9 of them performed well in the same trial last year and 6 were among the heaviest yielding entries in the International Screening Nursery Small seeded (FBISN-S) in 1980/81. One local check was added by the cooperator to make a total of 16 entries. The test entries originated from 7 different countries.

Methods and Management

The trial was 4x4 lattice with four replicates. The recommended plot size was four rows, each 4 m long, with inter-and intra row spacings of 0.50-and 0.10 m, respectively. Nine sets of the trial were distributed to cooperators in five countries. Results were reported from six trials covering four countries. Agronomic data furnished by cooperators are given in Table 4.3.1.

Results and Discussion

The data on time to flowering and maturity, and plant height for some of the locations reported are presented in Tables 4.3.2, 4.3.3, and 4.3.4, respectively. Overall entries, mean time to flower was 52 days (earliest) at Hudeiba in Sudan and 116 days(latest) at Terbol in Lebanon. Overall locations, the entry, 76TA69035(83 days) was the earliest, and the entry Syrian Local Short podded was the latest (91 days). Data on maturity showed small differences between the test entries (164-167 days). Overall entries, the two extreme locations were Hudeiba in Sudan with 134 days and Terbol in Lebanon with 191 days. Mean plant height was shortest at Tel Hadya (rainfed) in Syria (54 cm) and tallest at Sids in Egypt (125 cm). The overall mean for plant height across locations varied from 71 cm for 78S 48821 to 79 cm for 77TA 88118 Syrian Local Short podded.

The seed yield and rank of entries for each locations are given in Table 4.3.5, and the five heaviest seed yielding entries at each location are listed in Table 4.3.6. The highest mean seed yield of the entries was at Gimmeza in Egypt (4790 kg/ha), and the lowest was at Hudeiba in Sudan (547 kg/ha). Over-all locations, the entry Giza 4 (ILB 1820) had the highest seed yield (3098 kg/ha), and the entry Syrian Local (ILC 1812) had the lowest seed yield(2392 kg/ha). However, specific adaptation is shown with Giza 4, since it ranked 2nd in Egypt (both sites) and Sudan, while it ranked 15th in Syria (both sites) and 11th at Terbol in Lebanon. On the other hand, Syrian Local (ILB 1812) ranked 16th at all Egyptian and Sudanese sites but ranked 2nd, 4th and 6th at the two Syrian and Lebanese sites respectively. The reason for the low overall mean for ILB 1812, is that the West Asian sites had a lower mean than that of the Nile Valley sites. The coefficient of variation for seed yield was high at Hudeiba in Sudan (44.3%), whereas the other sites showed a reasonable range (12-27.6%). The three entries, 75TA 26062 (ILB 29), 74TA 133 (ILB 49), and 74TA 22 (ILB 9) also gave high seed yields and ranked 2nd , 3rd and 4th respectively (Table 4.3.5.). The entry 75TA 26062 (ILB 29) appeared more frequently (5 times) in Table 4.3.6. than any other genotype . This would suggest that the entry 75TA 26062 (ILB 29) may possess genes for high yield potential and/or wide adaptation. Also the entry 74TA133 (ILB 49) showed a good range of adaptation in addition to its excellent overall yield ranking.

A least significant difference was calculated to indicate the genotypes which significantly exceeded the local check (Table 4.3.5.). In Egypt and Sudan the local checks yielded higher than all the other entries included in the trial. In Lebanon the local check ranked 2nd but the difference was not significant. However, at Tel Hadya in Syria, under both irrigated and rainfed conditions, there were entries that significantly surpassed the local check. Mean seed yield and rank of entries at different locations over two years (1980/81 and 1981/82) are summarized in Table 4.3.7. The results show that the local check in both Egypt and Lebanon yielded higher than all the test entries ,while in Syria (both sites) most of the test entries yielded better than the local check.

Across locations the entry 75TA 26062 (ILB 29) ranked first in seed yield and was followed by 74TA 22 (ILB 9). The entry 75TA 26062 ranked second (Table 4.3.5) and first (Table 4.3.7) in seed yield over-all locations for one year (1980/81) and over two years (1979/80 and 1980/81). Therefore, 75 TA 26062 (ILB 29)might be considered as a source population to breed for wide adaptation.

Correlations among different locations for one year (1981/82) and over two years (1980/81 and 1981/82) for seed yield are given in Tables 4.3.8. and 4.3.9. The results of 1981/82 demonstrate negative correlations between Sudan and the West Asian countries (Syria and Lebanon). On the other hand, the only positive and significant association was between Sids in Egypt and Hudeiba in Sudan. These results may suggest that breeding materials developed in Egypt will have a good chance to do well in Sudan. Correlations among three agronomic characters and seed yield at different locations for 1981/82. are shown in Table 4.3.10. Time to maturity correlated positively and significantly with time to flowering (0.92) and also with seed yield (0.26). Plant height correlated positively and significanlty with seed yield (0.84), but negatively with time to flowering (-0.95) and with time to maturity (-0.67).

Table 4.3.1. Agronomic data for different locations for the FBIYT-S during 1981/ 82.

Country	Location	Planting date	Crop duration (days)[1]	Fertilizer kg/ha N	P_2O_5	K_2O	Irrig.	Herb.	Insec.
EGYPT	Gimmeza	26-11-1981	156	37.5	75		4		
	Sids	10-11-1981	159	37.5	75		5	Igran	
LEBANON	Terbol	3-12-1981	191		50				
SUDAN	Hudeiba	4-11-1981	134	-	-	-	10		
SYRIA	TH-Irrig.	22-11-1981	177		50				
	TH-Rainf.	22-11-1981	171		50				

(1) Days from planting to maturity.

Table 4.3.2. Time to flowering (days) for entries in the FBIYT-S at different locations during 1981/82.

ENTRY			ORIGIN	EGYPT		LEBANON	SUDAN	SYRIA		MEAN
				Gimmeza	Sids	Terbol	Hudeiba	Tel Hadya		
ILB		Selection						Irrigated	Rainfed	
ILB	9	74TA 22	China	67	69	118	53	113	109	88
	29	75TA 26062	Iraq	68	65	115	50	106	108	85
	30	74TA 85	Iraq	68	66	114	52	111	109	87
	31	74TA 87	Iraq	69	66	115	49	106	106	85
	32	75TA 26083	Iraq	69	69	115	50	108	108	87
	49	74TA 133	U.K.	69	69	118	52	110	111	88
	269	78S 48821	Spain	69	69	115	57	113	111	89
	277	76TA 69035	Lebanon	65	60	113	50	104	106	83
	285	77TA 88118	Lebanon	68	65	115	49	104	104	84
	287	77MS 88323	Lebanon	69	65	116	53	104	105	85
	407	78S 49395	Lebanon	70	71	115	53	107	113	88
	1812	Syr.Loc.Short-pod	Syria	71	71	119	58	113	112	91
	1817	76TA 56267	Lebanon	69	70	116	54	109	109	88
	1817	78S 49892	Lebanon	66	63	116	56	106	106	86
	1820	Giza 4	Egypt	65	60	115	48	109	108	84
		Local check		65	51	114	47	104	107	
		Location mean		68	66	116	52	108	108	

Table 4.3.3. Time to maturity (days) for entries in the FBIYT-S at different locations during 1981/82.

ENTRY			EGYPT		LEBANON	SUDAN	SYRIA		MEAN
			Gimmeza	Sids	Terbol	Hudeiba	Tel Hadya		
ILB		Selection					Irrigated	Rainfed	
ILB	9	74TA 22	156	160	190	133	175	171	164
	29	75TA 26062	161	159	192	134	179	172	166
	30	74TA 85	158	160	192	134	177	172	166
	31	74TA 87	158	161	190	134	176	171	165
	32	75TA 26083	155	158	192	135	177	171	165
	49	74TA 133	155	161	192	134	178	172	165
	269	78S 48821	154	158	190	135	177	171	164
	277	76TA 69035	154	160	192	134	176	171	165
	285	77TA 88118	155	155	190	133	179	171	164
	287	77MS 88323	151	159	190	134	178	173	164
	407	78S 49395	159	161	190	133	175	171	165
	1812	Syr.Loc.Short pod	159	163	193	136	177	171	167
	1817	76TA 56267	157	160	191	135	175	171	165
	1817	78S 49892	158	160	192	135	178	171	166
	1820	Giza 4	155	160	190	133	176	171	164
		Local check	154	156	193	124	176	171	
		Location mean	156	159	191	134	177	171	

Table 4.3.4. Plant height (cm) of entries in the FBIYT-S at different locations during 1981/82.

ENTRY			EGYPT	LEBANON	SYRIA		MEAN
			Sids	Terbol	Tel Hadya		
ILB		Selection			Irrigated	Rainfed	
ILB	9	74TA 22	128	64	57	60	77
	29	75TA 26062	121	63	61	59	76
	30	74TA 85	129	66	56	53	76
	31	74TA 87	115	66	54	54	72
	32	75TA 26083	125	66	64	56	78
	49	74TA 133	130	65	56	55	77
	269	78S 48821	120	56	53	54	71
	277	76TA 69035	125	68	61	54	77
	285	77TA 88118	135	66	60	54	79
	287	77MS 88323	133	66	58	51	77
	407	78S 49395	115	68	59	49	73
	1812	Syr.Loc.Short-pod	125	66	69	54	79
	1817	76TA 56267	119	66	62	55	76
	1817	78S 49892	135	66	59	53	78
	1820	Giza 4	129	60	61	46	74
		Local check	120	68	53	49	
		Location mean	125	65	59	54	

Table 4.3.5. Seed yield (Y= kg/ha) and rank (R) of entries in the FBIYT-S at different locations during 1981/82.

ENTRY			EGYPT				LEBANON		SUDAN		SYRIA				MEAN	
			Gimmeza		Sids		Terbol		Hudeiba		Tel Hadya					
											Irrigated		Rainfed			
ILB		Selection	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
ILB	9	74TA 22	5007	6	4986	5	3106	7	170	15	3093	1	1612	7	2996	4
	29	75TA 26062	5215	4	4903	6	3319	5	531	4	2847	3	1674	3	3082	2
	30	74TA 85	4771	10	5163	4	2931	9	462	8	2685	5	1579	8	2932	7
	31	74TA 87	4361	13	4118	11	2981	8	404	11	2843	4	1759	1	2744	8
	32	75TA 26083	4785	9	3441	14	2856	13	386	12	2481	10	1648	4	2600	11
	49	74TA 133	5299	3	4597	9	3769	1	512	5	2671	6	1421	12	3045	3
	269	78S 48821	3535	15	4854	7	2532	16	471	7	2171	13	1537	10	2517	14
	277	76TA 69035	4986	7	3511	13	2769	14	475	6	2204	12	1288	16	2539	12
	285	77TA 88118	4941	8	4774	8	3546	4	639	3	2556	8	1509	11	2994	5
	287	77MS 88323	4257	14	4431	10	2736	15	434	9	2519	9	1639	6	2669	9
	407	78S 49395	4604	12	3167	15	2917	10	312	13	2583	7	1574	9	2526	13
	1812	Syr.Loc.Short-pod	3347	16	2955	16	3269	6	75	16	3060	2	1648	4	2392	15
	1817	76TA 56267	4747	11	4097	12	2870	12	241	14	2292	11	1681	2	2655	10
	1817	78S 49892	5184	5	5240	3	3602	3	432	10	2093	14	1380	13	2989	6
	1820	Giza 4	5330	2	5889	2	2894	11	1205	2	1972	15	1296	15	3098	1
		local check	6268	1	6424	1	3606	2	2009	1	1468	16	1301	14		
		Location mean	4790		4534		3107		547		2471		1534			
		C.V.%	12.0		27.6		16.7		44.3		16.8		17.9			
		L.S.D.5%	818.6		1784.0		737.8		345.0		590.3		137.3			
		No. of entries significantly exceeding local check	0		0		0		0		14		11			

Table 4.3.6. The five heaviest seed yielding entries at the individual locations in the FBIYT-S during 1981/82.

RANK	EGYPT				LEBANON		SUDAN		SYRIA			
	Gimmeza		Sids		Terbol		Hudeiba		Tel Hadya			
									Irrigated		Rainfed	
	Selection	ILB	Selection	ILB	Selection	ILB	Selection	ILB	Selection	ILB	Selection	ILB
1	Local check		Local check		74TA 133	49	Local check	-	74TA 22	9	74TA 87	31
2	Giza 4	1820	Giza 4	1820	Local check	-	Giza 4	1820	Syr.L.S.P.	1812	76TA 56267	1817
3	74TA 133	49	78S 49892	1817	78S 49892	1817	77TA 88118	285	75TA 26062	29	75TA 26062	29
4	75TA 26062	29	74TA 85	30	77TA 88118	285	75TA 26062	29	74TA 87	31	75TA 26083	32*
5	78S 49892	1817	74TA 22	9	75TA 26062	29	74TA 133	49	74TA 85	30	Syr.L.S.P.	1812*

* The bracket indicate entries having the same rank.

Table 4.3.7. Mean seed yield (Y = kg/ha) and rank (R) of entries in the FBIYT-S at different locations over two years 1980/81 1981/82.

ENTRY			EGYPT Sids		LEBANON Terbol		SYRIA Tel Hadya Irrigated		SYRIA Tel Hadya Rainfed		MEAN	
ILB		Selection	Y	R	Y	R	Y	R	Y	R	Y	R
ILB	9	74TA 22	4820	2	3690	2	3800	4	2570	4	3720	2
	29	75TA 26062	4970	1	3550	3	3850	3	2780	2	3790	1
	30	74TA 85	4670	3	3290	7	3690	7	2570	5	3560	6
	31	74TA 87	4140	8	3490	4	3880	2	2790	1	3580	5
	49	74TA 133	4640	4	3750	1	3770	6	2460	6	3660	3
	269	78S 48821	4290	7	3110	9	3440	8	2390	8	3310	8
	287	77MS 88323	4620	5	3460	5	3790	5	2610	3	3620	4
	1812	Syr.Loc. hort pod	3430	9	3280	8	3990	1	2430	7	3280	9
	1817	78S 49892	4610	6	3320	6	3140	9	2360	9	3360	7
		Local check	6190		3958		3099		2408			

Table 4.3.8. Correlations (df = 13) among locations for seed yield of entries in the FBIYT-S during 1981/82.

LOCATION	EGYPT Sids	LEBANON Terbol	SUDAN Hudeiba	SYRIA Tel Hadya Irrig.	SYRIA Tel Hadya Rainfed
EGYPT- Gimmeza	0.47	0.42	0.48	-0.22	-0.44
- Sids		0.18	0.64**	-0.30	-0.34
LEBANON-Terbol			-0.01	0.28	-0.17
SUDAN-Hudeiba				-0.59*	-0.59*
SYRIA-TH-Irrigated					0.65**

* $P \leq 0.05$, ** $P \leq 0.01$.

Table 4.3.9. Correlation (df = 7) among different locations for seed yield in the FBIYT-S during two years (1980-82).

LOCATION	LEBANON Terbol	SYRIA Tel Hadya	
		Irrigated	Rainfed
EGYPT - Sids	0.47	-0.27	0.29
LEBANON - Terbol		0.42	0.41
SYRIA -TH - Irrigated			0.58

Table 4.3.10. Correlations among three agronomic characters and seed yield at different locations in the FBIYT-S during 1981/82.

Trait	Time to maturity	Plant height	Seed yield
Time to flowering	0.92^{**} (1)	-0.95^{**} (2)	-0.06 (1)
Time to maturity		-0.67^{**} (2)	0.26^{*} (1)
Plant height			0.84^{**} (2)

* $P \leq 0.05$

** $P \leq 0.01$, (1) df = 88, (2) df = 58

4.4. FABA BEAN INTERNATIONAL SCREENING NURSERY LARGE-SEEDED (FBISN-L)

Material

The Faba Bean International Screening Nursery Large-seeded (FBISN-L) comprised 36 entries, originated from a large number of countries, and two check entries, one of them was provided (Syr.L.L.) and the second to be supplied by the local cooperator. Entries were selected from performance in a number of yield trials in the ICARDA region, from released commerical cultivars, and others chosen from last year's nursery. Cooperators were free to select between and/or within entries for genetic material that could be used for their own research and/or practical breeding program.

Methods and Management

The thirty-six entries were planted in a single non-replicated row of 4 m length, with two check genotypes planted after every 10 test entries to allow some assessment of the environmental variation. The recommended inter - and intra row spacing was 0.50 and 0.01 m, respectively. Thirty five sets of the trial were distributed to cooperators in 19 countries. Results were reported from 11 sets covering 8 different countries and are discussed here.

Results and Discussion

Mean values of different agronomic characters for different entries during 1981/82, 1980/82 and 1979-82 are presented in Tables 4.4.1, 4.4.2, and 4.4.3 respectively. Time to flowering (Table 4.4.1.) varied from 93 days for Black Romi SVI (ILB 1796), and 39MB (ILB 1799) to 102 days for Aquadulce (ILB 1266); time to maturity from 178 days for 74TA 12 (ILB 12), 75TA 26062 (ILB 29), and 39MB (ILB 1799) to 182 days for 79S 97514 (ILB 444), Aquadulce (ILB 1266) and FLIP 80-16 (X75TA 2); and plant height from 70 cm for 74TA 12 (ILB 12) to 89 cm for 77TA 88311 (ILB 263).

Two years data (Table 4.4.2) showed that 74TA 190 (ILB 37) was the earliest in flowering and in maturity, whereas 76TA 56246 (ILB 398) was latest in flowering and among the late lines in maturity. Correlations between time to flowering and time to maturity were highly significant and positive in 1981/82 and also 1980-82. (Table 4.4.4.). Seed yield, however, did not exhibit any significant correlation with the three agronomic characters.

Seed yield and rank of entries at all locations and the overall mean are given in Table 4.4.5. Some idea of the environmental variation can be gained from the coefficient of variation (CV) given in Table 4.4.5. The CV ranged from 2.1% at Wuhan in China to 58.7% at Taiz in Yemen. The five heaviest seed yielding genotypes at each individual location are listed in Table 4.4.6. Considering all locations, the entry 76TA 56356 (ILB 282) appeared five times among the heaviest seed yielding entries and also ranked first in seed yield, between all test entries across locations. The entry Syr.L.L. appeared four times in Table 4.4.6. and in addition it ranked third in seed yield across locations. Although the two genotypes Turkish local (ILB 1821) and 5MCI (ILB 1805) ranked second and fourth in overall mean seed yield, they occurred amongst the five heaviest seed yielders only two times.

The seed yields of the six heaviest yielding genotypes across locations expressed as percentage of the location mean are given in descending order for each location in Table 4.4.7. Although all six genotypes showed considerable variation between locations, all except Turkish Local were relatively stable in that they exceeded the location mean at least 7 out of 11 times.

Seed yield and rank of the common entries across two years (1980/82) at different locations are summarized in Table 4.4.8.

The entries FLIP 80-16, 77TA 88311, 74TA 63, 76TA 56356, and Black Rome SVI were the heaviest seed yielding genotypes. Results based on one year as well as two years have shown that the entry 76TA 56356 has a good yield potentiality across a wide range of environments, since it ranked among the best five entries in Egypt, Italy, Spain, Sudan, and Yemen. Correlations among different locations across two years (1980/ 81 and 1981/ 82)for seed yield are given in Table 4.4.9. The low and non-significant correlations indicate that, in general, the tested populations across environments were unadapted.

Table 4.4.1. Values for three agronomic characters across several locations for entries in the FBISN-L during 1981/82.

ENTRY Selection	ILB	Country of origin	Time to flowering (days)[1]	Time to maturity (days)[2]	Plant height (cm)[3]
78 S 49907	10	Jordan	99	180	79
74 TA 12	12	Syria	96	178	70
78 S 49044	17	"	98	180	78
74 TA 63	24	Iraq	96	179	83
75 TA 26062	29	Hungary	95	178	80
78 S 49841	34	Iraq	99	180	82
74 TA 109	37	"	98	179	82
76 TA 56297	41	"	100	180	84
77 TA 88311	263	Spain	99	180	89
78 S 48426	268	"	98	180	86
74 TA 374	274	Lebanon	97	180	80
76 TA 56356	282	"	97	180	80
79 SL 48590	282	"	98	180	77
78 S 48476	285	"	95	179	83
74 TA 516	371	Algeria	96	180	83
76 TA 56246	398	Tunisia	101	181	83
79 S 97513	444	Iraq	98	179	89
79 S 97514	444	"	101	182	99
Aquadulce	1266	Spain	102	182	81
New Mammoth	1269	U.K.	98	181	79
Reina Blanca	1270	"	100	181	77
Black Romi SVI	1796	Syria	93	179	80
39 MB	1799	"	93	178	82
5 MCI	1805	"	95	180	83
Syr.Loc.Long-pod	1813	"	98	180	87
Syr.Loc.Short-pod	1812	"	96	181	88
79 SI	1814	"	98	181	85
Lattakia local	1815	"	98	180	84

Cont'd Table 4.4.1.

ENTRY Selection	ILB	Country of origin	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
76 TA 56809	1817	Lebanon	99	181	81
78 S 49895	1817	"	100	181	82
Turkish Local	1821	Turkey	100	181	85
Sevilla Giant	1269	U.K.	100	181	83
FLIP 80-14	X75TA 2	ICARDA	96	179	80
FLIP-80-16	X75TA 43	"	97	182	86
FLIP-80-17	X75TA 49	"	97	180	83
FLIP 80-20	X75TA115	"	95	180	86
Syr.Loc.Large means	1814	Syria	100	181	88

(1) Mean of data from 13 locations.

(2) Mean of data from 11 locations.

(3) Mean of data from 8 locations.

Table 4.4.2. Values for seed yield and three agronomic characters across several locations for entries in the FB ISN-L planted during (1980-82).

ENTRY Selection	ILB	Yield (1) (kg/ha)	Time to flowering (2) (days)	Time to maturity (3) (days)	Plant height (4) (cm)
78 S 49907	10	2379	101	173	78
74 TA 12	12	2349	97	172	74
78 S 49044	17	1986	97	172	78
74 TA 63	24	2653	96	170	81
75 TA 26062	29	2302	95	170	76
78 S 49841	34	2171	99	172	81
74 TA 109	37	2186	93	169	79
76 TA 56297	41	2043	99	172	81
77 TA 88311	263	2714	101	174	84
78 S 48426	268	2424	97	172	82
74 TA 374	274	2367	97	173	76
76 TA 56356	282	3105	98	173	74
79 SL 48590	282	2812	98	172	75
78 S 48476	285	2353	94	171	82
74 TA 516	371	2531	97	172	79
76 TA 56246	398	2093	102	174	77
79 S 97513	444	2597	98	172	85
79 S 97514	444	2469	100	173	86
Aquadulce	1266	2381	101	173	81
New Mammoth	1269	2435	98	172	75
Reina Blanca	1270	2689	100	172	73
Black Romi SVI	1796	2535	95	173	76
5 MCI	1805	2398	97	173	78
Syr. Loc.Long-pod	1813	2332	101	173	80
79 SI	1814	2329	93	172	79
Lattakia local	1815	2528	99	173	79
76 TA 56809	1817	2166	100	173	79
78 S 49895	1817	1981	99	175	74
Turkish Local	1821	2868	101	174	80
Sevilla Giant	1933	2248	101	174	78

Cont'd Table 4.4.2.

ENTRY Selection	ILB	Yield (kg/ha)	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
FLIP 80-14	X75TA 2	2388	96	171	79
FLIP 80-16	X75TA 43	2570	97	173	83
FLIP 80-17	X75TA 49	2494	97	171	79
FLIP 80-20	X75TA 115	2416	97	171	80

(1) Mean over 23 locations

(2) Mean over 29 locations

(3) Mean over 23 locations

(4) Mean over 22 locations

Table 4.4.3. Values for three agronomic characters across several locations for entries in the FBISN-L planted during (1979-82).

ENTRY Selection	ILB	(1) Time to flowering (days)	(2) Time to maturity (days)	(3) Plant height (cm)
78 S 49907	10	100	175	76
74 TA 12	12	94	173	72
78 S 49044	17	97	174	77
74 TA 63	24	94	173	80
76 TA 56297	41	96	174	78
78 S 48426	268	96	174	80
74 TA 374	274	95	175	75
76 TA 56356	282	96	175	73
79 SL 48476	285	92	173	79
76 TA 56246	398	100	176	79
Aquadulce	1266	98	175	80
New Mammoth	1269	98	175	75
Reina Blanca	1270	99	175	71
Black Romi SVI	1796	92	174	76
5 MCI	1805	95	174	76
Syr.LocLong-pod	1813	99	176	81
Lattakia Local	1815	96	175	77
76 TA 56809	1817	98	175	78
78 S 49895	1817	98	176	78
Turkish Local	1821	100	176	80
FLIP 80-16	X75TA 43	96	175	82
FLIP 80-17	X75TA 49	97	174	77

(1) Mean over 43 locations

(2) Mean over 28 locations

(3) Mean over 34 locations

Table 4.4.4. Correlations among three agronomic characters and seed yield based on mean values across locations in the FBISN-L during 1981/82(1) and 1980-82(2).

Characters	Time maturity	Plant flowering	Seed yield
Time to flowering	0.70**	0.17	-0.18
	(0.74)**	(0.08)	(0.02)
Time to maturity		0.35*	-0.01
		(-0.06)	(0.02)
Plant height			0.29
			(0.01)

(1) = Significance is based on 35 df, (2) = Significance is based on 32 df, Values in parentheses are for 1981/82, * $P \leq 0.05$, ** $P \leq 0.01$.

Table 4.4.5. Seed yield (Y = kg/ha) and rank (R) of entries in the FBISN-L at different locations during 1981/ 82.

ENTRY		CHINA		EGYPT				ITALY		LEBANON		SPAIN				SUDAN		SYRIA				YEMEN		MEAN	
Selection	ILB/ Cross No.	Wuhan		Sakha		Sids		Bari		Terbol		Cordoba		Madrid		Hudeiba		TH-Irrig.		TH-Reinf.		Taiz			
		Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
78 S 49907	10	237	23	3451	6	4694	31	4158	28	1412	33	4143	20	1997	25	523	11	3139	9	2046	8	1259	7	2460	22
74 TA 12	12	160	29	2285	21	6111	21	3558	31	301	36	3821	31	1847	27	355	18	2880	14	1417	26	971	12	2155	35
78 S 49044	17	186	27	4063	2	6556	16	3225	34	5	37	3893	25	2472	17	382	16	2583	27	2009	9	271	31	2331	27
74 TA 63	24	95	36	2951	10	8361	6	4892	21	1486	32	3893	25	2947	9	538	10	3324	5	3083	1	1396	4	2997	5
75 TA 26062	29	52	38	1951	25	8028	7	2892	37	523	35	3893	25	1947	26	699	5	2769	17	2009	10	871	16	2330	28
78 S 49841	34	197	25	563	35	7528	9	3158	35	1931	31	4179	17	2397	19	592	7	2843	15	1454	24	596	26	2313	23
74 TA 109	37	208	24	1007	32	6417	19	3692	30	2153	30	3786	32	2797	13	294	20	3028	10	2454	2	846	17	2426	23
76 TA 56297	41	283	20	2007	24	6472	18	1425	38	1338	34	2786	37	2272	21	667	6	2991	11	1417	27	746	20	2037	36
77 TA 88311	263	345	17	3674	4	6861	11	3558	32	2338	27	4250	15	3172	4	254	23	4583	1	2194	6	1246	8	2952	6
78 S 48426	268	471	11	3896	3	6861	11	2958	36	0	-	4679	8	2797	14	590	8	3546	3	2269	4	971	13	2640	16
74 TA 374	274	146	32	813	34	5597	23	4692	22	3153	18	3589	33	2934	10	143	31	2250	34	1343	30	756	19	2311	30
76 TA 56356	282	409	14	3535	5	6708	14	7358	2	3190	17	4661	9	3059	5	962	2	2620	23	1380	28	1769	2	3241	1
79 SL 48590	282	956	4	1090	31	8931	5	5292	14	2968	21	4089	22	2909	11	218	27	2398	29	1231	31	931	15	2813	9
78 S 48476	285	272	21	0	-	5403	25	4558	24	3671	11	2482	38	2059	24	927	3	2176	35	1454	25	-	-	2300	31
74 TA 516	371	77	37	868	33	6764	13	4025	29	4005	7	4661	10	3759	1	189	29	2620	24	1898	13	506	27	2679	15
76 TA 56246	398	157	30	313	36	4153	33	4225	26	3005	19	3411	35	2959	7	9	36	2435	28	1157	34	131	35	1996	37
79 S 97513	444	150	31	1535	30	7903	8	4292	25	5227	1	3589	34	3559	2	362	17	2769	18	1231	31	81	36	2791	12
79 S 97514	444	118	34	2146	23	5319	26	5158	17	4412	4	3875	29	2659	15	222	26	2843	16	1972	12	256	33	2635	17
Aguadulce	1266	127	33	1757	28	3958	35	5225	16	4042	6	3125	36	2584	16	63	33	1991	36	1787	15	266	32	2266	32
New Mammoth	1269	190	26	313	37	4819	30	5158	18	3301	15	3946	24	2959	8	445	14	3176	8	1083	37	276	30	2333	26
Reina Blanca	1270	352	16	2451	20	5611	22	7358	3	2708	22	5143	6	1059	34	9	36	2602	25	1491	21	-	-	2878	8
Black Romi SVI	1796	248	22	3174	9	6667	15	5358	12	4190	5	4250	16	1209	30	460	13	2602	25	1491	21	1143	10	2793	11
39 MB	1799	621	6	3285	7	8944	4	5558	10	3005	20	4357	14	1209	30	301	19	2972	12	2009	11	1393	5	3053	4
5 MCI	1805	625	5	2896	13	9167	2	5025	20	3375	14	3857	30	1184	32	282	22	2676	20	1491	21	1193	9	2625	18
Syr. Loc. Long-pod	1813	400	15	2951	11	4944	28	5625	9	3745	9	4429	13	1084	33	0	-	3269	6	2083	7	1393	5	2720	14

..2/..

Cont'd Table.4.4.5.

ENTRY Selection	ILB/ Cross No.	CHINA Wuhan Y	R	EGYPT Sakha Y	R	EGYPT Sids Y	R	ITALY Bari Y	R	LEBANON Terbol Y	R	SPAIN Cordoba Y	R	SPAIN Madrid Y	R	SUDAN Hudeiba Y	R	SYRIA TH-Irrig. Y	R	SYRIA TH-Rainf. Y	R	YEMEN Taiz Y	R	MEAN Y	R
Syr.L. Short-pod	1814	1228	2	2840	14	6944	10	5092	19	3708	10	4179	18	959	35	131	32	2898	13	1787	16	743	21	2410	24
79 L	1814	597	7	2840	15	3528	36	4225	27	2412	26	3893	28	959	35	37	34	2676	21	1676	18	1018	11	2169	34
Lattakia local	1815	502	8	4507	1	4944	29	5292	15	3671	12	4179	19	834	37	288	21	3380	4	2380	3	818	18	2800	10
76 TA 56809	1817	468	12	2674	16	6389	20	4625	23	3412	13	4036	23	1359	29	193	28	1935	37	1120	36	1593	3	2528	20
78 S 49895	1817	478	10	2507	18	6556	17	3425	33	2338	28	5250	4	509	38	36	35	2306	31	1824	14	1993	1	2475	21
Turkish local	1821	302	18	2507	19	10042	1	5525	11	2282	29	6375	1	3009	6	224	25	2713	19	1602	20	406	29	3181	2
Sevilla Giant	1933	286	19	1618	29	1347	38	6525	5	2431	24	4518	11	2209	22	146	30	2676	22	1639	19	606	25	2132	33
FLIP 80-14	X75T 2	107	35	1896	27	4153	34	5992	8	2505	23	5232	5	2134	23	853	4	1491	38	676	38	741	22	2344	25
FLIP 80-16	X75TA 43	426	13	2618	17	4431	32	6192	6	4505	3	5446	2	2859	12	245	24	3750	2	1194	33	741	22	2946	7
FLIP 80-17	X75TA 49	179	28	2285	22	2653	37	7725	1	3801	8	4768	7	2384	20	430	15	2306	32	1157	35	956	14	2604	19
FLIP 80-20	X75TA115	1101	3	1951	26	5292	27	6725	4	2431	25	4446	12	3234	3	542	9	2306	33	1380	29	631	24	2731	13
Local check means	*	3709	1	3250	8	9042	3	5300	13	3269	16	4098	21	369	28	2531	1	2398	30	1750	17	150	34		
Syr.Loc.Large	mean 1814	500	9	2931	12	5542	24	6150	7	4963	2	5402	3	2400	18	484	12	3250	7	2231	5	411	28	3115	3
Location mean		446		2300		6148		4874		2821		4227		2220		411		2768		1681		870			
C.V.%		2.1		11.0		16.1		25.6		28.0		9.0		19.9		57.4		18.0		13.2		58.7			
S.E.Checks		29.7		239.4		828.5		1037.2		816.3		302.5		286.8		611.5		360.0		186.4		116.4			
S.E.Checks VS test entries		57.6		463.5		1604.3		2008.6		1580.7		585.8		555.3		1184.2		697.2		361.0		225.4			

Table 4.4. 6. The five heaviest seed yielding entries at the individual locations in the FBISN-L during 1981/82.

RANK	CHINA Wuhan		EGYPT Sakha		EGYPT Sids		ITALY Bari		LEBANON Terbol	
	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.
1	Local check		Lattakia local	1815	Turkish local	1821	FLIP 80-17 X75TA 49		79S 97513	444
2	Syr.L.L.	1814	-	17	5 MCI	1805	/6 TA 56356	282	Syr.L.L.	1814
3	FLIP 80-20	X75TA115	78S 48426	268	Local check		[illegible] Blanco	1270	FLIP 80-16	X75TA43
4	79SL 48590	282	77 TA 88311	263	39 MB	1799	FLIP 80-20	X75TA115	79S 97514	444
5	5 MCI	1805	76 TA 56356	282	79 SL 48590	282	Sevill. Giant	1933	Black Romi SVI	1796

RANK	SPAIN Cordoba		SPAIN Madrid		SUDAN Hudeiba		SYRIA TH-Irrigated		SYRIA TH-Rainfed		YEMEN Taiz	
	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.
1	Turkish local	1821	74 TA 516	371	Local check	-	77 TA 88311	263	74 TA 63	24	78S 49395	1817
2	FLIP 80-16	X75TA43	79S 97513	444	76 TA 56356	282	FLIP 80-15	X75TA43	74 TA 10[illegible]	37	76 TA 56356	282
3	Syr .L.L.	1814	FLIP 80-20	X75TA 115	78S 48476	285	78S 48426	268	Lattakia Local	1315	76 TA 56809	1817
4	78S 49895	1817	77 TA 88311	263	FLIP 80-14	X75TA 2	Lattakia Local	1815	78S 48426	263	74 TA 63	24
5	FLIP 80-14	X75TA 2	76 TA 56356	282	75 TA 26062	29	74 TA 63	24	Syr.L.L.	1814	39 MB	1799

Table 4.4.7. Seed yield expressed as percent of location mean of the six entries with heaviest mean seed yield across locations in the FBISN-L during 1981/82.

ENTRY Selection	ILB	CHINA - Wuhan	EGYPT - Sakha	EGYPT - Sids	ITALY - Bari	LEBANON - Terbol	SPAIN - Cordoba	SPAIN - Madrid	SUDAN - Hudeiba	SYRIA - TH - Irrig.	SYRIA - TH - Rainf.	YEMEN - Taiz
76 TA 56356	282	92	154	109	151	113	110	138	234	95	82	203
Turkish Local	1821	68	109	163	113	81	151	136	55	98	95	47
Syr. Loc.Large	1814	112	127	90	126	176	128	108	118	117	133	47
39 MB	1799	139	143	145	114	107	103	54	73	107	120	160
74 TA 63	24	21	128	136	100	53	92	133	131	120	183	344
77 TA 88311	263	77	160	112	73	83	101	143	62	166	131	143

Table 4.4.8. Mean seed yield (Y = kg/ha) and rank (R) of entries in the FBISN-L at different locations across two years (1980/82).

Entry Selection	ILB/ Cross No.	EGYPT Sakha		LEBANON Terbol		SYRIA Tel Hadya				MEAN	
						Irrigated		Rainfed			
		Y	R	Y	R	Y	R	Y	R	Y	R
78S 49907	10	2325	8	2403	24	4050	17	2689	13	2867	17
74TA 12	12	1797	14	2921	22	4024	19	2475	17	2804	20
78S 49044	17	2269	9	1291	27	2820	28	2371	19	2188	28
74TA 63	24	2380	5	3125	20	4609	6	3241	1	3339	3
75TA 26062	29	1713	15	2069	25	3306	27	3171	2	2565	24
78S 49841	34	556	27	2896	23	3550	24	2166	26	2292	27
74TA 109	37	778	25	3396	16	4072	16	2949	5	2799	21
76TA 56297	41	1390	19	1433	26	4091	14	2331	21	2311	26
77TA 88311	263	2501	4	3137	19	5424	1	2419	18	3370	2
78S 48426	268	2834	2	1246	28	4542	7	2890	7	2878	16
74TA 374	274	737	26	3563	13	3505	25	2260	23	2516	25
76TA 56356	282	2367	6	3723	9	4177	12	2933	6	3300	4
78SL 48590	282	1227	22	3149	18	4262	10	2782	10	2855	19
78S 48476	285	1531	17	3649	12	3407	26	2327	22	2729	22
74TA 516	371	811	24	3779	6	3954	20	2882	9	2857	18
76TA 26246	398	533	28	3742	8	4362	9	2195	25	2708	23
79S 97513	444	1367	20	4353	2	4029	18	2515	16	3066	12
79S 97514	444	1811	13	3871	5	3631	23	3169	3	3121	9
Aquadulce	1266	1468	18	4211	3	4236	11	2538	15	3113	10
New Mammoth	1269	885	23	3693	10	5403	2	2219	24	3050	13
Reina Blanca	1270	2343	7	3192	17	4090	15	1890	28	2879	15
Black Rome SVI	1796	3174	1	4044	4	3823	21	2156	27	3299	5
5 MCI	1805	1704	16	3767	7	5120	3	2596	14	3297	6
79SL	1814	1871	11	3038	21	4676	5	2700	12	3071	11
Lattakia Local	1815	2649	3	3520	14	3739	22	2885	8	3198	8
Turkish Local	1821	1825	12	3679	11	4391	8	2990	4	3221	7
FLIP 80-16		1991	10	4550	1	4850	4	2352	20	3436	1
FLIP 80-12		1297	21	3513	15	4173	13	2702	11	2921	14

Table 4.4.9. Correlations (df = 26) among different locations for seed yield in the FBISN-L across the two years (1980-82).

LOCATION	LEBANON Terbol	SYRIA Tel Hadya	
		Irrigated	Rainfed
EGYTP - Sakha	-0.12	0.06	0.16
LEBANON - Terbol		0.27	-0.08
SYRIA - TH - Irrigated			-0.03

4.5 FABA BEAN INTERNATIONAL SCREENING NURSERY SMALL-SEEDED (FBISN-S)

Material

The Faba Bean International Screening Nursery Small-Seeded (FBISN-S) comprised 40 entries, originated from a large number of countries, and three checks, two of them were provided (one major and one minor type) with the third to be supplied by the local cooperator. Some of the entries were selected based on a limited number of yield tests in ICARDA regional trials, and others were chosen from last year's nursery.

Methods and Management

The forty entries were planted in single non-replicated rows of 4 m length with three check genotypes planted after every 10 test entries to allow some assessment of the environmental variation. The recommended inter-and intra row spacing was 0.50- and 0.10 m, respectively. Twenty-four sets of the trial were distributed to cooperators in15 countries. Results were reported from 11 sets covering 8 countries .

Results and Discussion

Mean values for three agronomic tratts viz, time to flowering, time to maturity, and plant height for the entries in 1981/82, common entries across two years (1980-82); and across three years (1979-82) are listed in Tables 4.5.1, 4.5.2, and 4.5.3 respectively. Time to flowering ranged from 84 days for 74TA 12 (ILB 5), 78S 49288 (ILB 112), 77TA 88135 (ILB 328), 74TA 498 (ILB 360), 78S 33011 and Syrian Local Short-pod to 94 days for 77 MS 88410; time to maturity from 158 days for 79S 78978 and 79S 77058 to 167 days for 78S 49171 (ILB 1266); and plant height from 76 cm for 77 MS 88252 (ILB 16) to 93 cm for 78S 49171 (ILB 1266).

The top two genotypes, 78S 48561 and 78S 33011 exceeded the individual location mean at all locations, indicating a high degree of stability. The other four genotypes namely, 78S 49288, 79S 78978, 78S 49264, and 74TA 12 acheived this seven times which suggests a relatively limited adaptation to specific environments.

Seed yield and rank of common entries across two years (1980/81 and 1981/82) at different locations are given in Table 4.5.8. The entries 74TA 12, 78S 49288, 78S 49264, 74TA 95, and 77MS 88252 were the heaviest seed yielding. Although, the entry 78S 48561 (ILB 1816) ranked first in 1981/82 and also appeared more than any other entry (4 times) in Table 4.5.6., it ranked 6 across two year results (Table 4.5.8.). Data based on individual year as well as across two years, have shown that the entry 78S 49288 (ILB 112) maintained its high yielding potential across years since it ranked 3rd and 2nd in Tables 4.5.5. and 4.4.8, respectively . Correlations for seed yield among different locations across two years (1980/81 and 1981/82) are shown in Table 4.5.9. The results indicate positive and significant correlations of Syria- TH - irrigated with Lebanon (0.47) and Syria- TH - rainfed (0.45).

The data on these agronomic characters based on one, two and three year results revealed much co-herence between the mean values across locations for common entries. The entry 78S 49288 (ILB 112) gave the highest seed yield (3076 kg/ha), whereas the selection 79 L 10873 gave the lowest (1763 kg/ha). Correlations among three agronomic characters and seed yield based on mean values in 1981/82 and across two years (1980-82) are given in Table 4.5.4. Time to flowering exhibited a significant and positive association with time to maturity. Plant height did not exhibit any association with any of these traits.

Seed yield and rank of genotypes at eleven locations and overall means are given in Table 4.5.5, and the five heaviest seed yielding genotypes at each individual location are listed in Table 4.5.6. The local check ranked first at Gimmeza in Egypt and at Hudeiba in Sudan (Table 4.5.5), and appeared three times among the five heaviest seed yielding genotypes at Gimmeza and Sids in Egypt and at Hudeiba in Sudan.

The CV was extremely high at Taiz in Yemen (60.9%) and high at Sids in Egypt (48.8%) followed by Hudeiba in Sudan (38.3%). The rest of the locations showed a reasonable range (10.3-28.4%).

The two selections 78S 48561 (ILB 1816) and 78S 33011 ranked first and second in seed yield across all locations but they appeared four times among the five heaviest seed yielding genotypes. The overall ranking of the entry Syr. L.S.(ILB 1811) in seed yeild was 15 although it appeared three times in Table 4.5.6. These results may suggest that the entry Syr . L.S. (ILB 1811) possesses specific adaptation to Ethiopia, Sudan, and Yemen.

The seed yield of the six heaviest yielding genotypes across locations expressed as a percentage of each location is given in Table 4.5.7.

Table 4.5.1. Values for three agronomic characters across several locations for entries in the FBISN-S during 1981/82.

ENTRY Selection	ILB/ Cross No.	Country of Origin	Time to flowering[1] (days)	Time to maturity[1] (days)	Plant height[2] (cm)
74 TA 12	5	Jordan	84	161	79
77 Ms 88252	16	Syria	88	161	76
77 TA 80023	18	"	87	161	80
78S 49264	22	"	86	161	80
74 TA 84	30	Iraq	89	161	78
77 TA 87	31	"	87	162	80
74 TA 91	32	"	85	161	86
74 TA 95	33	"	87	162	84
78S 49288	112	Ethiopia	84	162	90
75 TA 26333	207	Turkey	85	161	89
74 TA 367	269	Spain	86	162	89
77 TA 88118	285	Lebanon	85	160	84
77 Ms 88321	286	"	89	160	80
77 Ms 88322	286	"	90	160	84
77 Ms 88323	287	"	86	159	84
77 Ms 88324	287	"	87	160	91
75 TA 26467	295	Uruguay	88	160	87
77 Ms 88218	298	Spain	88	161	87
77 Ms 88338	317	U.K.	85	161	87
78S 48434	320	Japan	89	163	87
77 TA 88138	328	China	84	161	78
78S 48437	336	Sweden	86	161	84
78S 48504	339	Egypt	86	161	85
77 Ms 88158	352	"	86	162	94
77 Ms 88165	356	"	85	162	87
74 TA 498	360	"	84	160	85
79S 97173	363	"	91	162	92
78S 88362	372	Algeria	90	163	89
77 Ms 88410	421	Iran	94	163	91
78S 35513	905	Egypt	89	162	90

../2

Cont'd Table 4.5.1.

ENTRY Selection	ILB/ Cross No.	Country of origin	Time to flowering	Time to maturity (days)	Plant height (cm)
79S 97330	1105	Turkey	92	161	83
Syr.Loc.Small	1811	Syria	87	159	85
78S 48561	1816	Lebanon	86	160	89
78S 49896	1817	"	87	161	91
78S 49171	1266	Spain	87	167	93
78S 33011	X75TA 7		84	159	86
79L 10873	X75TA 35		86	159	86
79S 78978	X75TA 146		85	158	85
79S 79029	X75TA 193		85	161	89
79S 77058	X77Sd 11		86	158	86
Syr.Loc.Short pod	1812	Syria	84	162	83
Syr.Loc.L.mean	1814	Syria	91	167	82

(1) Mean of data from 11 locations
(2) Mean of data from 6 locations

Table 4.5.2. Values for seed yield and three agronomic characters across locations for common entries in the FN1SN-S planted across two years (1980-82).

ENTRY Selection	ILB/ Cross No.	Country of origin	Yield (1) (kg/ha)	Time to (1) flowering (days)	Time to (1) maturity (days)	Plant (1) height (cm)
74 TA 12	5	Jordan	3051	85	160	79
77 MS 88252	16	Syria	2718	92	163	79
78 S 49264	22	"	2933	88	161	78
74 TA 84	30	Iraq	2417	89	160	78
74 TA 87	31	"	3019	90	163	79
74 TA 95	33	"	3052	88	161	84
78 S 49288	112	Ethiopia	3076	86	161	86
75 TA 26333	207	Turkey	2768	90	162	86
74 TA 367	269	Spain	2991	90	163	87
77 TA 88118	285	Lebanon	2671	89	162	82
77 MS 88321	286	"	2506	90	158	81
77 MS 88322	286	"	2275	89	160	83
77 MS 88323	287	"	2872	88	159	82
77 MS 88324	287	"	2579	88	159	85
75 TA 26467	295	Uruguay	2706	90	160	85
77 MS 88338	317	U.K.	2365	88	162	83
78 S 48434	320	Japan	2616	92	164	86
77 TA 88138	328	China	2317	87	161	78
78 S 48437	336	Sweden	2536	90	162	82
78 S 48504	339	Egypt	2398	91	162	81
77 MS 88165	356	"	2782	88	161	83
74 TA 498	360	"	2737	88	161	81
79 S 97173	363	"	2316	93	164	87
77 MS 88410	421	Iran	2431	95	164	86
78 S 35513	905	Egypt	2707	90	161	83
79 S 97330	1105	Turkey	2383	94	162	75
78 S 48561	1816	Lebanon	2866	89	161	82
78 S 49896	1817	"	2281	88	160	85

..2/...

Cont'd 4.5.2.

ENTRY		Country of origin	Yield kg/ha	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
Selection	ILB/ cross No.					
79 L 10873	X75TA 35		1763	89	159	78
79 S 78978	X75TA 146		2869	88	159	79
79 S 79029	X75TA 193		2267	87	160	82
79 S 77058	X77 Sd 11		2147	86	159	79

(1) Based on 14 locations.

Table 4.5.3. Values for three agronomic characters across locations for common entries in FBISN-S planted across three years (1979-82).

ENTRY Selection	ILB/ Cross No.		Country of origin	Time to flowering (days) [1]	Time to maturity (days) [2]	Plant height (cm) [3]
74 TA	12	5	Jordan	85	166	75
77 MS	88252	16	Syria	91	168	75
74 TA	84	30	Iraq	89	166	75
74 TA	87	31	"	90	168	77
74 TA	95	33	"	87	167	82
75 TA	26333	207	Turkey	90	167	84
74 TA	367	269	Spain	88	168	85
77 TA	88118	285	Lebanon	88	166	79
77MS	88321	286	"	91	165	77
77MS	88322	286	"	91	166	80
77MS	88323	287	"	89	165	79
77MS	88324	287	"	89	165	83
75 TA	26467	295	Uruguay	90	166	82
77MS	88338	317	U.K.	87	167	80
78S	48434	320	Japan	92	169	81
77 TA	88138	328	China	87	166	75
78S	48437	336	Sweden	90	167	79
77MS	88165	356	Egypt	88	166	80
74 TA	498	360	"	88	166	79
77MS	88410	421	Iran	94	169	85
78S	35513	905	Egypt	91	166	81
78S	49896	1817	Lebanon	89	166	82
78S	49171	1266	Spain	90	171	84

(1) based on 37 locations

(2) based on 30 locations

(3) based on 28 locations

Table 4.5.4. Correlations among different agronomic characters across locations in the FBISN-S during 1981/82 [1] and during 1980-82 [2] (in parentheses)

Characters	Time to maturity	Plant height	Seed yield
Time to flowering	0.36*	0.09	-0.35*
	(0.64**)	(0.16)	(-0.18)
Time to maturity		0.20	-0.01
		(0.32)	(0.16)
Plant height			0.06
			(0.18)

(1) df for correlation =40, (2) df for correlation = 30.

* $P \leq 0.05$, ** $P \leq 0.01$.

Table 4.5.5. Seed yield (Y = kg/ha) and rank (R) of entries in the FABISN-S at different locations during 1981/82.

Entry			EGYPT				ETHIOPIA		LEBANON		SPAIN				SUDAN		SYRIA				TURKEY		YEMEN		MEAN	
			Gimmeza		Sids		Debre Zeit		Terbol		Cordoba		Madrid		Hudeiba		Tel-Hadya				Ankara		Taiz			
																	Irrig.		Rainf.							
Selection		ILB/ Cross No.	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
74 TA	12	5	5741	36	5819	14	7823	1	2125	35	4664	11	3025	19	-	-	2191	24	1994	10	1116	35	540	30	3185	6
77MS	88252	16	7130	23	4875	23	2883	9	2169	34	4092	27	3350	13	-	-	1932	31	1031	38	342	43	440	33	2568	25
77 TA	80023	18	6296	29	7208	7	3097	7	2347	32	5021	7	3925	5	196	25	2636	10	2290	6	1196	28	715	24	3175	7
78S	49264	22	6574	27	5819	15	2843	10	3421	6	4378	20	4450	2	-	-	4154	1	2364	3	1169	31	840	16	3274	5
74 TA	84	30	4352	39	3208	35	3377	4	1014	43	1771	43	2150	31	-	-	-	-	1253	31	489	42	-	-	1957	42
74 TA	87	31	7407	17	4875	24	2950	8	1606	40	4414	17	3800	7	-	-	2636	11	2475	1	702	41	690	25	2869	18
74 TA	91	32	7407	17	5431	19	3170	5	1199	42	3449	41	3825	6	135	28	2117	27	2327	5	1142	32	-	-	3020	12
74 TA	95	33	9352	3	5347	20	2623	13	2717	20	4021	29	3750	8	87	30	2636	12	2364	4	742	39	565	29	3109	9
78S	49288	112	9352	3	5875	13	4657	2	1680	39	4735	9	3650	9	26	36	3451	4	1475	27	2116	6	840	17	3442	3
75 TA	26333	207	6296	30	5042	22	2837	11	2347	33	2735	42	4200	4	-	-	2710	8	1994	M	1142	33	315	38	2693	24
74 TA	367	269	6222	33	4773	25	-	-	3423	5	4497	14	4492	1	697	11	3216	6	1019	39	2115	7	786	20	2840	20
77 TA	88118	285	5833	35	4412	29	-	-	2386	31	4211	23	2492	27	641	15	1994	29	1130	35	1382	21	486	32	2270	35
77MS	88321	286	6944	24	2273	40	-	-	3127	7	3997	30	1442	40	673	12	1586	35	1389	29	729	40	748	23	2083	39
77MS	88322	286	6667	25	4273	30	-	-	2572	25	4390	19	4217	3	530	19	1698	33	796	41	1555	15	436	34	2467	30
77MS	88323	287	8611	6	7607	6	-	-	3460	4	4497	15	2592	24	644	14	2364	18	1167	34	1729	11	511	31	3017	14
77MS	88324	287	7500	16	2829	37	-	-	1275	41	4854	8	3642	10	772	9	2216	23	1204	32	875	37	761	21	2357	33
75 TA	26467	295	6667	26	6662	9	-	-	2979	10	5390	3	3567	11	925	7	2586	13	2019	9	2182	5	1261	5	3113	8
77MS	88218	298	9444	2	1690	41	-	-	3498	3	4140	26	3042	17	634	16	1920	32	2056	7	1262	26	346	36	2548	27
77MS	88338	317	6389	28	4023	32	-	-	2683	21	3783	35	-	-	1133	4	2698	9	833	40	782	38	1076	11	2340	34
78S	48434	320	9167	5	6507	17	-	-	2460	28	4497	16	2917	21	1087	5	2179	25	1648	22	1502	18	2161	1	3020	12
77 TA	88138	328	6019	34	1236	43	890	29	2646	22	3735	37	567	42	650	13	2241	21	1623	23	1457	20	1122	9	2017	41
78S	48437	336	5741	37	1653	42	1557	24	1831	38	3628	39	1342	35	367	20	2722	7	1660	20	1177	30	597	28	2070	40
78S	48504	339	7407	19	2653	38	1030	27	2942	13	5057	6	2517	26	154	27	1278	36	1846	14	2284	3	807	18	2543	28
77MS	88158	352	7685	15	5486	18	2583	14	2498	27	4414	18	2867	22	320	22	2278	20	2031	8	1724	12	797	19	2971	16
77MS	88165	356	8519	7	4486	27	1757	22	2423	29	4342	22	1767	37	124	29	2426	16	1809	15	1537	17	997	13	2744	22

Cont'd Table 4.5.5.

ENTRY		EGYPT				ETHIOPIA		LEBANON		SPAIN				SUDAN		SYRIA				TURKEY		YEMEN		MEAN	
		Gimmeza		Sids		Debre Zeit		Terbol		Cordoba		Madrid		Hudeiba		Tel Hadya Irrig.		Tel Hadya Rainf.		Ankara		Taiz			
Selection	ILa/ Cross No.	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
74 TA 498	360	7407	20	5708	16	2377	15	3535	2	3664	38	2167	30	591	17	2463	14	1549	26	1284	24	960	15	2882	17
79S 97173	363	4352	40	4681	26	850	30	2942	14	3771	36	1617	39	44	34	2352	19	1735	16	1324	23	347	35	2183	37
78S 88362	372	2963	43	4042	31	1057	26	2572	26	3985	31	2567	25	196	26	1944	30	1698	17	1564	14	672	26	2115	38
77MS 88410	421	6296	31	3847	33	-	-	2868	15	4378	21	1667	38	28	35	2241	22	1623	24	1044	36	-	-	2399	32
78S 35513	905	7963	11	2597	39	2077	18	2720	19	3878	33	1967	33	272	23	4019	2	1623	24	1751	10	985	14	2714	23
79S 97330	1105	3519	42	8199	4	757	31	2843	16	4068	28	2342	28	71	31	2463	15	1364	30	1592	13	177	40	2490	29
Syr.L.Small	1811	8241	9	6532	12	3503	3	2102	36	4711	10	2042	32	1308	3	981	38	475	43	1258	27	1602	3	2978	15
78S 48561	1816	8519	8	8588	2	2343	16	2843	16	5068	5	3367	12	583	18	3796	3	1920	12	2658	1	1227	6	3719	1
78S 49896	1817	6296	32	3005	36	1630	23	2399	30	3890	32	1442	41	15	37	2426	17	1105	37	1538	16	1177	7	2266	36
78S 49171	1266	7963	12	4421	28	1423	25	2354	12	5211	4	3092	15	58	32	2093	28	1179	33	1192	29	1152	8	2794	21
78S 33011	X75TA 7	7963	12	6699	8	1857	20	2769	18	5426	2	3242	14	1355	2	-	-	1698	18	2312	2	1277	4	3460	2
79L 10873	X75TA 35	4352	41	6616	10	923	28	2065	37	4176	24	1942	34	733	10	-	-	1660	21	2005	8	1077	10	2555	26
79S 78978	X75TA 146	8241	10	8254	3	1810	21	3917	1	4176	24	3042	18	955	6	1204	37	1698	19	1471	19	1727	2	3318	4
79S 79029	X75TA 193	7407	21	9866	1	2143	17	3028	9	4604	13	2242	29	360	21	759	39	1401	28	1352	22	627	27	3072	11
79S 77058	X77Sd 11	5463	38	6616	11	2663	12	2621	24	3533	40	1792	36	917	8	389	40	660	42	1122	34	1027	12	2437	31
Local check means		10486	1	7660	5	3144	6	2639	23	4643	12	2800	23	2378	1	1620	34	1120	36	1276	25	225	39		
Syr.Loc.Med.means		7708	14	5194	21	2002	19	2956	11	3821	34	2988	20	202	24	2130	26	1861	13	1874	9	754	22	2863	19
Syr.Loc.Large means		7361	22	3604	34	-	-	3083	8	5455	1	3088	16	48	33	3417	5	2407	2	2183	4	328	37	3097	10
Location mean		7005		5100		1820		2597		4260		2797		463		2304		1595		1424		803			
C.V.%		15.3		48.8		78.2		28.4		10.3		20.2		38.3		27.3		17.9		17.8		60.3			
S.E.Checks		323.0		1892.5		1421.2		580.4		339.3		423.4		237.5		470.0		226.9		223.8		187.6			
S.E.Checks VS test entries.		1685.2		3455.1		2461.6		1053.7		619.5		773.0		433.6		858.2		414.3		408.6		342.5			

Table 4.5.6. The five heaviest seed yielding entries at the individual locations in the FBISN-S during 1981/ 82.

RANK	EGYPT				ETHIOPIA				LEBANON				SPAIN			
	Gimmeza		Sids		Debre Zeit		Terbol		Cordoba		Madrid					
	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.				
1	Local check		79 S 79029		74 TA 12	5	79 S 78978		Syr.L.L.	1814	74 TA 367	269				
2	77 MS 88218	298	78 S 48561	1816	78 S 49288	112	74 TA 498	360	78 S 33011		78 S 49264	22				
3	74 TA 95	33	79 S 78978		Syr.L.S.	1811	77 MS 88218	298	75 TA 26467	295	77 MS 88322	286				
4	78 S 49288	112	79 S 97330	1105	74 TA 84	30	77 MS 88323	287	78 S 49171	1266	75 TA 26333	207				
5	78 S 48434	320	Local check		74 TA 91	32	74 TA 367	269	78 S 48561	1816	77 TA 80023	18				

RANK	SUDAN		SYRIA				TURKEY		YEMEN	
	Hudeiba		TH-Irrigated		TH-Rainfed		Ankara		Taiz	
	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.	Selection	ILB/ Cross No.
1	Local check		78 S 49264	22	74 TA 87	31	78 S 48561	1816	78 S 48434	320
2	78 S 33011		78 S 35513	905	Syr.L.L.	1814	78 S 33011		79 S 78978	
3	Syr.L.S.	1811	78 S 48561	1816	78 S 49264	22	78 S 48504	339	Syr.L.S.	1811
4	77 MS 88338	317	78 S 49288	112	74 TA 95	33	Syr.L.L.	1814	78 S 33011	
5	78 S 48434	320	Syr.L.L.	1814	74 TA 91	32	75 TA 26467	295	75 TA 26467	295

Table 4.5.7. Seed yield expressed as a percentage of location mean of the six entries with heaviest mean seed yield across locations in the FBISN-S during 1981/ 82.

Entry Selection	ILB/ Cross No.	EGYPT - Gimmeza	EGYPT - Sids	ETHIOPIA-Debre Zeit	LEBANON - Terbol	SPAIN - Cordoba	SPAIN - Madrid	SUDAN - Hudeiba	SYRIA - TH- Irrig.	SYRIA - TH- Rainf.	TURKEY - Ankara	YEMEN- Taiz
78 S 48561	1816	122	168	129	109	119	120	126	165	120	187	152
78 S 33011	.	114	131	102	107	127	116	293	-	106	162	158
78 S 49288	112	134	115	256	65	111	130	6	150	92	149	104
79 S 78978		118	162	99	151	98	109	206	52	106	103	213
78 S 49264	22	94	114	156	132	103	159	-	180	148	82	104
74 TA 12	5	82	114	430	82	109	108	-	95	125	78	67

Table 4.5.8. Mean seed yield (Y = kg/ha) and rank (R) of entries in the FDISN-S at different locations across two years (1980 - 82).

ENTRY		EGYPT Sids		ETHIOPIA Debre Zeit		LEBANON Terbol		SYRIA Tel Hadya				TURKEY Ankara		MEAN	
								Irrigated		Rainfed					
Selection	ILB/ Cross No.	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
74 TA 12	5	5691	18	3986	2	3546	8	3459	17	2957	2	1899	13	3590	1
77 MS 88252	16	5774	17	2883	3	3382	10	4003	7	2493	7	1659	20	3366	5
78S 49264	22	6191	10	1516	19	4249	2	4466	3	2392	10	1819	16	3439	3
74 TA 84	30	5218	21	1953	14	3212	12	5762	1	1637	30	1399	26	3197	10
74 TA 87	31	7024	4	1659	18	2953	18	3914	9	2965	1	1499	24	3336	8
74 TA 95	33	6260	9	1479	21	3397	9	4425	4	2792	3	1886	14	3373	4
78S 49288	112	6358	8	2713	4	2416	27	4503	2	2198	17	2873	1	3510	2
75 TA 26333	207	6154	12	2474	5	3272	11	2869	25	2569	6	2355	2	3282	9
74 TA 367	269	3589	32	2351	7	4495	1	3685	10	2031	21	2228	3	3063	15
77 TA 88118	285	6103	14	2065	9	3687	6	3537	14	2003	22	1581	21	3163	11
77 MS 88321	286	4756	24	4485	1	3199	13	2684	26	2416	9	1328	30	3145	12
77 MS 88322	286	6186	11	2051	11	1761	31	1735	28	2303	15	2081	7	2686	25
77 MS 88323	287	6561	7	1471	22	3002	17	4187	5	2655	5	2175	4	3342	7
77 MS 88324	287	4436	27	1217	27	2668	23	3546	13	2307	14	2021	8	2699	23
75 TA 26467	295	6603	6	644	32	2743	20	3931	8	2781	4	2008	9	3118	14
77 MS 88338	317	5658	19	2064	10	2909	19	3335	19	1905	26	1215	31	2848	20
78S 48434	320	6075	15	1991	13	2168	30	3465	16	1879	27	1555	23	2856	19
77 TA 88138	328	3751	31	1231	26	2706	22	3611	12	2383	12	1457	25	2523	29
78S 48437	336	4219	29	1790	17	2724	21	3187	22	2429	8	1752	18	2684	26
78S 48504	339	4344	28	946	28	3150	15	1706	29	2056	20	2146	5	2391	30
77 MS 88165	356	5594	20	2470	6	3187	14	3213	21	1937	24	1925	12	3054	16
74 TA 498	360	5992	16	1996	12	3706	5	3320	20	2074	18	1746	19	3137	13
79S 97173	363	4802	23	926	29	3780	4	3535	15	2200	16	1839	15	2847	21
77 MS 88410	421	4857	22	1248	25	3965	3	3083	23	1994	23	1152	32	2717	22
78S 35513	905	4691	25	1810	15	3576	7	4178	6	1911	25	1786	17	2992	18
79S 97330	1105	7561	2	866	31	3138	16	3020	24	2065	19	1393	27	3007	17
78S 48561	1816	8339	1	1285	24	2644	25	3449	18	2387	11	2004	10	3351	6
78S 49896	1817	4145	30	1295	23	2496	26	3656	11	2313	13	2144	6	2675	27
79L 10073X75TA	7	4672	26	923	30	1724	32	380	32	1685	29	1577	22	1827	32
79S 78978X75TA	146	6116	13	1810	16	2242	29	2040	27	1754	28	1984	11	2658	28
79S 79029X75TA	193	7492	3	2143	8	2650	24	925	31	1605	31	1352	28	2695	24
79S 77058X77Sd	11	6617	5	1486	20	2409	28	1151	30	1068	32	1329	29	2343	31

Table 4.5.9. Correlations [1] among different locations for seed yield yield in the FBISN-S across the two years 1980-82.

LOCATION	ETHIOPIA Debre Zeit	LEBANON Terbol	SYRIA Tel- Hadya Irrig.	SYRIA Tel- Hadya Rainf.	TURKEY Ankara
EGYPT - Sids	-0.04	-0.19	-0.05	0.06	-0.03
ETHIOPIA - Debre Zeit		0.17	0.07	0.16	0.03
LEBANON - Terbol			0.47**	0.20	-0.06
SYRIA - TH - Irrigated				0.45*	0.19
SYRIA - TH - Rainfed					0.35

(1) df = 30, * $P \leq 0.05$, ** $P \leq 0.01$.

4.6. FABA BEAN INTERNATIONAL F_4 TRIAL (FBIF4T)

Material

The Faba Bean International F_4 Trial ($FBIF_4T$) was comprised of 14 F_4 populations, one ICARDA check (Syrian Local Large), and one check to be supplied by the local cooperator. The F_4 populations originated from crosses between high yielding lines, commerical cultivars, local adapted populations, and widely adapted genotypes. The material should have provided a wide range of intra- and inter population variation, within which cooperators were free to practice their own selection.

Methods and Management

The trial design was 4x4 lattice (3 replications), although the results have been analyzed as a randomized complete block. The suggested plot size was four rows, each of four meters length, with an inter- and intra row spacing of 0.50- and 0.10 m, respectively. Nine sets of the trial were distributed to cooperators in seven countries. Results were returned from six sets covering five countries. The agronomic practices employed at different locations are shown in Table 4.6.1.

Results and Discussion

Means for time to flowering, time to maturity, and plant height across locations are listed in Table 4.6.2. Time to flowering varied from 87 days for X79L 115 to 96 days for X79S 61. The variation for time taken to maturity was small (164 to 166 days). The shortest population was X79L 47 with 53 cm height, while the tallest was Syrian Local Large with 62 cm followed by X79S 64 with 59 cm.

The seed yield and rank of entries in the FBIF$_4$T at different locations during 1981/82 are given in Table 4.6.3. The "F" test indicated that the test entries differed significantly in seed yield at all locations. At Tel Hadya in Syria the local check was significantly out yielded by the cultivar Syrian Local Large and also four F$_4$ populations in the irrigated trial, while in the rainfed experiment only Syrian Local Large significantly exceeded the local check. However, the local check ranked first in seed yield at Sakha (Egypt), Hudeiba (Sudan), and Beja (Tunisia). Clearly, selection within the top performing F$_4$ populations in Syria could produce further yield advance under irrigation.

Overall locations, Syrian Local Large ranked first in seed yield, which reflects its adaptation to the irrigated and rainfed conditions in Syria and its good performance in Lebanon and Tunisia.

Correlations among different locations for seed yield are given in Table 4.6.4. The unadaptation of the tested populations across environments may account for the low and non-significant correlations. Correlations among three agronomic characters and seed yield for different locations in 1981/82 are given in Table 4.6.5. Seed yield correlated positively and significantly with time to flowering (0.91) and with time to maturity(0.96). There were positive and significant associations between plant height, time to flowering, and time to maturity but no association between seed yield and plant height.

Table 4.6.1. Agronomic data for the FBIF$_4$T at different locations during 1981/82.

Country	Location	Planting date	Crop duration[1] (days)	Fertilizer kg/ha N	P_2O_5	K_2O	Irrig.	Insec.	Fungicide
EGYPT	Sakha	18-11-1981	163	37.5	75		3	-	-
SUDAN	Hudeiba	4-11-1981	138	-	-	-	10	-	-
LEBANON	Terbol	3-12-1981	193	-	-	-	-	-	-
SYRIA - Irrig.	Tel-Hadya	22-11-1981	NR		50		-	-	-
- Rainf.	Tel-Hadya	5-12-1981	172		50		-	-	-

(1) Days from planting to maturity.

NR = Not reported

Table 4.6.2. Values for three agronomic characters across locations for entries in the FBIF$_4$T during 1981/82.

Cross No.	Time to flowering[1]	Time to maturity[1]	Plant height(cm)[2]
X 79S 53	92	164	56
X 79S 61	96	164	57
X 79S 64	95	165	59
X 79L 44	88	164	57
X 79L 47	89	165	53
X 79L 66	88	164	56
X 79L 102	89	165	57
X 79L 107	88	165	57
X 79L 114	88	165	55
X 79L 115	87	165	54
X 79L 116	89	165	57
X 79L 118	90	166	56
X 79L 119	88	164	55
X 79L 134	92	165	58
Syrian Loc.Large	94	165	62

(1) Mean over 5 locations

(2) Mean over 4 locations

Table 4.6.3. Seed yield (Y= kg/ha) and rank (R) of entries in the FBIF$_4$T at different locations during 1981/ 82.

CROSS NO.	EGYPT Sakha		LEBANON Terbol		SUDAN Hudeiba		SYRIA Tel-Hadya Irrigated		SYRIA Tel-Hadya Rainfed		TUNISIA Beja		MEAN	RANK
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
X 79S 53	1315	11	2401	14	629	8	2217	7	1379	9	250	14	1365	14
X 79S 61	1619	4	2698	9	120	16	2389	4	1562	3	80	16	1411	10
X 79S 64	1833	2	2319	15	204	15	2222	6	1531	4	319	12	1405	11
X 79L 44	1231	15	2290	16	706	4	2505	3	1235	12	281	13	1375	15
X 79L 47	1296	12	2784	7	876	3	2039	11	815	16	423	9	1372	16
X 79L 66	1454	8	2963	4	649	6	2111	9	1432	5	663	7	1545	5
X 79L 102	1352	10	2481	13	478	13	2539	2	1080	14	766	6	1449	9
X 79L 107	1759	3	2741	8	641	7	2322	5	1358	10	805	4	1604	3
X 79L 114	1593	5	2654	11	577	10	1589	15	1358	10	418	11	1365	13
X 79L 115	1278	14	3321	1	923	2	1922	13	889	15	421	10	1459	8
X 79L 116	1574	6	2593	12	608	9	2072	10	1210	13	237	15	1382	12
X 79L 118	1528	7	2679	10	706	4	1633	14	1432	5	962	3	1490	6
X 79L 119	1287	13	2963	4	534	12	2039	12	1407	8	614	8	1474	7
X 79L 134	1157	16	3223	3	569	11	2161	8	1679	2	776	5	1594	4
Syrian Loc.Large	1361	9	3247	2	395	14	3467	1	2074	1	1184	2	1955	1
Local check	1861	1	2963	4	1467	1	1428	16	1432	5	1197	1		
Location mean	1469		2770		630		2166		1367		587			
C.V. %	24.3		21.6		50.8		22.9		19.1		64.8			
L.S.D.(5%)	596.2		996.8		533.3		829.0		437.5		768.2			

Table 4.6.4. Correlations[1] (df = 13) among different locations for seed yield in the FBIF$_4$T during 1981/82[1].

LOCATION	LEBANON Terbol	SUDAN Hudeiba	SYRIA Tel Hadya		TUNISIA
			Irrigated	Rainfed	
EGYPT - Sakha	-0.39	-0.48	-0.14	0.16	-0.15
LEBANON- Terbol		0.24	0.13	0.21	0.50
SUDAN - Hudeiba			-0.40	-0.64*	0.10
SYRIA -TH-Irrigated				0.52	0.33
TH-Rainfed					0.43

(1) Local check was excluded from calculations
* $P \leq 0.05$.

Table 4.6.5. Correlations among three agronomic characters and seed yield for different locations in the FBIF$_4$T during 1981/82.

Character	Time to maturity	Plant height	Seed yield
Time to flowering	0.91** (1)	0.84** (2)	0.91** (1)
Time to maturity		0.94** (2)	0.96** (1)
Plant height			0.08 (3)

** $P \leq 0.01$

(1) Based on df = 43

(2) Based on df = 28

(3) Based on df = 13

5. LENTIL INTERNATIONAL TRIALS AND NURSERIES

In the lentil international trials and nurseries, two descriptors have been given under the 'entry' heading. The 'ILL' descriptor refers to the number originally given to an accession when it was received into the germplasm collection. The 'selection' descriptor refers to a selection made from within an accession and the absence of such a descriptor indicates that the entry comprises the original accession. A cultivar name given under the selection descriptor also indicates the original accession.

5.1. LENTIL ADAPTATION TRIAL (LAT)

Material

The test entries in the LAT comprised a wide range of genetic material including 14 land races, selections, and cultivars from the major lentil producing regions. These included from USA to Morocco and India, and from USSR to Sudan. There was, in addition to the 14 test cultivars, provision for two local checks. It was hoped that such a diverse set of cultivars would provide the variability necessary for the classification of countries into agro-ecological zones.

Methods and Management

The trial design was randomized complete block with four replications. The recommended plot size was 4 rows, each 4 m long with an inter- and intra row spacing of 0.25 m and 0.02 m respectively. Cooperators were, however, urged to use the practices that are locally recommended for lentil cultivation. The agronomic data for the different locations are given in Table 5.1.1.

There were 43 requests for LAT and 40 sets of the trial were despatched. Seventeen sets of data were returned amongst which all but one were analyzable. The locations returning data were Temuco, Chile; Mallawi, Egypt; Debre Zeit, Ethiopia; Tehran, Iran; Rome and Sicily, Italy; Terbol, Lebanon; Islamabad (x2), Karak and Quetta In Pakistan; Madrid, Spain; Tel Hadya, Syria; Ankara and Izmir, Turkey; Beja, Tunisia; and Pullman, USA.

Results and Discussion

The locations where flowering was earliest were Tehran in Iran; Rome and Sicily in Italy; Debre Zeit in Ethiopia, and Pullman in USA. (Table 5.1.2). The cold, high altitude site at Ankara was the last into flower (189 days). Amongst the entries, Pantnagar-L-234 (ILL 4380) and Giza 9 (ILL 784) were the earliest to flower (98-99 days) followed by Silaim (ILL 1861) from Sudan and Jordanian Local (ILL 4354). At the other end of the spectrum, the latest entries to flower were Iranian and Lebanese Locals (ILL 4351 and ILL 4399). There was little genotype- location interaction for flowering, and the results were consistent over locations.

The pattern of time to flowering both over locations and entries was echoed in time to maturity (Table 5.1.3). Across the sites the range in mean plant height was from 24 cm at Mallawi in Egypt to 48 cm at Izmir in Turkey (Table 5.1.4). Amongst the entries Pantnagar-L-234 (ILL 4380) was both the earliest in flowering and maturity, and also the shortest (29 cm), followed by Syrian Local Small (ILL 4401) at 30 cm. Chilean 78 (ILL 4711) was the tallest entry on average (36 cm) ranking above Lebanese Local (ILL 4399), Winterlik-L-11 (ILL 1877), ILL 504 and 74TA 264 (ILL 254).

The highest yielding locations were Pullman, USA and Mallawi, Egypt where an average of 2387 and 1958 kg/ha seed yield was realized respectively (Table 5.1.5). In excess of 1 ton/ha was also gained at Temuco, Tehran, Terbol, Quetta, Tel Hadya, Beja, El-Kef and Izmir. In contrast, seed yields were very low at Karak, Islamabad, Ankara, Sicily and Madrid. The coefficients of variation at most of these low yielding sites were high. In Tunis the incomplete data set did not allow an analysis of variance.

A local check was inserted by the local co-operator at each location. These checks ranked in the top five best entries everywhere except at both sites in Italy; Karak and Quetta in Pakistan; Madrid in Spain; and both sites in Tunisia. The test entries in LAT were mostly local unimproved cultivars. Since the local check was often outyielded by unimproved material, it emphasizes that plant introduction is an important and inexpensive breeding method with potential in many areas.

The results of Lentil Adaptation Trial for three seasons (Table 5.1.6) showed that Jordanian Local (ILL 4354) was the highest yielding entry on average (1169 kg/ha), followed by 74TA 264 (ILL 254) from Greece, and Syrian Local Large (ILL 4400). These three entries all ranked in the top four entries overall in the previous season (Table 5.1.6), showing their relative yield stability. In contrast 74TA 138 ranked 9 in 1981/82, emphasizing its less stable nature.

In previous seasons' data from LAT on the adaptation of lentil it is clear that there is a discontinuity between the performance in the Indo-Gangetic Plain and other colder sites with longer days situated to the West. This year the performance in Islamabad was negatively correlated to the performance in Tehran, Madrid, Quetta and Tel Hadya (Table 5.1.7) confirming the earlier results.

Table 5.1.1. Agronomic data for different locations for the LAT during 1981/82

Country	Location	Planting Date	Crop Duration (days)	Fertilizer (kg/ha) N	P_2O_5	K_2O	Crop Husbandry
CHILE	Temuco	1-9-1982	129		150	100	Pomarsol H
EGYPT	Mallawi	15-12-1981	151	15	15		2 Irrig.
ETHIOPIA	Debre Zeit	21-7-1982	127	-	-	-	
IRAN	Tehran	10-4-1982	99	18	46		7 Irrig.-Treflan Metasystox, Diazinon
ITALY	Rome	16-3-1982	99	50	100		
	Sicily	6-3-1982	101		60		
LEBANON	Terbol	17-11-1981	197	-	-	-	
PAKISTAN	Islamabad I	3-11-1981	165	28	45		3 Irrig.
	Islamabad II	4-11-1981	160	23	38		
	Karak	22-11-1981	153	-	-	-	
	Quetta	26-11-1981	211	12	12		2 Irrig.
SPAIN	Madrid	26-11-1981	160	40	120		
SYRIA	Tel Hadya	21-11-1981	181		50		
TURKEY	Ankara	3-11-1981	223	20	60		
	Izmir	20-1-1982	148	-	-	-	
U.S.A.	Pullman	6-5-1982	104	-	-	-	Tolban, Premerge, Imidan, Cygon

Table 5.1.2. Time to flowering (days) for entries in the LAT at different locations during 1981/82.

ENTRY		ORIGIN	CHILE	EGYPT	ETHIOPIA	IRAN	ITALY		LEBANON	PAKISTAN				SPAIN	SYRIA	TUNISIA	TURKEY	USA	MEAN
Selection	ILL		Temuco	Mallawi	Debre Zeit	Tehran	Rome	Sicily	Terbol	Islamabad I	Islamabad II	Karak	Quetta	Madrid	Tel Hadya	Beja	Ankara	Pullman	
74 TA 138	101	Morocco	93	87	81	55	67	75	153	135	119	117	119	121	144	144	189	53	110
74 TA 264	254	Greece	92	87	83	52	68	74	152	145	106	114	118	115	143	139	188	50	108
74 TA 577	500	Mexico	87	86	83	51	66	70	154	116	102	117	117	116	142	139	187	49	105
-	504	USSR	85	77	64	78	67	73	150	114	-	111	119	112	141	134	187	53	104
Giza 9	784	Egypt	80	71	49	42	61	67	152	119	66	109	119	111	142	134	191	47	96
Silaim	1861	Sudan	82	77	58	43	62	72	150	122	73	116	120	112	139	134	188	47	100
Winterlik L-11	1877	Turkey	95	91	84	54	70	79	155	138	118	118	120	119	144	151	188	53	111
Iranian Local	4351	Iran	101	92	-	54	69	79	157	148	117	113	118	128	149	147	191	49	114
Jordanian Local	4354	Jordan	82	81	58	42	61	67	152	117	119	114	118	112	137	134	190	47	102
Pantnagar L.234	4380	India	78	78	45	42	59	63	150	114	87	108	118	108	137	134	188	47	97
Lebanese Local	4393	Lebanon	92	95	84	73	69	78	155	147	137	118	118	124	149	150	188	53	114
Syr. Loc. Large	4400	Syria	92	87	84	55	67	73	152	146	125	110	120	114	142	138	189	53	109
Syr. Loc. Small	4401	Syria	91	92	82	50	63	70	152	132	108	108	118	114	139	138	187	48	106
Chilean 78	4711	USA	92	85	84	55	70	79	160	135	90	123	119	120	145	148	189	51	109
Location mean			89	85	72	53	66	73	153	131	105	114	119	116	142	140	189	50	

Table 5.1.3. Time to maturity (days) for entries in the LAT at different locations during 1981/82.

ENTRY		CHILE	EGYPT	ETHIOPIA	IRAN	ITALY	LEBANON	PAKISTAN				SPAIN	SYRIA	TURKEY	MEAN
Selection	ILL	Temuco	Mallawi	Debre Zeit	Tehran	Rome	Terbol	Islamabad I	Islamabad II	Karak	Quetta	Madrid	Tel Hadya	Ankara	
74 TA 138	101	128	148	140	97	98	200	162	162	152	206	161	184	223	158
74 TA 264	254	128	150	140	104	99	197	165	168	155	205	158	184	223	160
74 TA 577	500	130	147	120	92	96	196	163	170	146	209	158	182	223	157
-	504	130	146	140	108	98	191	163	-	150	215	153	179	223	158
Giza 9	784	128	146	110	90	96	194	159	134	146	210	150	180	223	152
Silaim	1861	128	149	115	87	95	192	167	141	151	213	150	178	223	153
Winterlik L-11	1877	130	157	-	113	104	200	161	174	159	213	177	182	223	166
Iranian Local	4351	135	156	-	97	106	206	172	162	154	213	177	188	223	166
Jordanian Local	4354	127	147	125	92	94	197	167	161	154	214	152	178	223	156
Pantnagar L-234	4380	125	146	81	87	89	188	160	146	156	212	146	170	223	149
Lebanese Local	4399	133	158	125	113	102	200	171	170	158	215	174	184	223	163
Syr. Loc. Large	4400	131	153	150	104	103	197	168	171	151	207	161	184	223	161
Syr. Loc. Small	4401	126	156	-	92	94	195	165	169	151	211	148	176	223	159
Chilean 78	4711	132	154	150	104	105	206	167	152	160	204	172	188	223	163
Location mean		129	151	127	99	99	197	165	160	153	211	160	181	223	

Table 5.1.4. Plant height (cm) of entries in the LAT at different locations during 1981/82.

ENTRY		CHILE	EGYPT	IRAN	ITALY	LEBANON	PAKISTAN			SPAIN	SYRIA	TURKEY		U.S.A.	MEAN
Selection	ILL	Temuco	Mallawi	Tenran	Sicily	Terbol	Islamabad I	Islamabad II	Quetta	Madrid	Tel Hadya	Ankara	Izmir	Pullman	
74 TA 138	101	30	26	32	27	35	35	28	31	37	30	28	46	36	32
74 TA 264	254	39	29	31	29	34	42	34	34	38	33	28	49	38	35
74 TA 577	500	32	27	28	26	35	31	35	32	37	28	26	48	34	32
-	504	34	28	32	27	39	34	-	32	38	34	24	52	39	35
Giza 9	784	29	34	29	27	37	36	47	38	34	28	23	42	33	34
Silaim	1861	28	21	30	24	36	35	40	35	35	30	28	50	31	33
Winterlik L-11	1877	36	19	32	27	43	34	30	43	42	32	27	53	37	35
Iranian Local	4351	26	21	32	24	38	35	33	31	35	23	19	45	38	31
Jordanian Local	4354	34	29	29	26	36	34	29	34	36	30	25	44	28	32
Pantnagar L-234	4380	27	22	23	23	27	32	34	29	34	24	27	35	30	29
Lebanese local	4339	38	20	35	25	40	35	36	33	39	34	25	55	35	35
Svr. Loc. Large	4400	37	22	31	28	36	35	29	39	37	31	23	52	39	34
Svr. Loc. Small	4401	26	19	28	22	35	29	25	32	35	29	26	44	34	30
Chilean 78	4711	34	22	34	26	42	35	32	41	39	34	23	57	45	36
Location mean		32	24	30	26	37	34	33	35	37	30	28	48	36	

Table 5.1.5. Seed yield (Y = Kg/ha) and rank (R) of entries in the LAT at different locations during 1981/82.

ENTRY		CHILE		EGYPT		IRAN		ITALY				LEBANON		PAKISTAN								SPAIN		SYRIA		TUNISIA				TURKEY				U.S.A.		MEAN	
		Temuco		Mallawi		Tehran		Rome		Sicily		Terbol		Islamabad I		Islamabad II		Karak		Quetta		Madrid		Tel Hadya		Beja		El-Kef		Ankara		Izmir		Pullman			
Selection	ILL	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
74 TA 138	101	1608	7	2750	1	1521	6	833	7	297	6	861	10	250	10	249	4	103	11	1048	9	307	9	1491	9	1681	3	921	7	139	6	1133	6	1759	14	997	9
74 TA 264	254	2342	1	1944	7	1588	4	781	8	412	2	1194	7	315	7	100	7	150	6	1928	2	631	1	1848	3	1249	6	-	-	104	10	1133	6	2285	8	1125	2
74 TA 577	500	1342	10	2014	5	1658	3	1044	2	404	3	1358	3	478	2	261	3	208	4	1000	10	231	13	1345	11	1249	6	1075	6	45	13	1275	4	2973	2	1057	6
-	504	1850	6	2292	3	829	13	1057	1	553	1	1167	8	322	6	-	-	133	8	1000	10	450	6	1279	12	1340	5	901	8	58	11	1100	8	3035	1	1086	4
Giza 9	784	1300	11	1944	7	971	12	940	4	259	9	917	9	237	12	533	2	217	3	1217	7	316	7	785	14	1354	4	1110	4	-	-	1034	10	2049	11	949	10
Sinai	1861	1475	9	1528	12	1258	9	901	6	266	8	1292	4	348	4	153	5	142	7	1610	4	316	7	1849	2	-	-	1238	3	117	8	1500	2	2247	9	1015	8
Winterlik L-11	1877	2017	5	1667	11	646	14	729	10	298	5	722	13	593	1	38	12	117	9	1848	3	517	4	1733	5	670	10	-	-	209	3	675	12	2035	13	907	11
Iranian Local	4351	1283	12	1778	10	1792	1	539	12	226	11	715	14	219	13	60	10	108	10	1353	5	588	2	1378	10	-	-	595	10	53	12	450	14	2413	6	847	13
Jordanian Local	4354	2283	2	2361	2	1342	8	977	3	333	4	1253	5	339	5	67	9	183	5	1243	6	577	3	1988	1	1169	8	-		191	4	1492	3	2905	3	1169	1
Pantnagar L-234	4380	1258	13	2292	3	1258	9	531	13	39	14	782	11	372	3	617	1	103	11	413	14	164	14	861	13	-	-	1716	1	187	5	1183	5	2160	10	871	12
Lebanese Local	4399	2258	3	1458	14	1004	11	466	14	131	12	1465	1	250	10	-	-	70	14	968	12	234	12	1622	7	1970	1	-	-	311	1	1058	9	2047	12	1021	7
Syr. Loc. Large	4400	2258	3	2014	5	1417	7	740	9	256	10	1434	2	287	8	70	8	258	1	1943	1	511	5	1687	6	1074	9	1085	5	109	9	1000	11	2759	4	1112	3
Syr. Loc. Small	4401	1258	13	1847	9	1563	5	940	4	282	7	1240	6	194	14	49	11	225	2	1149	8	263	10	1786	4	1774	2	1343	2	270	2	1608	1	2432	5	1072	5
Chilean 78	4711	1508	8	1528	12	1667	2	682	11	43	13	774	12	259	9	101	6	100	13	547	13	245	11	1533	8	-	-	790	9	129	7	609	13	2316	7	802	14
Location mean		1717		1958		1322		797		271		1084		319		192		151		1233		382		1513		1353		1077		148		1090		2387			
C.V. %		13.0		19.5		30.6		26.2		51.0		25.7		31.7		60.8		54.2		51.8		43.4		15.3		-		-		-		28.1		17.3			
S.E.		115.2		196.7		205.1		100.7		77.3		141.9		70.5		81.0		39.7		305.8		79.6		113.8		-		-		-		151.2		207.9			
L.S.D. 5%		328.2		560.1		584.1		286.7		224.8		404.2		200.7		231.6		112.9		871.1		226.8		324.1		-		-		-		430.7		592.3			
Local check 1		2267		2514		1363		435		144		1469		1363		919		117		790		400		1018		1129				351		575		5731			
Local check 2		2133		2375		1592		698		-		1017		1296		515		108		840		122		1683		-		655		360		1367		2253			

Table 5.1.6. The mean yield (Y = kg/ha) and rank (R) of common entries in LAT across locations during 1979-82.

ENTRY		1979/80 (1)		1980/81 (2)		1981/82 (3)	
Selection	ILL	Y	R	Y	R	Y	R
74TA 138	101	949	7	1084	1	997	9
74TA 264	254	-	-	1042	2	1125	2
74TA 577	500	1068	1	895	7	1057	6
-	504	-	-	1002	5	1086	4
Giza 9	784	889	8	691	13	949	10
Silaim	1861	-	-	703	12	1015	8
Wint. Pull. 11	1877	-	-	808	9	907	11
Iran. Loc.	4351	653	14	710	11	847	13
Jord. Loc.	4354	1028	5	1035	3	1169	1
Pant.L.234	4380	-	-	592	14	871	12
Leb. Loc.	4399	831	12	826	8	1021	7
Syr. Loc. L.	4400	1057	2	1030	4	1112	3
Syr. Loc. S.	4401	877	9	962	6	1072	5
Chilean 78	4711			743	10	802	14

(1) Mean of 13 locations

(2) Mean of 15 locations

(3) Mean of 17 locations

Table 5.1.7. Correlation (df = 9) between the seed yield of entries in the LAT at different locations during 1981/82

COUNTRY	LOCATION	EGYPT	IRAN	ITALY		LEBANON	PAKISTAN				SPAIN	SYRIA	TURKEY		USA
		Mallawi	Tehran	Rome	Sicily	Terbol	Islamabad I	Islamabad II	Karak	Quetta	Madrid	Tel Hadya	Ankara	Izmir	Pullman
CHILE	-Temuco	0.14	-0.32	0.15	0.44	0.32	0.21	-0.43	0.28	0.67*	0.74	0.62*	0.04	0.01	0.18
EGYPT	-Mallawi		0.09	0.13	0.16	0.03	-0.13	0.44	0.01	-0.24	-0.06	-0.24	0.10	0.31	-0.09
IRAN	-Tehran			0.04	0.01	0.17	-0.73**	-0.03	0.13	-0.31	-0.10	-0.16	-0.50	-0.02	0.30
ITALY	-Rome				0.69*	0.73**	0.14	-0.28	0.57	0.61*	-0.10	0.56	0.10	0.72*	0.44
	-Sicily					0.57	0.24	-0.43	0.46	0.65*	0.48	0.57	-0.18	0.36	0.30
LEBANON	-Terbol						-0.06	-0.22	0.87*	0.39	0.08	0.48	-0.10	0.70*	0.67*
PAKISTAN	-Islamabad I							0.15	-0.07	0.19	0.02	-0.05	0.01	-0.07	0.05
	-Islamabad II								-0.31	-0.63*	-0.63*	-0.82**	-0.01	0.18	-0.22
	-Karak									0.37	0.11	0.38	0.07	0.50	0.73**
	-Quetta										0.76**	0.67*	-0.12	-0.03	0.07
SPAIN	-Madrid											0.56	-0.17	-0.29	0.16
SYRIA	-Tel Hadya												0.21	0.29	0.19
TURKEY	-Ankara													0.38	-0.26
	-Izmir														0.26

* P≤0.05; ** P≤0.01

5.2. LENTIL INTERNATIONAL YIELD TRIAL LARGE-SEEDED (LIYT-L)

Material

The Lentil International Yield Trial Large-seeded comprised 14 test entries from eight countries with a seed size greater than 4.5 g/100 seeds, and two locally supplied check entries. The test entries were selections from germplasm, which had performed well in the Lentil International Screening Nursery Large-seeded in previous years.

Methods and Management

The experimental design was randomized complete block with three replicates. The suggested planting arrangement was 4 m long plots of 4 rows 25 cm apart with a planting density of 200 plants/m^2.

A total of 45 requests for LIYT-L were received, and we were able to distribute 35 sets of the trial to 17 countries. Results were received back from only 13 locations. These were Wagga Wagga, Australia; Urswenos, Chile; Sids, Egypt; Tehran, Iran; Marrow, Jordan; Terbol, Lebanon; Merchouch, Morocco; Pulawy, Poland; Izra'a and Tel Hadya, Syria; Ankara, Turkey; Beja, Tunisia; and Pullman, U.S.A. The agronomic data received from different locations is presented in Table 5.2.1.

Results and Discussion

The range in mean time to flower of the entries was from 106 days to 114 days (Table 5.2.2). The earliest genotype was 78S 26002 from Jordan, which was also the quickest entry in maturity. (Table 5.2.3). There were entries of a comparable time to flower

to the local checks at all sites except in Tunisia and in Egypt, where the test entries were respectively earlier and later to flower than the local check cultivars. The locations at which flowering came earliest were Pulawy in Poland (47 days) and Tehran in Iran (49 days), whereas the crop was latest in flowering and maturity at the cold site Ankara (Turkey) at 1000 m elevation above sea level.

The plant height of entries averaged over locations varied from 30-34 cm (Table 5.2.4). Plants grew tallest at Sids in Egypt (49 cm) where irrigation was provided, and shortest at Izra'a in Syria (19 cm) where there were droughty conditions during growth.

The seed yield varied from the low level of 248 kg/ha and 311 kg/ha at Izra'a (Syria) and Marrow (Jordan) respectively up to in excess of 2.2 tons/ha in Poland and USA (Table 5.2.5). The low yields reflected the droughty conditions of South Syria and North Jordan during the season. The coefficient of variation was from 11.9% in Poland to 73.9% at Ankara in Turkey.

The highest yielding entry was 78S 26002 from Jordan (1397 kg/ha), which was also the earliest. It was among the top five entries at 9 out of 13 locations (Table 5.2.6). The entry with the next best mean yield was ILL 1042 from Iran (1241 kg/ha). Considering the data of the entries common to the last three seasons (Table 5.2.7), 78S 26002 has ranked first since its inclusion in LIYT-L. Whereas ILL 1042 performed poorly in 1980-81, but better in the following season showing its less stable yield.

The correlations between the entry means for seed yield at different locations are given in Table 5.2.8. The performance at the two Syrian locations Izra'a and Tel Hadya was correlated, as was the performance at Tel Hadya with that at Sids in Egypt.

Table 5.2.1. Agronomic data for different locations for the LIYT-L during 1981/82.

Country	Location	Planting Date	Crop Duration (days)	Fertilizer (kg/ha)			Crop Husbandry
				N	P_2O_5	K_2O	
AUSTRALIA	Wagga Wagga	8- 6-1982	169		42		2 Irrig.-Treflan
CHILE	Ursw.nos	7- 9-1982	113	37.5	75		9 Irrig.
EGYPT	Sids	11-11-1981	160	-	-	-	5 Irrig.
IRAN	Tehran	10- 4-1982	101	18	46		7 Irrig.-Treflan,Metasystox Diazinon
JORDAN	Marrow	4-11-1981	NR	-	-	-	
LEBANON	Terbol	17-11-1981	197	-	-	-	
MOROCCO	Merchouch	17-11-1981	NR	30	50	60	
POLAND	Pulawy	26- 4-1982	96		90	120	Gesargard,Furaben,Eupaven Dithane
SYRIA	Izra'a	NR	144	-	-	-	
	Tel Hadya	21-11-1981	182		50		
TURKEY	Ankara	4-11-1981	224	20	60		
U.S.A.	Pullman	6- 5-1982	104	-	-	-	Tolban,Pregmerge,Imidan,Cygon

NR = Not reported.

Table 5.2.2. Time to flowering (days) for entries in the LIYT-L at different locations during 1981/82.

ENTRY		ORIGIN	AUSTRALIA	CHILE	EGYPT	IRAN	JORDAN	LEBANON	POLAND	SYRIA		TURKEY	TUNISIA	U.S.A.	MEAN
Selection	ILL		Wagga Wagga	Urswenos	Sids	Tehran	Marrow	Terbol	Pulawy	Izra'a	Tel Hadya	Ankara	Beja	Pullman	
78S 26002	8	Jordan	107	65	102	42	152	150	41	104	137	186	135	47	106
74TA 9	15	Jordan	124	74	113	50	157	153	48	106	143	188	139	53	112
74TA 19	28	Syria	120	74	107	48	159	152	49	105	141	189	140	53	111
74TA 20	30	Syria	121	74	108	51	160	152	48	106	143	189	141	52	112
78S 26064	193	Syria	121	74	113	49	159	151	48	106	143	188	142	53	112
78S 26066	193	Syria	120	74	112	52	171	144	48	106	142	188	139	51	112
74TA 264	254	Greece	124	71	112	53	159	153	48	106	143	188	141	50	112
74TA 276	262	Hungary	117	69	110	49	161	150	47	105	139	187	139	52	110
-	419	Chile	120	74	107	50	158	151	48	106	143	189	139	53	112
-	707	Cyprus	115	70	103	49	154	153	47	106	142	189	140	52	110
76TA 66182	915	Spain	127	72	108	50	167	155	48	106	149	189	144	51	114
75kf 36423	983	Chile	119	72	107	49	165	156	46	107	145	189	143	48	112
-	1042	Iran	108	68	103	45	158	153	42	104	137	190	137	49	108
Syr. Loc. Large	4400	Syria	121	74	102	49	162	151	48	106	143	187	138	53	111
Local check 1	-	-	120	73	90	49	163	156	49	106	135	187	153	47	
Local check 2	-	-	127	76	75	51	175	156	54	107	139	187	153	47	
Location mean			119	72	105	49	161	152	47	106	142	188	141	51	

Table 5.2.3. Time to maturity (days) for entries in the LIYT-L at different locations during 1981/82.

ENTRY		AUSTRALIA	CHILE	EGYPT	IRAN	Lebanon	POLAND	SYRIA		TURKEY	MEAN
Selection	ILL	Wagga Wagga	Urswenos	Sids	Tehran	Terbol	Pulawy	Izra'a	Tel Hadya	Ankara	
78S 26002	8	168	105	162	92	194	95	142	177	224	151
74TA 9	15	168	114	160	104	197	96	144	184	224	155
74TA 19	28	168	113	162	104	199	96	143	184	224	155
74TA 20	30	169	113	162	108	199	96	144	184	224	155
78S 26064	193	169	109	163	109	196	96	144	184	224	155
78S 26066	193	168	113	162	110	197	96	144	184	224	155
74TA 264	254	169	116	162	108	198	96	143	184	224	156
74TA 276	262	167	112	167	92	197	97	143	184	224	154
-	419	169	116	162	104	198	96	144	184	224	155
-	707	168	110	157	92	198	97	143	184	224	153
76TA 66182	915	169	116	158	94	197	96	145	184	224	154
75kf 36423	983	169	110	163	96	198	96	144	184	224	154
-	1042	169	109	157	96	196	96	142	178	224	152
Syr. Loc. Large	4400	169	116	160	104	196	96	144	184	224	155
Local check 1	-	172	115	157	104	200	99	143	174	224	
Local check 2	-	172	120	148	97	194	98	145	177	224	
Location mean		169	113	160	101	197	96	144	182	224	

Table 5.2.4. Plant height (cm) of entries in the LIYT-L at different locations during 1981/82.

ENTRY		AUSTRALIA	CHILE	EGYPT	IRAN	JORDAN	LEBANON	POLAND	SYRIA		TURKEY	U.S.A.	MEAN
Selection	ILL	Wagga Wagga	Urswenos	Sids	Tehran	Marrow	Terbol	Pulawy	Izra'a	Tel Hadya	Ankara	Pullman	
78S 26002	8	34	18	48	26	26	34	36	21	33	27	32	30
74TA 9	15	38	22	47	32	28	37	40	17	31	27	37	32
74TA 19	28	38	25	43	30	23	36	37	20	29	25	32	31
74TA 20	30	38	22	47	32	28	36	41	20	29	27	38	33
78S 26064	193	37	20	48	31	27	36	39	20	26	29	32	31
78S 26066	193	36	18	52	33	27	38	35	20	30	27	32	32
74TA 264	254	39	27	52	34	28	38	42	20	31	25	37	34
74TA 276	262	33	22	52	30	21	37	35	18	27	24	35	30
-	419	38	17	48	31	25	38	37	19	30	27	32	31
-	707	34	22	52	30	29	38	36	19	27	24	33	31
76TA 66182	915	35	20	42	30	20	37	35	18	30	27	33	30
75kf 36423	983	38	22	50	31	23	37	37	19	30	27	35	32
-	1042	35	17	50	29	23	37	35	21	31	23	33	30
Syr. Loc. Large	4400	38	22	48	33	24	38	37	20	27	28	36	32
Local check 1	-	48	23	52	31	31	41	46	18	28	29	37	
Local check 2	-	40	35	50	32	29	38	46	20	30	29	33	
Location mean		37	22	49	31	26	37	38	19	29	27	34	

Table 5.2.5. Seed yield (Y = kg/ha) and rank (R) of entries in the LIYT-L at different locations during 1981/82.

ENTRY		AUSTRALIA		CHILE		EGYPT		IRAN		JORDAN		LEBANON		MOROCCO		POLAND		SYRIA				TURKEY		TUNISIA		U.S.A.		MEAN	
		Wagga Wagga		Urswenos		Sids		Tehran		Marrow		Terbol		Merchouch		Pulawy		Izra'a		Tel Hadya		Ankara		Beja		Pullman			
Selection	ILL	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
78S 26002	8	1401	2	607	12	2204	2	1522	6	327	6	1773	1	979	8	2438	6	293	2	2477	1	329	10	1355	7	2460	5	1397	1
74TA 9	15	997	10	1090	6	639	14	1011	15	327	6	1421	9	549	15	2443	4	222	12	1368	8	435	5	1452	3	2442	7	1107	12
74TA 19	28	1290	3	521	15	1032	8	1367	12	230	11	1139	16	1681	1	2244	10	242	6	1394	6	287	11	1685	1	2353	10	1190	4
74TA 20	30	930	12	565	13	1176	5	1017	14	222	12	1148	15	868	9	2227	12	204	13	1369	7	335	9	810	13	2176	14	1004	14
78S 26064	193	925	13	645	11	625	15	1147	13	516	1	1514	6	819	11	2460	2	200	14	1317	9	425	6	892	12	2462	4	1073	13
78S 26066	193	1021	8	560	14	1014	9	1011	15	-		1588	5	1021	6	2579	1	242	6	1250	12	156	15	1358	6	2022	15	1152	7
74TA 264	254	1009	9	1602	2	657	13	1378	10	239	10	1264	14	1069	5	2070	14	242	6	1492	4	420	8	973	11	2636	2	1158	6
74TA 276	262	1282	4	1151	5	736	12	1433	9	205	13	1352	11	1174	4	2343	7	238	10	1287	10	102	16	1683	2	2333	11	1178	5
-	419	1104	6	507	16	1116	7	1439	8	283	8	1648	2	1007	7	2250	9	167	16	932	16	436	4	1337	9	2333	11	1120	10
-	707	1462	1	1403	3	1250	4	1722	2	378	4	1435	8	681	13	2232	11	249	5	1056	14	169	14	457	16	2398	8	1146	8
76TA 66182	915	331	11	1252	4	787	11	1694	3	422	3	1333	12	854	10	2440	5	260	4	1046	15	421	7	1352	8	1956	16	1134	9
75kf 36423	983	832	15	750	10	495	16	1861	1	-		1319	13	417	16	2266	8	180	15	1123	13	449	3	1385	4	2362	9	1120	10
-	1042	1107	5	955	9	954	10	1689	4	155	14	1403	10	1410	2	2013	15	293	2	2001	2	195	13	1317	10	2647	1	1241	2
Syr. L.L.	4400	1047	7	958	8	1171	6	1478	7	427	2	1616	4	1229	3	2448	3	233	11	1287	10	249	12	1360	5	2460	5	1228	3
Local check 1	-	873	14	1033	7	1431	3	1611	5	361	5	1444	7	819	11	2118	13	451	1	1767	3	493	1	702	14	2529	3		
Local check 2	-	625	16	2229	1	2532	1	1378	10	258	9	1648	2	646	14	1968	16	242	6	1460	5	486	2	628	15	2227	13		
Location mean		1052		989		1114		1422		311		1440		951		2284		248		1414		337		1172		2362			
C.V. %		15.2		36.1		57.5		26.6		-		22.8		38.5		11.9		39.6		12.3		73.9		32.4		13.2			
L.S.D. 5%		266.6		595.7		1067.2		631.4		-		546.8		611.4		452.8		163.3		288.7		415.2		633.3		520.5			
No. of entries significantly exceeding best local check		4		0		0		0		-		0		1		1		0		1		0		9		0			

Table 5.2.6. The five heaviest seed yielding entries at the individual locations in the LIYT-L during 1981/82.

RANK	AUSTRALIA Wagga Wagga		CHILE Urswenos		EGYPT Sids		IRAN Tehran		JORDAN Marrow		LEBANON Terbol	
	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL
1	-	707	Local check 2	-	Local check 2	-	75kf 36423	983	78S 26064	193	78S 26002	8
2	78S 26002	8	74TA 264	254	78S 26002	8	-	707	Syr. L.L.	4400	-	419 (1)
3	74TA 19	28	-	707	Local check 1	-	76TA 66182	915	76TA 66182	915	Local check 2	-
4	74TA 276	262	76TA 66182	915	-	707	-	1042	-	707	Syr. L.L.	4400
5	-	1042	74TA 276	262	74TA 20	30	Local check 1	-	Local check 1	-	78S 26066	193

RANK	MOROCCO Merchouch		POLAND Pulawy		SYRIA Izra'a		SYRIA Tel Hadya		TURKEY Ankara		TUNISIA Beja		U.S.A. Pullman	
	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL
1	74TA 19	28	78S 26066	193	Local check 1	-	78S 26002	8	Local check 1	-	74TA 19	28	-	1042
2	-	1042	78S 26064	193	78S 26002	8	-	1042	Local check 2	-	74TA 276	262	74TA 264	254
3	Syr. L.L.	4400	Syr.L.L.	4400	-	1042	Local check 1	-	75kf 36423	983	74TA 9	15	Local check 1	-
4	74TA 276	262	74TA 9	15	76TA 66182	915	74TA 264	254	-	419	75kf 36423	983	78S 26064	193
5	74TA 264	254	76TA 66182	915	-	707	Local check 2	-	74TA 9	15	Syr. L.L.	4400	78S 26002	8
													Syr. L.L.	4400

1) Genotypes in parenthesis had the same yield.

Table 5.2.7. The mean yield (Y = kg/ha) and rank (R) of common entries in LIYT-L across locations during the years 1979-82.

ENTRY Selection		ILL	1979/80 (1) Y	1979/80 (1) R	1980/81 (2) Y	1980/81 (2) R	1981/82 (3) Y	1981/82 (3) R
78S	26002	8	-	-	1134	1	1397	1
74TA	9	15	1227	1	1112	2	1107	12
74TA	19	28	1140	3	1106	4	1190	4
74TA	20	30	-	-	1073	6	1004	14
74TA	276	262	1219	2	1051	7	1178	5
76TA	66182	915	-	-	981	12	1134	9
75Kf	36423	983	-	-	1047	8	1120	10
-		1042	-	-	998	13	1241	2
Syr. Loc. Large		4400	1102	5	1029	11	1228	3

(1) Mean of 8 locations

(2) Mean of 13 locations

(3) Mean of 13 locations

Table 5.2.8. Correlations (df = 10) between different locations for the seed yield of entries in the LIYT-L during 1981/82.

LOCATION		CHILE	EGYPT	IRAN	JORDAN	LEBANON	MOROCCO	POLAND	SYRIA		TURKEY	TUNISIA	U.S.A.
		Urswenos	Sids	Tehran	Marrow	Terbol	Merchouch	Pulawy	Izra'a	Tel Hadya	Ankara	Beja	Pullman
AUSTRALIA	Wagga Wagga	0.01	0.59*	0.49	-0.21	0.24	0.22	-0.09	0.42	0.29	-0.63*	0.04	0.19
CHILE	Urswenos		-0.40	0.36	0.03	-0.20	-0.27	-0.21	0.32	-0.20	-0.17	-0.25	0.14
EGYPT	Sids			0.28	-0.02	0.52	0.07	0.13	0.38	0.59*	-0.17	-0.05	0.02
IRAN	Tehran				-0.01	0.25	0.28	-0.24	0.59*	0.09	-0.45	0.01	-0.01
JORDAN	Marrow					0.44	-0.50	0.74**	-0.20	-0.29	0.36	-0.30	-0.23
LEBANON	Terbol						-0.23	0.43	0.05	0.29	0.09	0.04	0.25
MOROCCO	Merchouch							-0.41	0.28	0.25	-0.39	0.54	0.24
POLAND	Pulawy								-0.16	-0.12	0.24	0.22	-0.43
SYRIA	Izra'a									0.70*	-0.42	0.15	0.22
	Tel Hadya										-0.14	0.18	0.48
TURKEY	Ankara											-0.07	-0.16
TUNISIA	Beja												-0.07

* P $\leq$ 0.05, ** P $\leq$ 0.01.

5.3. LENTIL INTERNATIONAL YIELD TRIAL-SMALL SEEDED (LIYT-S)

Material

The Lentil International Yield Trial-Small seeded (LIYT-S) comprised 22 test entries with a seed size less than 4.5 g/100 seeds. The test entries were selections from germplasm from a total of 9 countries which showed good performance in the Lentil International Screening Nursery Small-seeded. There was provision for two local check cultivars, in addition to the 22 test entries, at each location.

Methods and Management

The trial design was randomized complete block with four replications. The suggested planting arrangement was 4 m long plots of 4 rows 25 cm apart with a plant population of 200 plants/m^2. But co-operators were encouraged to use the locally recommended practices for lentil production in the management of the trial. Following 40 requests for LIYT-S, a total of 36 sets were distributed to 15 countries. Data were returned from 16 sites namely Mallawi and Shandweel in Egypt; Debre Zeit in Ethiopia; Tehran in Iran; Sicily in Italy; Kafardan and Terbol in Lebanon; Merchouch and Sidi Laidi in Morocco; Islamabad (2 sites) and Tarnab in Pakistan; Madrid in Spain; Izra'a and Tel Hadya in Syria; and Izmir in Turkey. The detail of the crop husbandry at the various locations is given in Table 5.3.1.

Results and Discussion

Amongst the test locations flowering was earliest at Tehran in Iran (49 days) and latest at Terbol in Lebanon (152 days) (Table 5.3.2). The earliest entry was ILL 1744 from Ethiopia which flowered

after an average of 96 days and matured in 151 days on average. Most of the entries with a Jordanian origin were also relatively early to flower. Winterlik Red 51 (ILL 1880) from Turkey and 74TA 305 (ILL 287) from Greece were amongst the latest to flower and latest to mature (Table 5.3.3).

The plants were tallest at Izmir in Turkey (50 cm) and shortest at Izra'a in Syria where they reached only 18 cm height on average because of the low rainfall conditions (Table 5.3.4). The later maturing entries, in general, achieved the greatest plant height.

The seed yield and coefficient of variation (Table 5.3.5) varied markedly over the locations. The highest mean yield, 2088 kg/ha, was achieved at Mallawi in Egypt which was followed by Tel Hadya in Syria (1793 kg/ha) and Terbol in Lebanon (1666 kg/ha). In contrast at some of the other locations including Islamabad I and II Tarnab, Madrid, Izra'a, Sicily and Shandweel, the yields were less than 500 kg/ha. At some of the locations the CV was extremely high and these included Madrid, Tarnab, Islamabad II, Sicily and Tehran. It can be seen in Table 5.3.6 that the local checks only figure prominently at Islamabad in Pakistan and Izra'a in Syria where there were droughty conditions during growth. Elsewhere, the ICARDA test entries yielded more than the local check cultivars and advantage in yield was significant at 10 sites.

Amongst the entries 78S 26013 (ILL 16) a selection made at ICARDA originating in Jordan produced the highest mean yield of 1051 kg/ha across the sites, and ranked in the top 5 entries at 7 sites. The entry with the second highest mean yield (991 kg/ha) was another selection originating from Jordan, namely 78S 26004 (ILL 9). This entry also showed wide adaptation to the Mediterranean region by

ranking amongst the best three entries at seven sites. A summary of the results of entries common to the last three seasons of LIYT-S are given in Table 5.3.7. 78S 26013 (ILL 16) was the best entry, on average since its inclusion in LIYT-S, ranking first in both the 1980/81 and 1981/82 seasons. Another entry 76TA 66005 also showed a comparatively more consistent and better performance during the last two years of its testing.

The correlations of genotypic performance at different sites showed the similarity between the yields within Syria at Tel Hadya and Izra'a (Table 5.3.8). The performance in Syria was also correlated to that in Izmir, Turkey; Madrid, Spain; and Merchouch, Morocco. The performance at the two Egyptian sites was also correlated.

Table 5.3.1. Agronomic data for different locations for the LIYT-S during 1981/82.

Country	Location	Planting Date	Crop Duration (days)	Fertilizer (Kg/ha)			Crop Husbandry
				N	P_2O_5	K_2O	
EGYPT	Mallawi	15-12-1981	147	15	15		2 Irrig.
	Shandweel	25-11-1981	144	-	-	-	
ETHIOPIA	Debre Zeit	21- 7-1982	122	-	-	-	
IRAN	Tehran	10- 4-1982	97	18	46		7 Irrig.-Metasystox, Diazinon
ITALY	Sicily	5- 3-1982	102		60		
LEBANON	Kfardan	19-12-1981	NR	-	-	-	
	Terbol	17-11-1981	196	-	-	-	
MOROCCO	Merchouch	17-11-1981	NR	30	40	60	
	Sidi Laidi	4-12-1981	NR	30	40	60	
PAKISTAN	Islamabad I	3-11-1981	172	28	45		3 Irrig.
	Islamabad II	5-11-1981	147	23	38		
	Tarnab	16-11-1981	172	-	-	-	
SPAIN	Madrid	27-11-1981	159	40	120		
SYRIA	Izra'a	NR	143	-	-	-	
	Tel Hadya	21-11-1981	179		50		
TURKEY	Izmir	20-11-1982	148	-	-	-	

NR = Not reported

Table 5.3.2. Time to flowering (days) for entries in the LIYT-S at different locations during 1981/82.

ENTRY Selection	ILL	Origin	EGYPT Mallawi	EGYPT Shandweel	ETHIOPIA Debre Zeit	IRAN Tehran	ITALY Sicily	LEBANON Terbol	PAKISTAN Islamabad I	PAKISTAN Islamabad II	PAKISTAN Tarnab	SPAIN Madrid	SYRIA Izra'a	SYRIA Tel Hadya	MEAN
76TA 66005	1	Jordan	80	91	47	43	-	150	128	89	126	108	105	136	100
78S 26003	8	Jordan	83	96	67	43	-	151	131	83	126	107	106	137	103
78S 26004	9	Jordan	83	95	66	45	68	152	133	84	127	110	105	137	100
78S 26013	16	Jordan	88	100	-	48	73	152	140	91	127	112	106	139	107
78S 26018	19	Jordan	81	93	55	43	67	152	128	85	126	109	104	136	98
78S 26024	23	Jordan	83	100	85	49	72	152	129	90	126	113	108	142	104
76TA 66054	99	Morocco	83	97	64	50	68	150	117	91	126	108	105	139	100
76TA 66116	264	Hungary	89	100	58	46	70	152	143	93	126	112	109	140	103
74TA 305	287	Greece	88	105	85	56	76	156	144	85	126	124	110	149	109
75Kf 36213	351	Mexico	87	96	83	56	76	152	117	84	126	111	109	144	103
74TA 441	353	Mexico	90	101	85	55	71	152	143	93	126	112	109	140	106
74TA 549	470	Syria	89	101	-	57	72	152	143	87	126	112	108	142	108
74TA 565	495	Mexico	88	100	85	56	78	153	146	89	126	115	109	147	108
74TA 572	498	Mexico	89	98	-	49	74	152	121	91	126	116	109	142	106
74TA 577	500	Mexico	86	96	85	48	72	152	115	98	126	113	110	142	104
74TA 580	501	Mexico	87	100	-	49	71	152	118	86	126	110	108	142	104
74TA 583	502	Mexico	89	99	-	50	76	152	117	86	126	114	109	144	106
75Kf 37356	752	Lebanon	82	94	86	46	73	154	121	89	126	111	108	140	103
-	1744	Ethiopia	74	70	53	42	67	150	132	87	127	110	104	135	96
Wint. R. 51	1880	Turkey	91	102	-	53	79	155	141	83	126	117	109	145	109
Jord. Loc.	4354	Jordan	82	93	57	43	68	151	133	84	128	110	105	138	99
Syr. Loc. S.	4401	Syria	91	99	85	48	71	151	134	85	126	114	108	140	104
Local check 1			69	65	45	54	78	155	115	89	126	124	107	135	
Local check 2			70	65	51	56	-	151	116	90	126	120	107	141	
Location mean			84	94	69	49	72	152	129	88	126	113	107	141	

Table 5.3.3. Time to maturity (days) for entries in the LIYT-S at different locations during 1981/82.

ENTRY		EGYPT		IRAN	LEBANON	PAKISTAN			SPAIN	SYRIA		MEAN
Selection	ILL	Mallawi	Shandweel	Tehran	Terbol	Islamabad I	Islamabad II	Tarnab	Madrid	Izra'a	Tel Hadya	
76TA 66005	1	147	143	87	196	171	149	171	157	144	177	154
78S 26003	8	142	142	92	196	174	149	172	150	143	177	154
78S 26004	9	143	144	94	195	172	146	172	159	142	177	154
78S 26013	16	149	145	97	195	174	148	171	160	141	177	156
78S 26018	19	148	142	92	196	172	148	170	162	142	178	155
78S 26024	23	151	146	97	197	170	150	171	161	144	179	157
76TA 66054	99	149	145	97	195	169	150	173	164	141	176	156
76TA 66116	264	144	146	97	196	173	143	173	158	142	177	155
74TA 305	287	153	147	104	198	179	146	172	165	146	185	160
75Kf 36213	351	150	142	104	198	172	147	173	162	145	183	158
74TA 441	353	141	147	92	196	174	145	171	153	143	177	154
74TA 549	470	147	145	97	193	178	149	171	155	143	176	155
74TA 565	495	156	145	97	197	177	143	173	158	146	180	157
74TA 572	498	144	143	104	195	172	147	170	157	144	180	156
74TA 577	500	148	144	97	197	172	147	171	163	144	180	156
74TA 580	501	145	144	97	196	172	149	172	159	144	180	156
74TA 583	502	152	145	97	196	172	149	171	159	145	183	157
75Kf 37356	752	146	143	104	200	168	150	171	159	146	183	157
-	1744	142	138	97	181	168	143	170	157	140	170	151
Wint. R. 51	1880	152	144	97	196	178	148	173	163	144	183	158
Jord. Loc.	4354	147	143	92	197	172	146	172	160	144	179	155
Syr. Loc. Small	4401	143	142	92	194	173	151	172	156	144	177	154
Local check 1		142	139	104	199	168	137	172	168	142	170	
Local check 2		141	141	97	195	168	136	174	162	142	184	
Location mean		147	144	97	196	172	147	172	159	143	179	

Table 5.3.4. Plant height (cm) of entries in the LIYT-S at different locations during 1981/82.

ENTRY		EGYPT		IRAN	ITALY	JORDAN	LEBANON	PAKISTAN		SPAIN	SYRIA		TURKEY	MEAN
Selection	ILL	Mallawi	Shandweel	Tehran	Sicily	Marrow	Terbol	Islamabad I	Islamabad II	Madrid	Izra'a	Tel Hadya	Izmir	
76TA 66005	1	29	36	25	-	24	36	36	30	34	18	29	47	31
78S 26003	8	30	41	28	-	27	32	35	28	33	18	28	47	32
78S 26004	9	28	42	24	28	23	33	31	36	34	20	27	49	31
78S 26013	16	24	35	30	31	34	37	34	31	34	22	30	49	33
78S 26018	19	28	35	28	27	25	34	36	34	37	20	29	48	32
78S 26024	23	27	39	28	29	26	35	40	33	37	21	30	52	33
76TA 66054	99	27	44	27	27	20	34	46	35	36	21	28	48	33
76TA 66166	264	31	38	24	28	-	35	36	33	36	17	30	44	32
74TA 305	287	21	44	34	29	-	40	50	32	34	16	33	50	35
75Kf 36213	351	22	49	32	30	26	41	43	32	36	18	31	60	35
74TA 441	353	22	36	24	23	-.	34	32	34	34	17	29	48	30
74TA 549	470	21	38	27	23	23	33	26	28	33	15	28	49	29
74TA 565	495	19	47	30	28	19	40	37	33	35	20	31	59	33
74TA 572	498	27	34	26	27	28	36	28	24	34	17	27	52	30
74TA 577	500	27	38	25	27	20	38	33	32	34	16	27	52	31
74TA 580	501	26	34	25	26	30	32	31	33	32	15	27	53	30
74TA 583	502	26	41	22	26	22	37	32	31	33	17	29	53	31
75Kf 37356	752	27	37	30	26	27	39	28	37	34	20	31	55	33
-	1744	27	34	19	20	23	30	29	36	29	17	25	43	28
Wint. R. 51	1880	26	36	24	26	21	37	27	33	37	17	27	48	30
Jord. Loc.	4354	30	36	26	29	22	35	36	34	37	19	31	50	32
Syr. Loc. S.	4401	20	37	26	26	22	36	31	31	34	19	30	45	30
Local check 1		31	47	28	26	29	42	36	34	36	22	26	54	
Local check 2		33	42	28	-	23	37	36	29	32	21	28	55	
Location mean		26	39	27	27	24	36	35	29	34	18	29	50	

Table 5.3.5. Seed yield (Y = kg/ha) and rank (R) of entries in the LIYT-S at different locations during 1981/82.

ENTRY		EGYPT				IRAN		ITALY		LEBANON				MOROCCO				PAKISTAN						SPAIN		SYRIA				TURKEY		MEAN	
Selection	ILL	Malawi		Shandweel		Tehran		Sicily		Kfardan		Terbol		Merchouch		Sidi Laidi		Islamabad I		Islamabad II		Tarnab		Madrid		Izra'a		Tel Hadya		Izmir			
		Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
76TA 66005	1	2375	6	514	13	646	23	613	4	565	8	1726	10	1604	7	641	9	294	3	188	10	708	1	409	2	338	6	2371	2	1250	19	949	5
78S 26003	8	2361	7	771	1	1054	18	759	2	559	9	1510	16	1634	5	453	19	43	23	90	23	500	4	338	4	337	7	2343	3	1533	7	952	4
78S 26004	9	2722	1	681	3	1213	10	630	3	661	2	1476	20	1844	3	565	13	48	21	146	19	394	7	508	1	298	9	2083	9	1600	3	991	2
78S 26013	16	1847	18	583	6	1658	3	485	9	530	11	2352	1	2234	1	680	7	65	19	156	15	531	2	216	13	415	4	2459	1	1559	5	1051	1
78S 26018	19	2569	2	674	5	1146	13	364	15	591	4	1654	12	1934	2	719	5	48	21	156	15	344	11	305	6	413	5	2325	4	1321	15	971	3
78S 26024	23	2292	8	681	3	1123	14	536	7	391	22	1465	21	1385	10	526	15	41	24	89	24	325	13	156	18	233	17	2142	7	1558	6	863	11
76TA 66054	99	2458	4	576	7	1071	15	281	19	346	23	1503	17	1776	4	831	2	124	9	156	15	294	17	236	9	432	3	2087	8	1659	2	922	6
76TA 66116	264	1931	16	521	12	1613	5	512	8	514	15	1632	13	1292	11	818	3	115	11	234	8	306	16	153	19	295	10	1988	11	1400	11	888	8
74TA 305	287	2222	10	528	11	2271	2	458	11	409	21	1399	23	1042	17	547	14	107	12	307	6	406	6	206	14	147	23	1574	14	1334	14	864	10
75Kf 36213	351	2250	9	472	15	2400	1	607	5	586	5	1753	8	1000	19	573	12	80	16	125	20	525	3	292	7	227	18	1274	22	1192	20	890	7
74TA 441	353	1458	23	174	22	1242	9	258	20	476	20	1962	2	1619	6	450	20	50	20	182	12	250	20	231	10	323	8	2026	10	1517	8	815	15
74TA 549	470	1667	22	208	21	1629	4	289	17	524	12	1920	3	1536	8	357	23	80	16	91	22	388	8	272	8	257	13	2167	6	1483	10	858	12
74TA 565	495	2403	5	424	17	1454	6	916	1	538	10	1681	11	1182	12	742	4	106	13	182	12	250	20	153	19	245	14	1465	18	992	22	849	14
74TA 572	498	2063	13	347	20	1263	8	373	14	482	19	1566	15	943	21	852	1	154	6	214	9	256	19	84	23	265	12	1628	13	1367	13	790	19
74TA 577	500	2181	11	549	9	925	21	448	12	514	15	1771	7	979	20	685	6	144	7	156	15	331	12	153	19	243	15	1546	16	1275	17	793	18
74TA 580	501	2056	14	396	19	1446	7	483	10	739	1	1441	22	1151	15	664	8	106	13	318	4	450	5	227	11	223	19	1547	15	1517	8	851	13
74TA 583	502	2139	12	466	16	1058	16	284	18	521	14	1896	4	1030	18	578	11	143	8	339	3	319	14	164	17	198	21	1155	23	1258	18	770	20
75Kf 37356	752	2542	3	410	18	1158	12	596	6	567	7	1503	17	776	23	448	21	157	4	266	7	375	9	322	5	243	15	1417	19	1283	16	804	16
-	1744	1917	17	479	14	113	24	25	23	309	24	1233	24	906	22	526	15	93	15	109	21	269	18	33	24	118	24	1093	24	1583	4	587	22
Minz. R. 51	1880	1333	24	174	22	1042	19	250	21	522	13	1503	17	776	23	328	24	76	18	313	5	163	24	227	11	195	22	1338	21	1092	21	622	21
Jord. Loc.	4354	2042	15	542	10	996	20	312	16	625	3	1743	9	1505	9	628	10	156	5	176	14	225	23	352	3	280	11	2171	5	1400	11	877	-
Syr. Loc. S.	4401	1764	20	160	24	1058	16	417	13	491	17	1885	5	1125	16	503	17	117	10	183	11	356	10	178	16	223	19	1934	12	1662	1	804	10
Loc. Check 1	-	1792	19	750	2	825	22	91	22	577	6	1785	6	1167	13	469	18	1426	1	1426	1	250	20	191	15	465	1	1390	20	617	24		
Loc. check 2	-	1736	21	576	7	1204	11	-		491	17	1628	14	1161	14	372	22	1324	2	417	2	319	14	116	22	445	2	1513	17	692	23		
Location mean		2088		486		1234		434		522		1666		1317		581		212		209		356		230		286		1793		1339			
C.V.%		19.2		20.1		54.8		60.7		37.9		19.9		32.3		26.6		40.8		54.8		62.3		96.2		34.3		12.9		27.2			
L.S.D. 5%		563.8		137.3		953.8		371.9		279.5		459.3		692.1		217.8		122.1		181.6		312.1		311.9		138.3		327.6		512.9			
No. of entries significantly exceeding best local check.		7		0		2		10		0		1		4		5		0		0		1		1		0		12		20			

Table 5.3.6. The five heaviest seed yielding entries at the individual locations in the LIYT-S during 1981/82.

RANK	EGYPT				IRAN		ITALY		LEBANON				MOROCCO			
	Mallawi		Shandweel		Tehran		Sicily		Kafardan		Terbol		Merchouch		Sidi Laidi	
	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL
1	78S 26004	9	78S 26003	8	78Kf 36213	351	74TA 565	495	74TA 580	501	78S 26013	16	78S 26013	16	74TA 572	498
2	78S 26018	19	Local check 1	-	74TA 305	287	78S 26003	8	78S 26004	9	74TA 441	353	78S 26018	19	76TA 66054	99
3	75Kf 37356	752	78S 26004	9 (1)	78S 26013	16	78S 26004	9	Jord. Loc.	4354	74TA 549	470	78S 26004	9	76TA 66116	264
4	76TA 66054	99	78S 26024	23	74TA 549	470	76TA 66005	1	78S 26018	19	74TA 583	502	76TA 66054	99	74TA 565	495
5	74TA 565	495	78S 26018	19	76TA 66116	264	75Kf 36213	351	75Kf 36213	351	Syr. Loc. S.	4401	78S 26003	8	78S 26018	19

RANK	PAKISTAN						SPAIN		SYRIA				TURKEY	
	Islamabad		Islamabad		Tarnab		Madrid		Izra'a		Tel Hadya		Izmir	
	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL
1	Local check 1	-	Local check 1	-	76TA 66005	1	78S 26004	9	Local check 1	-	78S 26013	16	Syr. Loc. S.	4401
2	Local check 2	-	Local check 2	-	78S 26013	16	76TA 66005	1	Local check 2	-	76TA 66005	1	76TA 66054	99
3	76TA 66005	1	74TA 583	502	75Kf 36213	351	Jord. Loc.	4354	76TA 66054	99	78S 26003	8	78S 26004	9
4	75Kf 37356	752	74TA 580	501	78S 26003	8	78S 26003	8	78S 26013	16	78S 26018	19	-	1744
5	Jord. Local	4354	Wint. R. 51	1880	74TA 580	501	75Kf 37356	752	78S 26018	19	Jord. Loc.	4354	78S 26013	16

(1) Genotypes in parenthesis had the same yield.

Table 5.3.7. The mean yield (Y = kg/ha) and rank (R) of the common entries in LIYT-S across locations during the years 1979-82.

ENTRY		1979-80[1]		1980-81[2]		1981-82[3]	
Selection	ILL	Y	R	Y	R	Y	R
76TA 66005	1		-	1098	2	949	5
78S 26013	16		-	1105	1	1051	1
76TA 66054	99	759	8	945	11	922	6
76TA 66116	264	815	3	902	16	888	8
74TA 305	287		-	904	15	864	10
75Kf 36213	351		-	884	17	890	7
74TA 441	353	846	1	1039	4	815	15
74TA 549	470	475	22	864	18	858	12
74TA 572	498	746	9	967	10	790	19
74TA 580	501	805	4	1009	6	851	13
75kf 37356	752		-	969	9	804	16
-	1744	607	13	588	23	587	22
-	1880	494	21	1017	5	622	21
-	4354	803	5	1002	7	877	9
Syr. Loc. Small	4401	575	15	736	20	804	16

(1) Mean of 11 locations
(2) Mean of 13 locations
(3) Mean of 15 locations

Table 5.3.8. Correlations (df = 20) between the seed yield of entries in the LIYT-S at different locations during 1981/82.

LOCATION		EGYPT	IRAN	ITALY	LEBANON		MOROCCO		PAKISTAN			SPAIN	SYRIA		TURKEY
		Shandweel	Tehran	Sicily	Kfardan	Terbol	Merchouch	Sidi Laidi	Islamabad I	Islamabad II	Tarnab	Madrid	Izra'a	Tel Hadya	Izmir
EGYPT	Mallawi	0.75**	0.01	0.55**	0.18	-0.35	0.20	0.40	0.15	-0.17	0.16	0.42*	0.26	0.12	-0.05
	Shandweel		-0.05	0.37	0.05	-0.24	0.44*	0.37	-0.12	-0.34	0.24	0.29	0.36	0.35	0.15
IRAN	Tehran			0.36	0.23	0.24	0.03	0.06	-0.27	0.16	0.20	0.09	-0.01	-0.02	-0.21
ITALY	Sicily				0.43*	0.02	0.12	0.16	0.04	-0.10	0.44*	0.37	0.18	0.19	-0.32
LEBANON	Kfardan					0.19	0.15	-0.01	0.06	0.22	0.23	0.61**	0.17	0.15	-0.23
	Terbol						0.43*	0.01	0.02	-0.10	0.20	0.05	0.41	0.36	-0.01
MOROCCO	Merchouch							0.21	-0.25	-0.47*	0.29	0.48*	0.84**	0.87**	0.40*
	Sidi Laidi								0.30	0.03	0.18	-0.22	0.40	0.12	-0.02
PAKISTAN	Islamabad I									0.31	0.27	0.07	-0.05	-0.09	-0.31
	Islamabad II										-0.12	-0.13	-0.33	-0.48*	-0.39
	Tarnab											0.31	0.28	0.34	-0.09
SPAIN	Madrid												0.42*	0.49*	0.03
SYRIA	Izra'a													0.78**	0.25
	Tel Hadya														0.45*

* $p \leq 0.05$, ** $p \leq 0.01$

5.4. LENTIL INTERNATIONAL SCREENING NURSERY-LARGE SEEDED (LISN-L)

Material

The Lentil International Screening Nursery-Large Seeded (LISN-L) comprised test entries with a seed size greater than 4.5 g/100 seeds. Thirty-five of these entries were selections from germplasm originating in 16 countries, and the remaining 11 entries were selected from single crosses made in Lebanon in 1975. The entries were selected on the basis of their performance in trials in both Lebanon and Syria. In addition to test entries, two checks namely ILL 440 and 74TA 138 (ILL 101) were supplied from Tel Hadya and the third check was added by the co-operator.

Methods and Management

The test entries along with the checks were grown in single unreplicated rows which were arranged in an augmented complete block design. There were 200 seeds/row, and it was suggested that cooperators plant at a density of 200 plants/m^2. Cooperators were also urged to use the locally recommended crop husbandry for the management of the trial.

The total of 35 sets of LISN-L were distributed to 17 countries. Data were received back from 15 locations and 10 data sets could be analyzed. These included, Temuco in Chile; Tehran in Iran; Rome in Italy; Terbol in Lebanon; Lahore in Pakistan; Madrid in Spain; Tel Hadya in Syria; Ankara and Diyarbakir in Turkey; and Pullman in USA. The details of the agronomic practices used are presented in Table 5.4.1.

Results and Discussion

The range in time to flowering was from 109 - 133 days (Table 5.4.2). The earliest entries to flower were ILL 842 and ILL 851 from Lebanon, and ILL 4605 from Argentina. The latest entry to both flowering and maturity was 78S 26127 (ILL 642) from Turkey. The correlations (Table 5.4.3) showed the existence of positive and significant association between time to flowering and maturity. The overall range in plant height of the entries was from 29-38 cm with Laird (ILL 4349) being the tallest entry. There was a significant and positive correlation between time to flowering and plant height. None of these three agronomic characters exhibited association with seed yield.

The seed yield at different locations varied by a margin of ten fold with 2222 kg/ha realized at Temuco in Chile and only 213 kg/ha harvested at Madrid in Spain (Table 5.4.4). Similarly there were marked differences in the coefficients of variation across sites. For example, the coefficient of variation at Temuco in Chile was 6.4%, and it was 84.1% at Ankara in Turkey.

The macrosperma entries were not well adapted to the Indus plain where exclusively microsperma cultivars are grown. In Lahore all the test entries were later to both flowering and maturity than the local check; consequently the test entries yielded poorly, if at all. At the other nine locations the local check ranked lower, and it was outyielded by some of the test entries. Thus it ranked 2, 13, 14, 37, 19, 17, 7, 8 and 21 in Chile, Iran, Italy, Lebanon, Spain, Syria, Turkey (both sites) and USA respectively.

The highest mean yield was achieved by ILL 857, a selection from Algeria, with a yield of 1506 kg/ha. ILL 857 ranked first or

second at three sites. The second best yield was given by ILL 851, a selection from Lebanon, with 1419 kg/ha. Amongst the five best entries there was little consistency in performance across locations (Table 5.4.5).

Table 5.4.1. Agronomic data for different locations for the LISN-L during 1981/82.

Country	Location	Planting Date	Crop Duration (days)	Fertilizer (kg/ha)			Crop Husbandry
				N	P_2O_5	K_2O	
CHILE	Temuco	16. 8.81	143		150		S.T.Benlate + Calixin M + A.t.t.ic
ETHIOPIA	Debre Zeit	21. 7.82	133	-	-	-	
IRAN	Tehran	12. 4.82	97	18	46		7 Irrig.
ITALY	Rome	16. .82	151	56	100		
	Sicily	6. 3.82	NR		60		
LEBANON	Terbol	1.12.81	188	-	-	-	
PAKISTAN	Lahore	7.11.81	181	-	-	-	3 Irrig.
SPAIN	Madrid	27.11.81	231	40	120		
SYRIA	Tel Hadya	22.11.81	185		50		
TURKEY	Ankara	3.11.81	230	20	60		
	Diyarbakir	NR	NR	-	-	-	
U.S.A.	Pullman	6. 5.82	104	-	-	-	Tolban

NR = Not reported.

Table 5.4.2. Values for three agronomic characters for the entries across locations in the LISN-L during 1981/82.

ENTRY		Country of	Time to flowering	Time to maturity	Plant height
Selection	ILL	origin	(days)	(days)	(cm)
76TA 66012	6	Jordan	116	162	30
-	7	Jordan	114	158	30
78S 26011	15	Jordan	114	161	31
-	20	Jordan	114	157	32
-	23	Jordan	111	157	29
-	39	Syria	118	161	32
-	45	Syria	122	162	31
78S 26052	112	Turkey	119	147	33
74TA 265	254	Greece	122	161	29
76TA 66136	323	Yugoslavia	124	164	32
-	323	Yugoslavia	125	162	32
78S 26127	642	Turkey	133	166	33
-	707	Hungary	120	159	31
-	780	Syria	125	160	33
-	842	Lebanon	109	150	32
-	851	Lebanon	109	149	32
-	857	Algeria	114	161	32
-	920	Tunisia	111	150	29
-	947	Iran	122	162	32
-	975	Chile	117	157	30
75kf 36822	1397	Iran	123	163	30
-	2149	Jordan	112	153	30
Laird	4349	Canada	127	159	38
Cyprus Local	4368	Cyprus	120	159	33
-	4507	Syria	127	161	30
-	4515	Syria	126	161	33
-	4523	Syria	119	160	32
-	4524	Syria	126	161	31

Contd..

Cont'd Table 5.4.2.

ENTRY Selection	ILL	Country of origin	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
Precoz	4605	Argentina	110	158	29
Nablus	4606	Palestine	114	157	30
Chilean 78	4711	U.S.A.	117	154	36
79Sh 4867 X 75TA	30	ICARDA, Syria	123	162	34
79S 53247 X 75TA	49	ICARDA, Syria	127	162	33
79S 59741 X 75TA	49	ICARDA, Syria	124	163	31
79Sh 4806 X 75TA	49	ICARDA, Syria	125	163	32
79Sh 4809 X 75TA	49	ICARDA, Syria	113	153	34
79Sh 4890 X 75TA	49	ICARDA, Syria	125	163	33
78S 13621-1 X 75TA	53	ICARDA, Syria	124	163	33
79Sh 4908 X 75TA	82	ICARDA, Syria	121	163	32
79 Ter 46	4400	Syria	120	164	33
80S 50507	4400	Syria	123	163	33
79 Ter 794	4400	Syria	122	163	34
79 Ter 835 X 75TA	24	ICARDA, Syria	123	163	33
79 Ter 860	4400	Syria	124	164	33
79 Ter 1774 X 75TA	44	ICARDA, Syria	128	164	33
79 Ter 3032 X 75TA	82	ICARDA, Syria	125	164	30
Check 1	4400	Syria	120	160	32
Check 2	101	Morocco	123	162	30

Table 5.4.3. Correlations between three agronomic characters and seed yield based on means across locations in the LISN-L during 1981/82.

Trait	Time to maturity	Plant height	Seed Yield
Time to 50% flowering	0.63**	0.38**	-0.19
Time to maturity		-0.07	0.06
Plant height			-0.21

** $P \leq 0.01$

Table 5.4.4. Adjusted seed yield (Y=kg/ha) and rank (R) of entries in the LISN-L at different locations during 1981/82.

ENTRY		CHILE		IRAN		ITALY		LEBANON		PAKISTAN		SPAIN		SYRIA		TURKEY				U.S.A.		MEAN [1]	
Selection	ILL/ cross	Temuco		Tehran		Roma		Terbol		Lahore		Madrid		Tol Hodya		Ankara		Diyorbakir		Pullman			
		Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
76TA 66012	6	1951	34	449	18	1200	18	3362	1	459	5	88	45	1132	36	0	26	590	33	1703	12	1309	7
-	7	1858	38	249	36	1200	18	1829	7	-	-	63	46	1945	4	-	-	340	46	1289	34	1097	35
78S 26011	15	1865	37	0	42	1408	7	2540	2	260	19	63	46	1478	19	0	26	190	48	1189	39	1092	36
-	20	1631	43	123	40	1450	5	1551	15	333	9	113	42	1598	15	0	26	390	42	1983	4	1105	34
-	23	1898	35	316	33	1200	18	2251	4	293	14	113	42	1652	12	0	26	390	42	1709	14	1191	18
-	39	2565	18	16	41	1033	36	1551	15	233	21	138	39	1185	32	0	26	1790	2	1036	45	1164	25
-	45	2738	11	0	42	1117	30	2073	5	263	18	188	30	1038	42	0	26	1980	1	1696	15	1354	4
78S 26052	112	1238	47	0	42	1367	10	1740	8	351	8	363	4	2345	2	-	-	490	39	1503	26	1131	29
74TA 265	254	2905	6	0	42	1450	5	1518	17	100	24	263	9	1332	29	0	26	840	27	1483	28	1224	13
76TA 66136	323	2105	25	0	42	783	45	1351	24	-	-	188	30	905	46	0	26	990	22	1943	5	1033	38
-	323	2996	4	458	17	1200	18	1633	12	293	14	263	9	1078	39	436	8	1273	11	938	47	1230	12
78S 26127	642	2243	24	238	37	992	38	1044	40	-	-	238	17	892	47	204	25	523	38	1152	40	915	45
-	707	2603	17	552	9	1367	10	1655	11	-	-	263	9	1078	39	-	-	373	45	1545	24	1180	19
-	780	3056	3	438	21	1200	18	1299	27	-	-	238	17	1412	21	649	3	1123	19	672	48	1180	19
-	842	2443	21	412	23	1367	10	1410	19	-	-	163	37	1932	6	-	-	223	47	-	-	1136	28
-	851	2803	9	412	23	1492	3	1388	21	317	12	188	30	2385	1	-	-	823	29	1858	6	1419	2
-	857	2729	13	698	2	1742	1	1599	13	-	-	213	25	1678	10	-	-	173	49	3212	1	1506	1
-	920	1983	31	678	3	1242	16	2355	3	-	-	263	9	1798	9	-	-	623	31	1465	29	1301	8
-	947	2789	10	378	27	1158	23	1177	31	-	-	213	25	1398	24	1217	1	873	26	1025	46	1126	31
-	975	2296	22	285	34	1492	3	2021	6	477	4	213	25	1932	6	-	-	573	35	1725	12	1317	6
75Kf 36822	1397	1381	45	703	1	1283	15	899	42	-	-	222	22	634	49	227	22	540	37	1503	26	896	46
-	2149	1641	42	409	25	1408	7	1388	21	-	-	247	13	1060	41	-	-	390	42	1543	25	1011	40
Laird	4349	1074	48	-	-	950	42	677	47	49	25	497	1	1127	37	246	21	1190	15	1563	22	1011	40
Cyprus Local	4368	3341	1	656	5	1117	30	1344	25	572	2	272	8	927	44	299	19	690	30	1063	44	1176	21
-	4507	2001	30	283	35	1075	34	1177	31	451	6	247	13	1340	26	210	23	840	27	1556	23	1065	37

cont'd 2/

nt'd. Table 5.4.4.

ENTRY		CHILE		IRAN		ITALY		LEBANON		PAKISTAN		SPAIN		SYRIA		TURKEY				U.S.A.		MEAN(1)	
Selection	ILL/ cross	Temuco		Tehran		Rome		Terbol		Lahore		Madrid		Tel Hadya		Ankara		Diyarbakir		Pullman			
		Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
-	4515	2561	19	343	30	1117	30	821	45	332	10	322	6	1340	26	352	16	1640	3	2069	3	1277	9
-	4523	2294	23	369	28	1158	23	977	41	265	17	372	3	1340	26	263	14	1240	12	2129	2	1235	11
-	4524	2514	20	203	38	1075	34	1410	19	310	13	172	35	914	45	494	4	1290	9	1729	11	1163	26
Precoz	4605	1727	40	-	-	1158	23	1121	36	-	-	472	2	1474	20	-	-	440	41	1836	8	1175	23
Nablus	4606	521	49	149	39	1533	2	1321	26	404	7	297	7	1407	23	-	-	590	33	1809	9	953	43
Chilean 78	4711	2030	29	574	7	686	48	277	48	239	20	230	19	1225	31	-	-	457	40	1392	31	859	47
79Sh 4867	x75TA 30	1596	44	320	32	769	46	1144	35	-	-	55	48	1492	18	986	2	907	24	1085	43	921	44
79S 53247	49	1836	39	494	14	769	46	1155	34	-	-	130	40	1252	30	364	14	1157	17	1285	35	1010	42
79S 59741	49	1963	32	467	16	1144	26	1077	38	166	23	330	5	1892	8	-	-	907	24	1785	10	1196	16
79Sh 4806	49	1883	36	407	26	1144	26	1388	21	-	-	130	40	1958	3	-	-	1057	20	1665	16	1204	15
79Sh 4809	49	1316	46	447	19	936	43	855	43	-	-	180	33	1385	25	-	-	557	36	1138	42	852	48
79Sh 4890	49	2050	27	520	12	853	44	1699	10	-	-	230	19	1625	13	-	-	957	23	1278	36	1152	27
78S 13621-1	53	2696	14	547	10	1103	33	1444	18	-	-	105	44	1665	11	434	9	1507	5	1625	19	1337	5
79Sh 4908	82	1696	41	-	-	1353	13	-	-	-	-	180	33	1625	13	434	9	607	32	1852	7	1219	14
79 Ter 46	4400	2830	8	667	4	1144	26	1733	9	293	14	30	49	1945	4	346	17	1607	4	1152	40	1389	3
80S 50507	4400	2736	12	363	29	1214	17	784	46	224	22	222	22	932	43	310	18	1390	7	1252	38	1112	32
79 Ter 794	4400	2622	16	609	6	964	40	1162	33	-	-	172	35	1092	38	434	9	1140	18	1598	20	1178	24
79 Ter 835	x75TA 24	2869	7	563	8	964	40	1218	29	-	-	147	38	1145	35	381	13	1240	12	1265	37	1176	21
79 Ter 860	ILL 4400	2942	5	489	15	672	49	1196	30	-	-	222	22	1412	21	434	9	1290	9	1345	33	1196	16
79 Ter 1774	x75TA 44	2049	28	329	31	1006	37	840	44	-	-	197	28	1545	16	488	5	1240	12	1645	17	1106	33
79 Ter 3032	82	1962	33	443	20	1131	29	1062	39	-	-	247	13	785	48	364	14	1190	15	1425	30	1031	39
Local check mean		3319	2	509	13	1333	14	1102	37	1118	1	230	19	1496	17	462	7	1300	8	1565	21		
Check 1 mean		2677	15	423	22	967	39	1582	14	332	10	245	16	1165	34	477	6	1470	6	1641	18	1271	10
Check 2 mean		2052	26	543	11	1383	9	1280	28	541	3	190	29	1173	33	286	24	1050	21	1348	32	1127	38
Location mean		2222		381		1161		1486		347		213		1399		325		907		1526			
C.V. %		6.4		26.3		16.5		33.2		30.6		36.8		13.2		84.1		11.6		16.1			
SE checks		108.9		81.9		127.9		277.8		128.3		51.6		106.8		203.8		93.6		154.3			
SE check v. test entry		217.8		163.7		255.9		555.7		256.6		103.1		213.6		406.1		187.3		308.6			

(1) The mean over locations excludes Pakistan (Lahore) and Turkey (Ankara).

Table 5.4.5. The five heaviest seed yielding entries at the individual location in the LISN-L during 1981/82.

RANK	CHILE		IRAN		ITALY		LEBANON		PAKISTAN	
	Temuco		Tehran		Rome		Terbol		Lahore	
	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL
1	Cyprus local	4368	75Kf 36822	1397	-	857	76TA 66012	6	Local check	-
2	Local check	-	-	857	Nablus	4606	78S 26011	15	Cyprus local	4368
3	-	780	-	920	-	851 (1)	-	920	Check 2	101
4	-	323	79 Ter. 46	4400	-	975	-	23	-	975
5	79 Ter 860	4400	Cyprus local	4368	-	20	-	45	76TA 66012	6
					74TA 265	254				

RANK	SPAIN		SYRIA		TURKEY				U.S.A.	
	Madrid		Tel Hadya		Ankara		Diyarbakir		Pullman	
	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL
1	Laird	4349	-	851	-	947	-	45	-	857
2	Precoz	4605	78S 26052	112	79Sh 4867	30	-	39	-	4523
3	-	4523	79Sh 4806	x75TA 49	-	780	-	4515	-	4515
4	78S 26052	112	-	7	-	4524	79 Ter.46	4400	-	20
5	79Sh 59741	x75TA 49	79 Ter.46	440	79 Ter. 1774	x75TA 44	78S 13621-1	x75TA 53	76TA 66136	323

(1) The brackets indicate entries with the same yield.

5.5. LENTIL INTERNATIONAL SCREENING NURSERY-SMALL SEEDED (LISN-S)

Material

The Lentil International Screening Nursery-Small Seeded (LISN-S) comprised a total of 59 test entries, which had a seed size of less than 4.5 g/100 seeds. The entries were selected for inclusion on the basis of their previous performance in Lebanon and Syria. The test entries comprised 38 selections which resulted from single crosses made at ICARDA, and 21 selections from germplasm accessions originating from 9 countries.

Methods and Management

The nursery was executed in single unreplicated rows in an augmented design. There were three checks, of which two namely 74TA 305 (ILL 287) from Greece; and ILL 4401 from Syria were supplied by ICARDA, and the third was the best local check cultivar to be used by the cooperator. The recommendation for planting was 4 m long rows with 200 seeds/row giving a plant density of 200 plants/m^2. However, cooperators were urged to follow locally recommended practices of lentil husbandry.

A total of 31 sets of LISN-S were requested and 30 sets were despatched to 15 countries. Data were received from 15 locations, and analysable from 10 sites. These were Mallawi, Egypt; Tehran, Iran; Rome, Italy; Marrow, Jordan; Terbol, Lebanon; Kathmandu, Nepal; Lahore and Tarnab, Pakistan; Madrid, Spain; and Tel Hadya, Syria. The details of the agronomic practices used are given in Table 5.5.1.

Results and Discussion

The range in time to flower amongst the entries was from

103-124 days, a period of three weeks (Table 5.5.2). The earliest entries were 79Ter 2824, 78S 26003, and 78S 26018 and 78S 13860-1.

There was a significant negative correlation ($r = -0.31$, Table 5.5.3) between time to flowering and seed yield. The early entries were among the highest yielding, particularly at the Southern locations where early flowering was a pre-requisite for adaptation.

The time to maturity was positively correlated to time to flowering for the entries ($r = 0.32$). The overall range in maturity time was from 151-167 days. The corresponding span in plant height was from 26-34 cm; and since there was a correlation between plant height and maturity ($r = 0.33$) the latest entries to mature were also among the tallest.

The variation across sites in seed yield (Table 5.5.4) was considerable with the highest yields of 1765 and 1863 kg/ha being realized at Terbol and Tel Hadya respectively. In contrast the seed yields at Madrid in Spain, and Lahore and Tarnab in Pakistan were less than 400 kg/ha. There was a similar marked range in the coefficients of variation of the sites from a minimum of 16.8 and 17.7% at Rome in Italy and Tel Hadya in Syria to values in excess of 50% at Marrow in Jordan, Kathmandu in Nepal, Tarnab in Pakistan, and Madrid in Spain. Clearly more emphasis should be placed on the former than the latter results.

The locally supplied check ranked first at Lahore in Pakistan, 6 at Tarnab in Pakistan, 9 at Kathmandu in Nepal, 11 at Marrow in Jordan. However, it ranked 21, 24, 28, 37, 55 and 58 out of 62 entries (59 test entries and 3 checks) at the other sites. The yield advantage of ICARDA entries over the local material is less at the

Southern sites than at the more Northern locations. The highest yielding entry overall was 78S 26018, which ranked in the top 5 (Table 5.5.5) at four out of 10 sites and gave a mean yield of 1293 kg/ha. The highest yielding entry at the Southern locations was 78S 26003 which ranked second overall and also ranked in top five at four out of ten sites and gave a mean yield of 1201 kg/ha. In the Northern locations the entries 78S 13740-1 and ILL 1939 ranked second and third following 78S 26018. These entries merit further testing.

Table 5.5.1. Agronomic data for different locations for the LISN-S during 198:/82.

Country	Location	Planting Date	Crop Duration (days)	Fertilizer (kg/ha)			Crop Husbandry
				N	P_2O_5	K_2O	
EGYPT	Mallawi	14.12.81	165	15	15		
ETHIOPIA	Debre Zeit	21. 7.82	129	-	-	-	
IRAN	Tehran	12. 4.82	97	18	46		Treflan - Metasystox
ITALY	Rome	16. 3.82	151	56	100		
	Sicily	6. 3.82	NR		60		
JORDAN	Marrow	7.11.81	183	-	-	-	
LEBANON	Kafrdan	NR	NR	-	-	-	
	Terbol	1.12.81	188	-	-	-	
NEPAL	Kathmandu	23.10.81	175	20	40	20	
PAKISTAN	Lahore	7.11.81	171	-	-	-	
	Islamabad I	4.11.81	177	28	45		3 Irrig.
	Islamabad II	4.11.81	176	-	-	-	
	Tarnab	23.11.81	145	-	-	-	
SPAIN	Madrid	27.11.81	217	40	120		
SYRIA	Tel Hadya	22.11.81	185		50		

NR = Not reported.

Table5.5.2. Values for three agronomic characters for the entries across locations in the LISN-S during 1981/82.

Selection	ILL/ Cross	Country of origin	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
78S 26003	8	Jordan	104	159	30
78S 26009	13	"	113	156	31
78S 26010	14	"	107	159	29
78S 26018	19	"	104	160	32
-	241	Syria	108	163	30
78S 26083	346	Mexico	109	157	28
-	346	"	113	158	30
74TA 434	350	"	114	163	33
74TA 559	492	Syria	116	160	27
74TA 572	498	Mexico	111	160	32
78S 26112	631	Turkey	117	162	32
78S 26177	837	Lebanon	118	164	31
75Kf 36904	1486	Iran	108	163	30
-	1866	Syria	106	159	27
Winter. Pull 11	1877	Turkey	117	166	30
78S 26303	1888	Syria	116	161	29
-	1895	"	111	156	28
-	1939	Morocco	109	160	31
-	2116	Ethiopia	108	156	26
-	2194	Pakistan	114	162	27
-	2351	Iran	109	156	31
78S 13006-1	X75TA 1	ICARDA, Syria	107	160	30
78S 13159-1	X75TA 14	ICARDA, Syria	109	160	29
78S 13183-1	X75TA 16	ICARDA, Syria	110	160	30
78S 13494-1	X75TA 44	ICARDA, Syria	114	157	30
78S 13558	X75TA 49	ICARDA, Syria	113	163	34
78S 13565-1	X75TA 49	ICARDA, Syria	109	160	30
78S 13572-1	X75TA 50	ICARDA, Syria	113	162	29

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Cont'd Table 5.5.2.

Selection	ILL/ Cross	Country of origin	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
78S 13572-2	X75TA 50	ICARDA, Syria	112	163	30
78S 13597-1	X75TA 52	ICARDA, Syria	117	161	30
78S 13644	X75TA 55	ICARDA, Syria	112	157	29
78S 13740-1	X75TA 65	ICARDA, Syria	114	159	31
78S 13740-2	X75TA 65	ICARDA, Syria	112	156	28
78S 13816-1	X75TA 78	ICARDA, Syria	111	160	29
78S 13845-1	X75TA 83	ICARDA, Syria	109	161	29
78S 13860-1	X75TA 85	ICARDA, Syria	104	162	32
80S 25940	X75TA 20	ICARDA, Syria	112	161	31
80S 27521	X75TA 9	ICARDA, Syria	109	159	31
80S 27525	X75TA 20	ICARDA, Syria	108	157	30
80S 29318	X75TA 1	ICARDA, Syria	108	161	32
80S 29558	X75TA 18	ICARDA, Syria	119	162	29
80S 29604	X75TA 20	ICARDA, Syria	107	167	28
80S 29677	X75TA 30	ICARDA, Syria	107	160	29
80S 29690	X75TA 31	ICARDA, Syria	110	160	31
80S 29855	X75TA 46	ICARDA, Syria	110	160	30
80S 50030	X75TA 4	ICARDA, Syria	105	160	31
79Ter 140	X75TA 4	ICARDA, Syria	105	160	30
79Ter 1910	X75TA 47	ICARDA, Syria	108	158	31
79Ter 1950	X75TA 47	ICARDA, Syria	106	158	31
79Ter 1990	X75TA 49	ICARDA, Syria	109	161	32
79Ter 2002	X75TA 49	ICARDA, Syria	114	164	32
79Ter 2509	ILL 4399	ICARDA, Syria	124	162	31
79Ter 2667	X75TA 65	ICARDA, Syria	109	163	32
79Ter 2824	X75TA 70	ICARDA, Syria	103	151	29
79Ter 3023	X75TA 74	ICARDA, Syria	113	159	28
79Ter 3222	X75TA 78	ICARDA, Syria	106	162	31

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Cont'd Table 5.5.2.

Selection	ILL/ Cross	Country of origin	Time to flowering (days)	Time to maturity (days)	Plant height
79Ter 3345	ILL 4399	ICARDA, Syria	124	162	31
79Ter 3495	X75TA 85	ICARDA, Syria	108	159	29
79Ter 3617	X75TA 88	ICARDA, Syria	108	161	30
	ILL 4404 (Check 1)	Syria	111	160	28
74TA 305	ILL 287 (Check 2)	Greece	113	164	33

Table 5.5.3. Correlation between three agronomic characters and seed yield based on means across locations in the LISN-S during 1981/82.

Trait	Time to maturity	Plant height	Seed yield
Time to 50% flowering	0.32**	0.07	-0.31*
Time to maturity		0.33**	-0.18
Plant height			0.08

* $P \leq 0.05$, ** $P \leq 0.01$

Table 5.5.4. Adjusted seed yield (Y = kg/ha) and rank (R) of entries in the LISN-S at different locations during 1981/82.

ENTRY		EGYPT		IRAN		ITALY		JORDAN		LEBANON		NEPAL		PAKISTAN				SPAIN		SYRIA		Southern		Northern		Overall	
Selection	ILL/ Cross	Mallawi		Tehran		Rome		Marrow		Terbol		Kathmandu		Lahore		Tarnab		Madrid		Tel Hadya		mean (1)		mean (2)		mean (3)	
		Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
78S 26003	0	1975	2	195	58	1095	37	1354	2	2439	8	1146	6	138	20	136	3	125	42	2504	4	1085	1	1272	12	1201	2
78S 26009	13	753	54	615	24	1303	16	539	13	1806	33	396	39	0	28	69	22	175	30	1998	27	406	51	1179	22	889	36
78S 26010	14	975	39	395	44	1553	7	1057	3	2517	7	586	26	-	-	69	22	100	57	1531	49	543	37	1219	18	966	21
78S 26018	19	2086	1	409	42	1428	10	1359	1	3217	2	396	39	-	-	2	58	250	19	2556	3	828	8	1572	1	1293	1
-	241	1309	17	695	14	1345	13	347	23	2561	6	416	36	-	-	2	59	125	42	1331	56	576	30	1211	19	973	18
78S 26083	346	1309	17	475	35	1545	1	459	15	2017	21	426	35	0	28	2	60	175	30	2038	24	579	28	1310	9	1036	10
-	346	1309	17	1082	1	1178	31			1772	35	266	48	112	22	69	22	150	35	1398	54	548	36	1116	29	903	32
74TA 434	350	1364	10	682	18	1262	19	559	12	1350	45	476	33	37	25	2	61	200	26	1411	53	614	23	981	47	843	43
74TA 559	492	864	45	842	5	928	50	976	4	1694	37	386	41	-	-	69	22	150	35	2318	13	440	48	1186	21	906	31
74TA 572	498	1198	27	902	2	1262	19	722	5	1650	39	1026	7	0	28	2	62	125	42	1584	47	742	12	1105	30	969	20
78S 26112	631	1086	34	333	48	514	62	416	16	2235	15	0	59	-	-	78	15	208	23	1629	41	388	54	984	46	760	56
78S 26177	837	1309	17	220	57	789	57	615	8	2180	17	0	59	-	-	78	15	333	11	2642	1	462	46	1233	15	944	26
75kf 36904	1486	975	39	620	23	748	59	120	29	946	55	342	43	-	-	144	2	108	50	909	60	487	44	666	60	599	61
-	1866	753	54	300	55	1206	26	0	32	1380	43	232	50	405	13	64	32	8	61	2229	18	350	58	1025	41	772	52
Winter.Pull 11	1877	975	39	326	49	664	60	537	14	1435	42	292	45	-	-	78	15	133	38	1909	33	448	47	893	54	727	59
78S 26303	1886	1086	34	353	47	1098	36	617	7	1935	25	142	54	-	-	64	32	33	60	2349	12	431	49	1154	25	883	38
-	1895	1086	34	593	26	1248	23	144	28	1857	30	0	59	-	-	51	43	108	50	2042	23	379	57	1170	23	873	39
-	1939	1309	17	413	41	1581	2	597	10	2591	5	252	49	730	2	64	32	283	14	2376	9	542	38	1449	3	1109	6
-	2116	309	62	320	51	1248	23	357	21	1924	27	292	45	474	11	78	15	208	23	1762	38	226	61	1092	32	768	54
-	2194	864	45	546	31	1123	35	608	9	2401	10	52	56	-	-	64	32	383	6	2416	7	327	60	1374	6	981	16
-	2351	994	38	684	17	1289	17	336	24	1072	51	609	25	-	-	149	1	375	8	1122	59	584	26	908	52	787	51
78S 13006-1	x75TA 1	772	52	564	29	1373	12	350	22	672	60	769	23	0	28	82	11	400	4	1829	35	541	39	968	48	808	46
78S 13159-1	14	1438	8	717	12	1331	14	366	20	650	61	1309	3	125	21	56	41	400	4	1416	52	934	4	903	53	915	28
78S 13183-1	16	1105	31	797	8	1414	11	210	27	650	61	979	12	111	23	69	22	675	1	2589	2	718	14	1225	17	1035	11
78S 13494-1	44	1216	25	824	6	1081	38	116	30	1817	31	449	34	31	26	42	47	375	8	1349	55	569	32	1089	35	894	34

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Cont'd Table 5.5.4.

ENTRY		EGYPT		IRAN		ITALY		JORDAN		LEBANON		NEPAL		PAKISTAN				SPAIN		SYRIA		Southern		Northern		Overall	
Selection	ILL/ Cross	Mallawi		Tehran		Rome		Marrow		Terbol		Kathmandu		Lahore		Tarnab		Madrid		Tel Hadya		mean (1)		mean (2)		mean (3)	
		Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
78S 13558	X75TA 49	1772	5	524	33	1498	8	256	25	1150	50	199	51	199	19	42	47	325	12	1789	36	671	17	1057	38	912	30
78S 13565-1	X75TA 49	883	43	724	11	1248	23	376	19	1050	52	839	18	18	27	82	11	125	42	1522	50	601	25	934	51	809	45
78S 13572-1	X75TA 50	1216	25	744	10	1331	14	243	26	883	57	529	28	-	-	82	11	250	19	1722	40	609	24	986	45	845	42
78S 13572-2	X75TA 50	772	52	717	13	1164	32	663	6	917	56	369	42	-	-	69	22	475	2	1922	31	403	52	1039	39	801	47
78S 13597-1	X75TA 52	883	43	551	30	998	45	78	31	1183	49	1009	8	-	-	42	47	75	59	1589	45	645	20	879	56	791	50
78S 13644	X75TA 55	920	42	846	4	1081	38	-	-	2228	16	506	32	368	14	82	11	233	21	1767	37	503	42	1231	16	958	23
78S 13740-1	X75TA 65	698	56	593	27	1498	8	-	-	2406	9	1186	4	476	10	69	22	408	3	2473	5	651	19	1476	2	1166	3
78S 13740-2	X75TA 65	809	47	820	7	1289	17	-	-	2261	14	716	24	358	15	69	22	383	6	2273	16	531	41	1405	4	1078	9
78S 13816-1	X75TA 78	698	56	520	34	1206	26	-	-	1917	28	276	47	253	17	42	47	308	13	1753	39	339	59	1141	26	840	44
78S 13845-1	X75TA 83	1142	28	540	32	1581	2	-	-	2361	11	516	31	-	-	29	52	183	28	2313	14	562	33	1396	5	1083	8
78S 13860-1	X75TA 85	1586	6	453	38	1039	42	-	-	1928	26	936	14	107	24	69	22	183	28	1913	32	864	6	1103	31	1013	13
80S 25940	X75TA 20	698	56	326	50	831	54	-	-	1883	29	316	44	-	-	136	3	133	38	1620	43	383	55	959	50	743	58
80S 27521	X75TA 9	1253	22	380	45	1581	2	-	-	2350	12	986	11	486	9	69	22	108	50	1980	28	769	10	1280	11	1088	7
80S 27525	X75TA 20	586	61	400	43	1206	26	-	-	2717	3	546	27	-	-	56	41	208	23	2033	25	396	53	1313	8	969	19
80S 29318	X75TA 1	698	56	320	52	1581	2	-	-	2106	18	1836	1	-	-	42	47	258	18	2207	19	859	7	1294	10	1131	4
80S 29558	X75TA 18	809	47	602	25	942	49	-	-	2265	13	789	21	-	-	64	32	350	10	1269	57	554	35	1086	35	886	37
80S 29604	X75TA 20	698	56	-	62	609	61	-	-	1343	46	959	13	-	-	78	15	175	30	2429	6	578	29	1139	27	898	33
80S 29677	X75TA 30	809	47	35	61	984	46	-	-	2620	4	843	15	-	-	64	32	275	16	2362	10	574	31	1255	13	1000	14
80S 29690	X75TA 31	1253	22	869	3	1025	43	-	-	754	58	999	10	245	18	91	9	125	42	2362	10	781	9	1027	40	935	27
80S 29855	X75TA 46	1364	10	622	22	984	46	-	-	1009	54	519	29	-	-	104	7	175	30	1576	48	662	18	873	57	794	49
80S 50030	X75TA 4	1253	22	455	37	1567	6	-	-	1787	34	1439	2	705	4	91	9	125	42	2242	17	928	5	1235	14	1120	5
79Ter 140	X75TA 4	1920	3	635	20	1150	34	-	-	754	58	849	15	621	5	64	32	125	42	2296	15	944	3	992	43	974	17
79Ter 1910	X75TA 47	809	47	749	9	1192	29	-	-	1365	44	1169	5	-	-	78	15	275	16	2069	22	685	15	1130	28	963	22
79Ter 1950	X75TA 47	1142	28	635	21	1067	40	-	-	1987	22	409	37	-	-	64	32	125	42	2149	20	538	40	1193	20	947	24
79Ter 1990	X75TA 49	1364	10	422	40	1067	40	-	-	1287	47	789	21	-	-	64	32	150	35	2416	7	739	13	1066	36	945	25

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Cont'd. Table 5.5.4.

ENTRY Selection		ILL/ Cross	EGYPT Mallawi		IRAN Tehran		ITALY Rome		JORDAN Harrow		LEBANON Terbol		NEPAL Kathmandu		PAKISTAN Lahore		PAKISTAN Tarbab		SPAIN Madrid		SYRIA Tel Hadya		Southern mean (1)		Northern mean (2)		Overall mean (3)	
			Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
79Ter 2002	X75TA	49	1327	13	306	53	803	56	-	-	2039	20	109	55	-	-	24	53	283	14	1909	33	487	43	1068	37	850	41
79Ter 2509	ILL	4399	1105	31	66	60	845	52	-	-	1817	31	169	52	-	-	11	57	133	38	1962	29	428	50	965	49	764	55
79Ter 2667	X75TA	65	1549	7	693	16	762	58	-	-	1050	52	169	52	512	7	24	53	108	50	496	61	581	27	622	61	606	60
79Ter 2824	X75TA	70	1327	13	373	46	1012	44	-	-	1539	40	799	20	712	3	131	5	-	-	402	62	752	11	831	59	798	48
79Ter 3023	X75TA	74	1327	13	426	39	845	52	-	-	1983	23	519	29	-	-	24	53	108	50	1589	45	623	21	990	44	853	40
79Ter 3222	X75TA	78	1383	9	673	19	970	48	-	-	1206	48	409	37	515	6	51	43	158	34	1162	58	614	22	834	58	752	57
79Ter 3345	ILL	4399	1105	31	306	54	887	51	-	-	2083	19	9	57			24	53	133	38	1602	44	379	56	1002	42	769	53
79Ter 3495	X75TA	85	1327	13	240	56	1262	19	-	-	3461	1	9	57	497	8	78	15	108	50	1629	41	471	45	1340	7	1014	12
79Ter 3617	X75TA	88	1883	4	93	59	1262	19	-	-	1528	41			428	12	104	7	108	50	1429	51	993	2	884	55	915	29
Local check mean			1056	37	589	28	826	55	574	11	1969	24	1008	9	1450	1	107	6	92	58	2082	21						
Check 1 mean			787	51	462	36	1181	30	386	18	1689	38	842	17	-	-	51	43	188	27	1940	30	560	34	1092	33	893	35
Check 2 mean			1139	30	694	15	1153	33	414	17	1759	36	837	19	317	16	49	46	221	22	2011	26	675	16	1168	24	983	15
Location mean			1125		530		1152		492		1765		584		336		65		210		1863							
C.V.%			37.7		46.2		16.8		56.1		31.9		56.9		29.3		68.0		64.2		17.7							
S.E. checks			216.4		155.0		102.2		209.9		332.1		294.6		149.5		27.1		61.9		205.9							
S.E. check Vs. test entry			467.5		334.9		220.8		342.8		717.4		636.4		342.5		58.5		133.6		444.7							

(1) Southern mean includes Mallawi, Egypt; Tarnab, Pakistan; and Kathmandu, Nepal.

(2) Northern mean includes Tehran, Iran; Rome, Italy; Terbol, Lebanon; Madrid, Spain; and Tel Hadya, Syria.

(3) Overall mean includes all sites in (1) and (2).

Table 5.5.5. The five heaviest seed yielding entries at the individual location in the LISN-S during 1981/82.

RANK	EGYPT Mallawi		IRAN Tehran		ITALY Rome		JORDAN Marrow		LEBANON Terbol	
	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL
1	78S 26018	19	-	346	78S 26083	346	78S 26018	19	79Ter. 3495 X	85
2	78S 26003	8	74TA 572	498	-	1939 (1)	78S 26003	8	78S 26018	19
3	79Ter. 140 X 75TA	4	80S 29690 X 75TA	31	78S 13845-1 X 75TA	83	78S 26010	14	80S 27525	20
4	79Ter.3617 X 75TA	88	78S 13644 X 75TA	55	80S 27521 X 75TA	9	74TA 559	492	80S 29677 X 75TA	30
5	78S 13558 X 75TA	49	74TA 559	492	80S 29318 X 75TA	1	74TA 572	498	-	1939

RANK	NEPAL Kathmandu		PAKISTAN Lahore		PAKISTAN Tarnab		SPAIN Madrid		SYRIA Tel Hadya	
	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL
1	80S 29318 X 75TA 1		Local check	-	-	2351	78S 13183-1 X 75TA	16	78S 26177	837
2	80S 50030 X 75TA 4		-	1939	75Kf 36904	1486	78S 13572-2 X 75TA	50	78S 13183-1 X 75TA	16
3	78S 13159-1 X 75TA 14		79Ter. 2824 X 75TA	70	78S 26003	8	78S 13740-1 X 75TA	65	78S 26018	19
4	78S 13740-1 X 75TA 16		80S 50030 X 75TA	4	80S 25940 X 75TA	20	78S 13006-1 X 75TA	1	78S 26003	8
5	79Ter. 1910 X 75TA 47		79TEr. 140 X 75TA	4	79Ter. 2824 X 75TA	70	78S 13159-1 X 75TA	14	78S 13740-1 X 75TA	65

(1) The brackets indicate entries with the same yield.

5.6. LENTIL INTERNATIONAL SCREENING NURSERY EARLY (LISN-E)

Material

The Lentil International Screening Nursery Early (LISN-E) was started to provide early maturing material needed by co-operators in Egypt, Ethiopia and Sudan in Africa, and Bangladesh, India and Pakistan. The nursery comprised 48 early selections from germplasm from six countries. This included released varieties from Chile, Precoz; Egypt, Giza 9; and India, T36, Pant.L-406 and Pant.L-639.

Methods and Management

The trial was executed in single unreplicated rows in an augmented design. There were three checks, two of which, namely 74TA 549 (ILL 470) from Mexico, and ILL 4401 from Syria, were supplied by ICARDA, and the third check, the best local cultivar, was to be added by the co-operator. The recommendation for planting was for a single row 4 m long with 200 seeds/row. However, cooperators were urged to use the locally recommended agronomic practices for the management of the trial.

There were 35 requests for LISN-E, a new nursery, and 30 sets were distributed to thirteen countries. Data were received from eleven sites and analysable from a total of five locations. These were Mallawi in Egypt; Quetta and Lahore in Pakistan; Terbol in Lebanon, and Tel Hadya, Syria. The details of the agronomic practices supplied by the cooperators are given in Table 5.6.1.

Results and Discussion

The range in time to flower amongst the entries was from

93-112 days (Table 5.6.2). The earliest entry was L-830 (ILL 2578) from India, whereas the last entry to flower was ILL 228 from Pakistan. The entry L-830 was also first to maturity and ILL 228 the second last to maturity. For plant height the range was from 25-35 cm. The early flowering genotype L-830 (ILL 2578) was also one of the shortest entries; the others were ILL 2532 and ILL 4372 from India. Interestingly amongst the tallest entries one, namely ILL 4375, was also from India in addition to Giza 9, the Egyptian cultivar.

The correlations between agronomic characters and seed yield are given in Table 5.6.3. It is clear that time to maturity was significantly and positively associated with time to flowering and seed yield.

The nursery LISN-E was launched specifically for those areas where early maturity is a pre-requisite for adaptation. Such areas include Egypt and Pakistan, whence we have results. The mean seed yield from these countries is called Southern mean (Table 5.6.4). In these Southern locations, the local check ranked 9 and 11 indicating that introducing early germplasm is a fruitful method of breeding in these areas. The entries with the highest southern means were TT2 (ILL 2527), Pant L-538 (ILL 2500), and LL-1 (ILL 2582). In Syria and Lebanon (Table 5.6.5) only Silaim (ILL 1861) and check 1 (ILL 4401) were among the top five.

Table 5.6.1. Agronomic data for different locations for the LISN-E during 1981/82.

Country	Location	Planting Date	Crop Duration (days)	Fertilizer (kg/ha)			Crop Husbandry
				N	P_2O_5	K_2O	
EGYPT	Mallawi	14.12.81	165	15	15		2 Irrig.
ETHIOPIA	Debre Zeit	21. 7.82	133	-	-	-	
JORDAN	Marrow	NR	NR				
LEBANON	Terbol	1.12.81	187	-	-	-	
PAKISTAN	Islamabad I	4.11.81	177	28	45		3 Irrig.
	Islamabad II	4.11.81	174	-	-	-	3 Irrig.
	Lahore I	7.11.81	162	-	-	-	3 Irrig.
	Lahore II	7.11.81	162	-	-	-	
	Tarnab	22.11.81	145	-	-	-	
	Quetta	25.11.81	223	12	12		2 Irrig.
SYRIA	Tel Hadya	22.11.81	183		50		-

NR = Not reported.

Table 5.6.2. Values for three agronomic characters for the entries across locations in the LISN-E during 1981/82.

Selection	ILL	Country of origin	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
P.I. 250155	228	Pakistan	112	171	28
Giza 9	784	Egypt	95	168	35
F 130	813	"	95	173	34
EL 19	1690	Ethiopia	98	166	33
EL 23	1693	"	103	164	31
EL 70	1735	"	101	164	29
EL 76	1741	"	100	163	30
EL 79	1744	"	99	164	29
Silaim	1861	Sudan	103	169	29
EL 39	2431	Ethiopia	99	166	31
EL 53	2434	"	100	163	32
EL 65	2435	"	99	163	29
EL 74	2437	"	100	164	28
EL 83	2439	"	100	163	31
Pant. L - 538	2500	India	101	166	32
Pant. L - 406	2501	"	99	163	29
T - 31	2525	"	98	162	29
T - 36	2526	"	99	165	30
TT - 2	2527	"	99	163	28
S30/16	2532	"	99	163	25
L - 312	2536	"	97	163	32
Pant. L - 639	2573	"	101	163	29
L - 830	2578	"	93	160	27
L - 1278	2580	"	95	162	29
L - 1282	2581	"	98	162	31

...Cont'd 2/

Cont'd. Table 5.6.2.

Selection	ILL	Country of origin	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
LL - 1	2582	India	98	163	29
LL - 30	2584	"	104	164	29
K - 75	2585	"	99	163	31
LWS - 3	2590	"	96	164	30
P - 257	2768	"	98	164	29
P - 943	3278	"	105	162	32
B 77	3493	"	100	164	29
LG - 7	3512	"	100	163	30
LG - 8	3613	"	103	165	31
LG - 116	3629	"	101	165	31
JL - 443	4371	"	105	163	29
JL - 446	4372	"	108	162	27
JL - 717	4374	"	99	167	33
JL - 814	4375	"	97	163	35
Ec - 10	4376	"	100	165	31
Pant. L - 286	4377	"	100	164	33
12	4402	Pakistan	99	163	30
162	4403	"	98	163	31
340	4404	"	110	164	33
9-6	4405	"	98	163	33
18-10	4406	"	99	164	31
18-12	4407	"	99	164	32
Precoz	4605	Chile	98	167	31
Check 1	4401	Syria	110	170	29
Check 2	470	Syria	109	169	28

Table 5.6 3. Correlations between three agronomic characters and seed yield based on means across locations in the LISN-E during 1981/82.

Trait	Time to maturity	Plant height	Seed yield
Time to 50% flowering	0.31*	-0.24	0.26
Time to maturity		0.21	0.46**
Plant height			0.08

* $p \leq 0.05$, ** $p \leq 0.01$

Table 5.6.4. Seed yield (Y = kg/ha) and rank (R) of entries in the LISN-E at different locations during 1981/82.

ENTRY		EGYPT		LEBANON		SYRIA		PAKISTAN				Southern		Northern		Overall	
Selection	ILL	Mallawi		Terbol		Tel Hadya		Lahore		Quetta		mean (1)		mean (2)		mean (3)	
		Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
P.I. 250155	228	515	38	547	27	2032	8	-	-	156	37	336	40	1290	12	813	17
Giza 9	784	181	48	1392	4	1686	17	290	30	382	6	284	41	1539	6	786	20
F 130	813	181	48	1047	9	845	41	-	-	341	10	261	46	946	28	604	37
EL 19	1690	626	35	881	14	1739	15	128	38	49	47	268	45	1310	10	685	27
EL 23	1693	0	50	1536	2	2205	6	314	29	249	26	188	49	1871	4	861	15
EL 70	1735	737	25	792	17	1179	32	106	41	302	15	382	37	986	25	623	34
EL 76	1741	404	42	614	25	1805	12	160	36	245	27	270	43	1210	14	646	32
EL 79	1744	404	42	714	20	1619	18	195	35	0	49	200	48	1167	18	586	39
Silaim	1861	0	50	1414	3	2565	2	-	-	176	34	89	50	1990	1	1039	6
EL 39	2431	737	25	814	16	1432	23	46	44	608	3	464	32	1123	19	727	24
EL 53	2434	1237	3	251	42	1214	31	784	19	119	39	713	14	733	36	721	25
EL 65	2435	681	28	218	47	1481	21	0	45	162	36	281	42	850	32	508	44
EL 74	2437	1126	6	284	40	1614	19	281	31	112	40	506	27	949	27	683	28
EL 83	2439	681	28	451	34	2081	7	127	39	0	49	269	44	1266	15	668	29
Pant. L - 538	2500	793	19	373	36	1361	29	1549	7	-	-	1172	2	867	31	1019	7
Pant. L - 406	2501	1237	3	329	38	1414	25	860	17	111	41	736	13	872	30	790	18
T - 31	2525	459	40	573	26	1428	24	0	45	184	31	214	47	1001	24	529	42
T - 36	2526	904	15	707	21	1388	27	678	21	48	48	543	23	1048	21	745	23
TT - 2	2527	681	28	529	28	1534	20	818	18	3028	1	1509	1	1032	22	1318	1
S30/16	2532	793	19	329	38	2588	1	708	20	290	18	597	20	1459	6	942	10
L - 312	2536	774	21	359	37	916	39	455	26	354	9	528	24	638	39	572	41
Pant. L - 639	2573	663	31	259	41	1383	28	1012	13	277	22	651	16	821	33	719	26
L - 830	2578	774	21	225	44	743	42	257	33	298	16	443	34	484	42	459	45
L - 1278	2580	663	31	0	51	1463	22	429	28	378	7	490	28	732	37	587	38
L - 1282	2581	330	46	514	31	1023	37	448	27	750	2	509	26	769	35	613	36
LL - 1	2582	441	41	225	44	850	40	2553	1	361	8	1118	3	538	40	886	13
LL - 30	2584	774	21	114	50	530	43	1585	6	91	43	817	9	322	43	619	35
K - 75	2585	663	31	170	49	316	44	676	22	131	38	490	29	243	45	319	48

Cont'd. Table 5.6.4.

ENTRY		EGYPT		LEBANON		SYRIA		PAKISTAN				Southern		Northern		Overall	
Selection	ILL	Mallawi		Terbol		Tel Hadya		Lahore		Quetta		mean (1)		mean (2)		mean (3)	
		Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
LWS - 3	2590	663	31	703	22	1396	26	278	32	180	32	374	39	1050	20	644	33
P - 257	2768	774	21	225	44	1076	36	916	16	262	29	651	17	651	38	651	31
P - 943	3278	959	10	518	29	0	47	127	39	309	14	465	31	259	45	383	49
B 77	3493	1070	7	429	35	174	45	1151	10	94	42	772	11	302	44	584	40
LG - 7	3512	848	16	196	48	0	47	990	15	52	46	630	18	98	50	417	46
LG - 8	3613	737	25	518	29	0	47	1008	14	334	11	693	15	259	45	519	43
LG - 116	3629	626	35	1062	8	0	47	2002	2	68	45	899	6	531	41	752	22
JL - 443	4371	1181	5	229	43	68	46	60	43	75	44	439	35	149	49	323	50
JL - 446	4372	1015	8	484	32	0	47	238	34	273	24	509	25	242	48	402	47
JL - 717	4374	959	10	740	18	1841	11	530	24	298	16	596	21	1291	11	874	14
JL - 814	4375	1404	2	462	33	1148	34	142	37	165	35	570	22	805	34	664	30
EL - 10	4376	1515	1	1007	10	921	38	525	25	288	19	776	10	964	26	851	16
Pant. L - 286	4377	348	45	892	13	1770	13	639	23	286	20	424	36	1331	9	787	19
12	4402	293	47	659	23	1743	14	1625	5	313	13	744	12	1201	15	927	11
162	4403	959	10	659	23	1716	16	1044	12	450	4	813	8	1188	16	966	8
340	4404	848	16	970	12	1956	9	1733	3	179	33	920	4	1463	7	1137	3
9-6	4405	959	10	992	11	1356	30	1235	8	280	21	825	7	1174	17	964	9
18-10	4406	404	42	870	15	1156	33	1229	9	226	29	620	19	1013	23	777	21
18-12	4407	848	16	736	19	1090	35	1638	4	221	30	902	5	913	29	907	12
Precoz	4605	515	38	1159	7	2436	5	-	-	232	28	374	38	1798	5	1085	4
Local check mean		989	9	1620	1	1920	10	1095	11	274	23						
Check 1 mean	4401	956	14	1269	5	2533	3	70	42	432	5	486	30	1901	2	1052	5
Check 2 mean	470	600	37	1220	6	2523	4	-	-	314	12	458	33	1872	3	1164	2
Location mean		724		653		1319		712		296							
C.V.%		39.2		22.1		12.6		63.8									
S.E. checks		210.1		191.1		184.8		235.2									
S.E. check V. test entry		420.3		382.2		369.6		498.8									

(1) Southern mean includes sites in Egypt and Pakistan
(2) Northern mean includes sites in Lebanon and Syria.

Table 5.6.5. The five heaviest seed yielding entries at individual locations in the LISN-E during 1981/82.

RANK	EGYPT		LEBANON		PAKISTAN				SYRIA	
	Mallawi		Terbol		Lahore		Quetta		Tel Hadya	
	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL	Selection	ILL
1	Ec - 10	4376	Local check	-	LL - 1	2582	TT - 2	2527	S30/16	2532
2	JL - 814	4375	EL 23	1693	LG - 116	3629	L - 1282	2581	Silaim	1861
3	EL - 53	2434(1)	Silaim	1861	340	4404	EL - 39	2431	Check 1	4401
4	Pant. L. 406	2501	Giza 9	784	18-12	4407	162	4403	Check 2	470
5	JL - 443	4371	Check 1	4401	12	4402	74TA 549	470	Precoz	4605

5.7. LENTIL INTERNATIONAL F_3 TRIAL (LIF_3T)

Material

The Lentil International F_3 Trial (LIF_3T) comprised 17 F_3 generation bulk populations from single crosses made at Tel Hadya, Syria in 1980. The aims of the crosses are shown in detail in Table 5.7.1, and included recombining such characters as high yield, early maturity, wide adaptation, and characteristics associated with a mechanical harvest. The trial was designed to provide early generation segregating material to cooperators and to estimate the yield of the bulk populations across locations.

Methods and Management

The 17 test entries together with a local check were included in an experiment in a randomized complete block design with two replications. The suggested planting arrangement was 4 m long plots of four rows with a plant density of 160 plants/m^2. Cooperators were, however, urged to use the locally recommended practices for lentil husbandry.

Requests for 21 sets of LIF_3T were received, and fifteen sets of the trial were supplied to ten different countries. Data were received from nine sites, but it was only possible to analyse the data from six sites. These were Sids in Egypt, Tehran in Iran, Rome in Italy, Terbol in Lebanon, Madrid in Spain and Tel Hadya in Syria. Details of the agronomic practices used are shown in Table 5.7.2.

Results and Discussion

The time to flower amongst the populations varied from

98 to 120 days showing a range of about three weeks (Table 5.7.3). The earliest crosses to flower were X80S 168, X80S 169, X80S 170, and X80S 185. These crosses were also amongst the first to reach maturity. There was a strong correlation between time to flower and time to maturity. The last entry to flower, X80S 267, was also the last to reach maturity on average. One of the tallest crosses, X80S 169, has also been mentioned as among the earliest. The tall and early flowering habit is characteristic of Egyptian germplasm which provided one of the parents of this cross. The above values for flowering, maturity, and plant height are the mean values of each cross, and do not reflect the variation within crosses from segregation.

At the different locations the seed yield varied from 1475 kg/ha at Terbol in Lebanon to 138 kg/ha at Madrid in Spain (Table 5.7.4). These seed yields were associated with a corresponding, but inverse, range in coefficient of variation from 17.0% at Terbol in Lebanon to 70.3% at Madrid in Spain. The correlations between sites of genotypic performance are shown in Table 5.7.5, but they were not significant.

The highest mean yield across locations was realized by X80S 397, a cross between Iranian local (ILL 4351) and Laird (ILL 4349). This cross gave 1174 kg/ha an average, and ranked first at two sites. The second highest yielding cross was X80S 154. There was no local check in Italy, elsewhere, the local check ranked 3, 6, 8, 6, and 1 in Egypt, Iran, Lebanon, Spain, and Syria respectively. However, only at Tehran in Iran was there a population which gave significantly more yield than the local check.

Table 5.7.1. Parents of crosses included in LIF_3T.

Cross No.	Female Parent			Male Parent		
	Selection	ILL	Origin	Selection	ILL	Origin
X80S 154	76TA 66088 High yield, Lebanon	223	Iran	- Early maturity	1697	Eth.
X80S 168	74TA 276 High yield, Lebanon	262	Hung.	Giza 9 Early maturity	784	Egy.
X80S 169	74TA 276 High yield, Lebanon	262	Hung.	74TA 769 Early maturity	828	Egy.
X80S 170	74TA 276 High yield, Lebanon	262	Hung.	- Early maturity	1697	Eth.
X80S 171	74TA 276 High yield, Lebanon	262	Hung.	- Early maturity	1744	Eth.
X80S 178	74TA 276 High yield, Lebanon	262	Hung.	- Early maturity	3243	Ind.
X80S 185	74TA 577 High yield, Lebanon	500	Mex.	74TA 769 Early maturity	828	Egy.
X80S 198	74TA 577 High yield, Lebanon	500	Mex.	- Early maturity	3399	USSR
X80S 200	Syr. Loc. large High yield, Lebanon	4400	Syr.	Giza 9 Early maturity	784	Egy.
X80S 267	Iranian Loc. Local	4351	Iran	78S 26152 Tall, erect types	793	Egy.
X80S 375	Syr. Loc. small High yield, Syria	4401	Syr.	- Strong stem	792	Egy.
X80S 376	Syr. Loc. small High yield, Syria	4401	Syr.	- Strong stem	988	Chile
X80S 377	Iranian Loc. Local	4351	Iran	78S 26152 Tall, erect types	793	Iran
X80S 397	Iranian local Local	4351	Iran	Laird Tall, erect types	4349	Can.
X80S 403	- High harvest index	1753	Afgh.	74TA 22 Vigourus veg. growth	31	Syr.
X80S 450	75kf 36423 High yield, Syria	983	Chile	74TA 276 Wide adaptation	262	Hung.
X80S 458	Hamawe white High yield, Syria	2129	Syr.	74TA 276 Wide adaptation	262	Hung.

Table 5.7.2. Agronomic data for different locations for the LIF_3T during 1981/82.

Country	Location	Planting Date	Crop Duration (days)	Fertilizer (kg/ha) N	P_2O_5	K_2O	Crop Husbandry
EGYPT	Sids	11-11-1981	159	37.5	75		5 Irrigations
IRAN	Tehran	12-4-1982	103	18	46		7 Irrigations + Treflan
ITALY	Rome	16-3-1982	96	50	100		
LEBANON	Terbol	17-11-1981	197	-	-		
SPAIN	Madrid	27-11-1981	201	40	120		
SYRIA	Tel Hadya	21-11-1981	182		50		

Table 5.7.3. Mean values over locations for three agronomic characters for entries in the LIF_3T during 1981/82.

Entry	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
X80S 154	110	162	35
168	98	154	35
169	98	153	38
170	99	154	38
171	100	156	34
178	110	167	35
185	99	157	38
198	111	165	37
200	111	170	36
267	120	172	35
375	113	169	35
376	116	167	36
377	111	164	35
397	111	164	32
403	104	156	36
450	117	166	35
458	104	157	35

Table 5.7.4. Seed yield (Y = kg/ha) and rank (R) of entries in the LIF$_3$T at different locations during 1981/82.

Entry X80 S	EGYPT Sids		IRAN Tehran		ITALY Rome		LEBANON Terbol		SPAIN Madrid		SYRIA Tel Hadya		MEAN	
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
154	1104	12	1492	2	1047	4	1847	2	178	3	1337	3	1168	2
168	1403	7	1442	3	1161	2	1569	9	125	11	868	15	1095	4
169	1118	11	1358	4	1302	1	1786	3	144	8	783	17	1082	5
170	1139	9	767	16	802	8	1465	10	138	9	913	13	871	11
171	1139	9	1217	7	917	5	1257	14	63	17	813	16	901	10
178	1729	4	1108	10	1115	3	1104	16	75	16	1070	5	1034	6
185	1618	5	1150	9	813	7	1382	12	138	9	940	12	1007	7
198	1292	8	975	13	542	10	840	18	63	17	1062	7	796	15
200	2139	2	1292	5	417	16	1694	5	163	4	1113	4	1136	3
267	535	18	933	14	510	13	965	17	113	13	992	10	675	17
375	1021	13	1008	12	240	17	1722	4	150	7	977	11	853	12
376	604	16	1092	11	516	12	1378	13	113	13	1067	6	795	16
377	785	15	742	17	854	6	1639	6	88	15	912	14	837	13
397	2299	1	925	15	542	10	2111	1	125	11	1043	8	1174	1
403	847	14	2067	1	469	15	1403	11	231	2	642	18	943	9
450	556	17	1158	8	651	9	1160	15	275	1	1017	9	803	14
458	1410	6	742	17	510	13	1632	7	160	5	1503	2	993	8
Local check	1822	3	1283	6	-	-	1601	8	154	6	1733	1		
Location mean	1254		1153		730		1475		138		1044			
C.V.%	27.3		23.4		-		17.0		70.3		19.9			
L.S.D. 5%	722.1		568.8		-		531.7		207.4		438.9			
No. of entries significantly exceeding local check	0		1		-		0		0		0			

Table 5.7.5. Correlations (df = 15) between different locations for the seed yield of entries in LIF_3T during 1981/82.

LOCATION	IRAN Tehran	ITALY Rome	LEBANON Terbol	SPAIN Madrid	SYRIA Tel-Hadya
EGYPT-Sids	-0.06	0.05	0.41	-0.22	0.23
IRAN-Tehran		0.18	0.06	0.45	-0.43
ITALY-Rome			0.07	-0.23	-0.19
LEBANON-Terbol				0.21	0.15
SPAIN-Madrid					0.02

5.8. LENTIL INTERNATIONAL F_3 TRIAL-EARLY (LIF_3T-E)

Material

The Lentil International F_3 Trial-Early (LIF_3T-E) comprised 32 F_3 generation bulk populations from single crosses made at Tel Hadya, Syria during 1980. The crosses were made to recombine the early flowering and maturing habit of Egyptian, Ethiopian and Indian parents with a high yield potential in the Mediterranean area (Table 5.8.1). The aim of the trial was to provide early generation segregating material for selection by cooperators, and to yield test the bulk populations over different environments.

Methods and Management

The thirty-two test entries together with a local check cultivar were included in a randomized complete block design with two replications. The recommended plot size was 4 rows 0.25 m apart and 4 m long with a planting density of 160 plants/m^2. However, cooperators were urged to use the locally recommended agronomic practices for the trial.

There were 21 requests for LIF_3T-E and fifteen sets of the trial were distributed to ten countries. Data were received from eight locations, and they were complete enough to permit analysis at six sites. These locations were Mallawi in Egypt; New Delhi in India; Merchouch in Morocco; Islamabad and Karak in Pakistan; and Tel Hadya in Syria. The details of the agronomic practices reported are given in Table 5.8.2.

Results and Discussion

There was a range of 94 to 102 days in the mean time to

flower of the entries (Table 5.8.3). This low variation of around a week may be attributed to the similar aims and material of the recombinations. The lack of variation in time to flower was reflected in a similar small range of 162 to 167 days in time to maturity. The variation between the populations in plant height was from 28 to 34 cm. It should be noted that these values for flowering, maturity, and plant height reflect the population mean of each bulk, and do not refer to the range of variation within crosses from segregation.

There was more than a ten-fold difference in the mean yields at different locations (Table 5.8.4). The range was from 157 kg/ha at Karak in Pakistan to 1652 kg/ha at Mallawi in Egypt. There was also a wide range in the coefficient of variation from 15.9% at Tel Hadya in Syria to 43.2% at Karak in Pakistan.

The local check yield ranked 7, 1, 10, 2, 8 and 17 in Egypt, India, Morocco, the two sites in Pakistan, and Syria respectively. However, only at Tel Hadya, Syria was the difference in yield between the best entry and the local check significant. Amongst the entries, the highest mean yield of 1397 kg/ha was given by the cross X80S 217. This cross was the earliest into flower, and its parents were 74TA 9 (ILL 15) from Jordan and 74TA 769 (ILL 828) from Egypt. 74TA 9 is a macrosperma genotype that is widely adapted around the Mediterranean. This cross ranked amongst the top six at all sites but one. It yielded more than the local check at three locations. The second highest yielding bulk population was X80S 187, whose parents were 74TA 577 (ILL 500) from Mexico and ILL 1744 from Ethiopia. This cross also yielded more than the local at three sites, and ranked first at two of these locations. Clearly the recombination of material with a high yield in the Mediterranean area with early maturing genotypes is providing some crosses whose adaptation extends south of the

Mediterranean to Egypt, India and Pakistan by virtue of their early flowering habit. Since some of these crosses involve a macrosperma parent and this large seeded habit is unknown in the Indian sub-continent, these crosses may be injecting new genetic variation into the sub-continent.

The correlations of genotype performance between different locations emphasized the similarity of response of the entries at Islamabad in Pakistan, New Delhi in India and Merchouch in Morocco (Table 5.8.5).

Table 5.8.1. Parents of crosses included in LIF_3T-E.

Cross No.	Female Parent			Male Parent		
	Selection	ILL	Origin	Selection	ILL	Origin
X80S 153	76TA 66088	223	Iran	-	784	Egy.
X80S 154	76TA 66088	223	Iran	-	1697	Eth.
X80S 168	74TA 276	262	Hung.	Giza 9	784	Egy.
X80S 169	74TA 276	262	Hung.	74TA 769	828	Egy.
X80S 170	74TA 276	262	Hung.	-	1697	Eth.
X80S 171	74TA 276	262	Hung.	-	1744	Eth.
X80S 175	74TA 276	262	Hung.	-	2953	Ind.
X80S 176	74TA 276	262	Hung.	-	3125	Ind.
X80S 177	74TA 276	263	Hung.	-	3213	Ind.
X80S 178	74TA 276	262	Hung.	-	3243	Ind.
X80S 181	74TA 276	262	Hung.	-	3369	Ind.
X80S 182	74TA 276	262	Hung.	-	3399	USSR
X80S 184	74TA 577	500	Mex.	Giza 9	784	Egy.
X80S 185	74TA 577	500	Mex.	-	828	Egy.
X80S 186	74TA 577	500	Mex.	-	1697	Eth.
X80S 187	74TA 577	500	Mex.	-	1744	Eth.
X80S 188	74TA 577	500	Mex.	-	2669	Ind.
X80S 189	74TA 577	500	Mex.	-	2716	Ind.
X80S 190	74TA 577	500	Mex.	-	2724	Ind.
X80S 193	74TA 577	500	Mex.	-	3213	Ind.
X80S 197	74TA 577	500	Mex.	-	3369	Ind.
X80S 198	74TA 577	500	Mex.	-	3399	USSR
X80S 199	74TA 577	500	Mex.	-	3458	Eth.
X80S 200	Syr.Loc.Large	4400	Syr.	Giza 9	784	Egy.
X80S 202	Syr.Loc.Large	4400	Syr.	-	1697	Eth.
X80S 207	Syr.Loc.Large	4400	Syr.	-	2953	Ind.
X80S 217	74TA 9	15	Jor.	74TA 769	828	Egy.
X80S 378	76TA 66005	1	Jor.	-	2714	Ind.
X80S 379	76TA 66005	1	Jor.	-	2739	Ind.
X80S 380	76TA 66005	1	Jor.	-	2947	Ind.
X80S 382	74TA 22	31	Syr.	-	2939	Ind.
X80S 389	Wint. red. 51	1880	Tur.	-	2714	Ind.

Table 5.8.2. Agronomic data for different locations for the LIF_3T-E during 1981/82.

Country	Location	Planting Date	Crop Duration (days)	Fertilizer (kg/ha)			Crop Husbandry
				N	P_2O_5	K_2O	
EGYPT	Mallawi	15-12-1981	147	15	15		2 Irrigations
INDIA	New Delhi	23-11-1981	NR	20	40		2 Irrig.-Metasystox
MOROCCO	Merchouch	17-11-1981	NR	30	50	60	
PAKISTAN	Islamabad	4-11-1981	173	28	45		3 Irrigations
	Karak	23-11-1981	NR	-	-	-	
SYRIA	Tel Hadya	21-11-1981	182		50		

NR = Not reported.

Table 5.8.3. Mean values over locations for three agronomic characters for entries in the LIF_3T-E during 1981/82.

Entry	Time to flowering (days)	Time to maturity (days)	Plant height (cm)
X80 S 153	97	162	32
X80 S 154	101	163	32
X80 S 168	99	167	29
X80 S 169	99	166	34
X80 S 170	97	164	34
X80 S 171	101	166	32
X80 S 175	97	163	30
X80 S 176	96	165	31
X80 S 177	98	166	32
X80 S 178	98	164	33
X80 S 181	98	164	29
X80 S 182	98	163	34
X80 S 184	98	165	32
X80 S 185	96	166	34
X80 S 186	100	165	31
X80 S 187	99	165	29
X80 S 188	97	164	29
X80 S 189	98	162	31
X80 S 190	97	165	28
X80 S 193	101	164	32
X80 S 197	98	163	30
X80 S 198	98	165	33
X80 S 199	97	164	30
X80 S 200	99	164	29
X80 S 202	98	163	32
X80 S 207	98	165	28
X80 S 217	94	167	34
X80 S 378	102	166	32
X80 S 379	99	164	33
X80 S 380	98	165	29
X80 S 382	100	164	33
X80 S 389	102	165	31

Table 5.8.4. Seed yield (Y = kg/ha) and rank (R) of entries in the LIF$_3$T-E at different locations during 1981/82.

Entry X80 S	EGYPT Mallawi		INDIA New Delhi		MOROCCO Merchouch		PAKISTAN Islamabad		PAKISTAN Karak		SYRIA Tel Hadya		MEAN	
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
153	1806	11	607	18	1225	18	648	31	150	15	1335	8	962	18
154	1083	32	414	22	1388	5	785	25	233	2	1697	1	933	22
168	1472	23	707	13	1363	9	1641	4	183	9	1187	19	1092	6
169	1722	14	533	20	1375	6	833	22	200	5	1210	16	979	15
170	1222	29	781	11	1100	24	833	22	167	12	1405	4	918	23
171	1361	25	281	29	1325	12	704	26	150	15	1280	11	850	30
175	1528	19	355	28	1050	28	1293	8	133	21	1105	28	911	25
176	2333	1	680	14	1113	23	1148	12	117	25	958	32	1058	8
177	1806	11	414	22	1063	26	704	26	117	25	1267	12	895	28
178	1000	33	414	22	975	30	970	15	67	33	1360	6	798	32
181	1222	29	-	-	1263	14	1389	7	87	32	877	33	968	16
182	1556	18	-	-	1367	8	922	17	117	25	1055	29	1003	13
184	1611	17	636	17	925	31	974	14	200	5	1260	14	934	21
185	1500	21	784	10	1588	2	1663	3	150	15	1148	22	1139	4
186	1667	15	799	9	1275	13	878	20	133	21	1352	7	1017	11
187	2111	6	1006	6	1663	1	2130	1	117	25	1125	25	1359	2
188	2194	4	1013	5	1263	14	1593	5	100	31	1173	21	1223	3
189	1889	8	1139	3	1375	6	704	26	167	12	1130	24	1067	7
190	1278	26	917	7	1125	22	667	30	117	25	1117	27	870	29

...Cont'd 2/

Cont'd. Table 5.8.4.

Entry X80 S	EGYPT Mallawi		INDIA New Delhi		MOROCCO Merchouch		PAKISTAN Islamabad		PAKISTAN Karak		SYRIA Tel Hadya		MEAN	
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
193	1139	31	754	12	1063	26	1293	8	150	15	1318	10	953	20
197	2222	3	481	21	1338	11	648	31	217	4	1215	15	1020	10
198	1472	23	1109	4	1175	20	919	18	167	12	1195	18	1006	12
199	1278	26	666	16	1263	14	611	33	150	15	967	31	823	31
200	2167	5	599	19	988	29	1156	11	117	25	975	30	1000	14
202	1500	21	-	-	1200	19	970	15	150	15	1460	3	1056	9
207	1278	26	-	-	775	33	1204	10	133	21	1118	26	902	27
217	2278	2	1524	2	1588	2	1478	6	133	21	1380	5	1397	1
378	1667	15	368	27	1175	20	881	19	183	9	1177	20	909	26
379	1528	19	680	14	1263	14	789	24	200	5	1328	9	965	17
380	1806	11	873	8	1413	4	1062	13	267	1	1137	23	1093	5
382	1889	8	377	26	1088	25	693	29	187	9	1262	13	915	24
389	1861	10	385	25	913	32	878	20	226	3	1462	2	954	19
Local check	2074	7	1760	1	1346	10	1967	2	187	8	1202	17		
Location mean	1652		726		1224		1061		157		1219			
C.V. %	29.9		26.2		30.8		18.2		43.2		15.9			
L.S.D. 5%	1007.1		390.2		769.5		394.6		138.1		396.0			
No. of entries significantly exceeding local check	0		0		0		0		0		1			

Table 5.8.5. Correlations (df = 26) between different locations for the seed yield of entries in the LIF_3T-E during 1981/82.

LOCATION	INDIA New Delhi	MOROCCO Merchouch	PAKISTAN Islamabad	PAKISTAN Karak	SYRIA Tel Hadya
EGYPT - Mallawi	0.29	0.21	0.27	-0.04	-0.37
INDIA - New Delhi		0.49**	0.41*	-0.18	-0.16
MOROCCO - Merchouch			0.43*	0.13	-0.02
PAKISTAN - Islamabad				-0.29	-0.21
- Karak					0.31

* $P \leq 0.05$, ** $P \leq 0.01$

6. AGRONOMY

6.1. DATE OF PLANTING AND PLANT-POPULATION TRIAL (DPPT)

Introduction

1981/82 growing season was the third year to conduct the Date of Planting and Plant-population Trial in the three grain legumes : Faba Beans, Lentils and Chickpeas. The objectives of the trial in all the three crops were :(i) to find out the optimum date of planting of the three crops in the different agro-ecological locations in the ICARDA region; (ii) to find out the consequence of deviating from this date on the crop performance and (iii) to determine the response of the crop to change in plant-population in relation to the date of planting.

Results of previous seasons (1979/80, 1980/81) have revealed that in most locations advancing date of planting early into the season increased growth and seed yields of faba beans and lentils. In case of chickpeas, delaying planting into spring reduced growth and seed yield substantially in all locations, however, varying the planting dates within winter did not lead to significant changes in the crop performance. The results on data from the plant population treatments reveal a tendency to increase seed yield with increasing population in wetter areas; under drier conditions, the existing genotypes of the three legumes have shown consistent high degree of plasticity.

Material and Methods

It was suggested that the cooperators should use the locally adapted cultivar. There were four dates for each crop. The four dates for faba beans in the Mediterranean region were suggested as follows : D_1-10 October; D_2-30 October; D_3-20 November and D_4-10 December. In Ethiopia the dates were to be evenly distributed from beginning of June

to end July. However, the cooperators could modify the dates to suite their requirements. The four dates in lentils were selected as follows: D_1-40 days earlier than the conventional date at each location; D_2-20 days earlier; D_3- at the conventional date and D_4-20 days later than the conventional date. The four dates for chickpeas were selected as follows : D_1- early winter; D_2- mid winter; D_3- late winter and D_4- early spring.

The population levels were varied by changing the row width keeping the spacing within the row constant. The details of the treatments are given in the appropriate tables.

The experiment was conducted in a single split-plot design with dates of planting ascribed to the main plots and the population levels to the sub plots. It was suggested that the sub-plot size should be 20 m^2 (4m x 5m) for the three crops; the net plot harvested and seed yields reported to come from the central rows of 4 m, and the outside rows and 0.5 m at either end of the central rows to be discarded. Some of the co-operators provided data on monthly maximum and minimum temperatures and total rainfall for the duration of the crop. These are presented in figure 1.

6.1.1. FABA BEAN DATE OF PLANTING AND PLANT-POPULATION TRIAL (FBDPPT)

Results and Discussion

Fourteen trials were sent to different locations in seven countries and data were received only from six locations: three in Ethiopia (Debre Zeit, Holetta, Kulumsa); one in Lebanon (Terbol) and two in Syria (Lattakia and Tel Hadya). These are presented in Table 6.1.1. The highest mean seed yield was obtained from Tel Hadya (3084 kg/ha) and lowest from Lattakia (1106 kg/ha). The low yields at Lattakia were attributed to the Orobanche infestation there.

The ANOVA for the experimental design revealed that the seed yield varied significantly due to different date of planting treatments at all the locations, however the plant population effects and interaction between date of planting x plant populations were significant only at Terbol.

FBDPPTs in Ethiopia revealed that July 1 (D_2) for Debre Zeit, June 6 and June 20 for Holetta (D_1 and D_2) and June 14 (D_2) for Kulumsa were the optimum dates for planting faba beans. The earlier or later sowings in most cases reduced the yields by significant margins.

At Terbol, in Lebanon, Dec 8 (D_3) gave the highest yield and seed yields at earlier and later plantings were drastically reduced though reduction was statistically significant only at Nov 4 planting date (D_1). Also the plant population levels of 20 and 25 plant/m^2 gave high yields which were significantly superior than population level of 16.7 plants/m^2. The interaction being significant, the best combination was identified as one with plant population level of 25.0 plants/m^2 planted on December 8 (D_3 planting date). All other combinations gave much lower yields which were in general statistically inferior to this.

At Lattakia in Syria, the plantings on December 12 gave the high yield as compared to the later plantings on January 8 and February 9 where the yield levels were estimated to be almost less than half of the former planting. So the optimum date of planting for Lattakia seemed to be early December. At Tel Hadya, the maximum seed yield was obtained from planting on December 6 (D_3) and the significant reduction in yield were noticed when the plantings were advanced to November 6 (D_1) and delayed to January 4 (D_4). The differences in yield from plantings on November 16 and December 6 were, however, statistically not significant.

The lack of yield advantages from early winter plantings (D_1 and D_2) at Terbol in Lebanon and Tel Hadya in Syria in this season could have been due to late frost leading to the damage of the early reproductive growth. At Tel Hadya for example, freezing temperatures were recorded upto end of March.

Table 6.1.1. Seed yield of faba beans at different dates of planting (D) and plant population (P) levels in FBDPPT at different locations during 1981/82.

PLANT POPULATION	LOCATION														
	ETHIOPIA (Debre Zeit) Date of Planting					ETHIOPIA (Holetta) Date of Planting					ETHIOPIA (Kulumsa) Date of Planting				
	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean
33.3 plants/m^2 (P_1)	1818	2172	2045	924	1740	2697	3060	1877	1191	2206	2516	2665	2301	1639	2280
25.0 plants/m^2 (P_2)	1826	2413	1949	894	1771	3015	2924	1945	1063	2237	2710	2859	2391	1684	2411
20.0 plants/m^2 (P_3)	1722	2039	1856	861	1620	3120	2973	1638	1017	2187	2858	3023	2504	1620	2501
16.7 plants/m^2 (P_4)	1951	2281	2120	806	1790	2867	2763	1751	996	1067	2438	2950	2262	1491	2285
Mean	1829	2226	1993	871	1730	2925	2930	1803	1067	1924	2631	2874	2365	1609	2369
C.V. %	D=34.2 P=15.5					D=23.2 P=12.3					D=10.9 P=12.8				
L.S.D. at 5%	D=148 P=NS D x P = NS					D=405 P=NS D x P = NS					D=206 P=NS D x P = NS				
Dates	June 18	July 1	July 17	July 29		June 6	June 20	July 4	July 18		May 31	June 14	June 27	July 11	

PLANT POPULATION	LEBANON (Terbol) Date of Planting					SYRIA (Lattakia) Date of Planting					SYRIA (Tel Hadya) Date of Planting				
	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean
33.3 plants/m^2 (P_1)	1744	1978	2762	2296	2195	1776	1866	744	397	1196	2916	3392	3719	2601	3157
25.0 plants/m^2 (P_2)	1553	2607	3160	2022	2335	1760	1723	716	525	1181	2971	3272	3391	2955	3147
20.0 plants/m^2 (P_3)	2052	2421	2514	2416	2351	1579	1567	587	412	1036	2769	3300	3410	2605	3021
16.7 plants/m^2 (P_4)	1928	1739	2395	2077	2035	1323	1822	486	419	1012	3169	3178	3226	2476	3012
Mean	1819	2186	2708	2203	2308	1610	1744	633	438	1106	2956	3285	3436	2659	3084
C.V. %	D=29.5 P=18.4					D=48.0 P=23.5					D=12.2 P=5.1				
L.S.D. at 5%	D=526 P=293 D x P = 585					D=425 P=NS D x P = NS					D=384 P=NS D x P = NS				
Dates	Nov 4	Nov 24	Dec 8	Jan 11		Nov 6	Dec 12	Jan 8	Feb 9		Nov 6	Nov 16	Dec 6	Jan 4	

6.1.2. LENTIL DATE OF PLANTING AND PLANT-POPULATION TRIAL (LDPPT)

Results and Discussion

Fifteen trials were sent to eight different countries and data were received from only three locations namely Terbol (Lebanon), Kallurkot (Pakistan) and Tel Hadya (Syria), These are presented in Table 6.1.2. The highest yield was reported from Terbol (1696 kg/ha) and the lowest from Kallurkot (935 kg/ha). The low yields at Kallurkot could be attributed to the fact that early planting dates could not be carried out because the trial arrived late. Nevertheless, between the two late dates, November planting outyielded December planting by 19.2% but the differences were not statistically significant.

The ANOVA for the experimental design revealed that the seed yield varied significantly due to different date of planting treatments (D) at Tel Hadya and Terbol, and due to different plant population levels (P) at Kallurkot and Tel Hadya. The interaction between date of planting x plant population was however significant at Terbol and Kallurkot.

At Terbol the highest seed yield was recorded from December 3 planting which was very closely followed by December 21 planting. The later planting on January 11 gave significantly lower yield, however, the yield in earlier planting on November 16 was reduced by about 7 percent but it was not a significant reduction. The best date of planting cum plant population combination at Terbol was 222.2 plants/m^2 planted on December 21.

At Tel Hadya in Syria, the earlier dates namely November 23 and December 13 gave high yields and there was a significant reduction

in yields from the later plantings on January 10 and Fabruary 4. Similarly the highest plant population density of 333.3 plants/m^2 gave the highest yields and with every change in plant population level there was a continuous significant reduction in seed yield. The best date and plant population combination was December 13 with 333.3 plants/m^2.

Both at Tel Hadya and Terbol, the winter season was comparatively colder than previous years and for about 39 nights, the temperatures were below zero and some of these freezing temperatures were noticed in March also. This could have adversally affected the crop growth at these sites and influenced the usual well pronounced increases from earlier plantings.

In Pakistan at Kallurkot, the early planting dates could not be carried as the trial reached late. There was a positive response with the increasing plant population density per unit area and the highest yields were obtained from 333.3 plants/m^2 treatment. The differences between yields from November 11 plantings for different plant population levels were not well pronounced as were from December 6 plantings. This indicated that seed yield response was positive to increased population in later plantings probably because there is less time for the crop to exploit its plasticity.

Table 6.1.2. Yield (kg/ha) of lentils at different dates of planting (D) and plant population (P) levels in LDPPT at different locations during 1981/82.

PLANT POPULATION	LOCATION														
	LEBANON (Terbol) Date of Planting					PAKISTAN (Kallurkot) Date of Planting					SYRIA (Tel Hadya) Date of Planting				
	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean
333.3 Plants/m^2 (P_1)	1411	1803	1876	1723	1703	-	-	1068	1109	1089	1517	1937	1389	1078	1480
222.2 Plants/m^2 (P_2)	1785	1861	2018	1378	1761	-	-	1013	919	966	1743	1536	1251	1314	1314
166.7 Plants/m^2 (P_3)	1914	1982	1669	1296	1715	-	-	958	737	848	1574	1755	1222	1150	1150
133.3 Plants/m^2 (P_4)	1658	1725	1759	1274	1604	-	-	1027	646	837	1601	1489	1071	782	780
Mean	1692	1843	1831	1418	1696	-	-	1017	853	935	1609	1679	1233	1081	1181
C.V. %	D=16.6	P=14.1				D=16.0		P=14.2			D=10.4		P=14.0		
L.S.D. at 5%	D=224	P=NS		D x P=341		D=NS		P=139	D x P=197		D=116		P=141		D x P=NS
Date	Nov 16	Dec 3	Dec 21	Jan 11				Nov 11	Dec 6		Nov 23	Dec 13	Jan 10	Feb 4	

6.1.3. CHICKPEA DATE OF PLANTING AND PLANT - POPULATION TRIAL (CDPPT)

Results and Discussion

Twenty six trials were sent to different locations in 12 countries and data were received from Terbol in Lebanon and Quetta and Kallurkot in Pakistan. These are presented in Table 6.1.3. The highest seed yield was recorded at Terbol (1624 kg/ha) and the lowest at Quetta (385 kg/ha). The low yields at Quetta were attributed to too much rains falling in January and February.

The ANOVA for the experimental design revealed that the seed yield varied significantly at all the sites, whereas the plant populations affect and interaction between plant populations and date of planting were significant only at Terbol.

The results from Terbol reveal that advancing the planting date of chickpea from December (D_3) into November 24 or November 4 had no significant effect on seed yield. This may be attributed partly to the cold winters experienced at that site. On the other hand, delaying planting into spring produced only one third of the winter seed yields. Also, increasing the plant population level from 16.7 to 25.0 and 33.3 plants/m^2 increased the yield levels significantly. The best yields were obtained from December 8 planting with plant population density of 25 plants/m^2.

In Pakistan at Kallurkot the results reveal that planting chickpeas in December and January as compared to November reduced the yields by 62% and 85% respectively and delaying it further into February almost led to complete crop failure to obtain the real optimum date of planting at this location, the trial could include some planting dates in October.

At Quetta in Paksitan, the yield levels were comparatively very low and the highest yield was recorded from Janaury planting. The earlier or later planting reduced the yield levels but the reductions were not significant statistically.

Table 6.1.3. Yield (kg/ha) of chickpeas at different dates of planting (D) and plant populations (P) levels in CDPPT at different locations during 1981/82.

PLANT POPULATION	LOCATIONS														
	LEBANON (Terbol) Date of Planting					PAKISTAN (Kallurkot) Date of Planting					PAKISTAN (Quetta) Date of Planting				
	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean
33.3 plants/m^2	2138	1982	2003	774	1724	1299	628	260	36	556	284	408	410	401	376
25.0 plants/m^2	2098	1948	2319	758	1781	1688	644	281	16	662	306	428	420	375	382
20.0 plants/m^2	1750	1860	1922	265	1524	1438	585	175	21	555	365	586	368	276	399
16.7 plants/m^2	1931	1539	1774	630	1468	1648	430	211	12	575	349	407	389	380	381
MEAN	1979	1832	2004	682	1624	1518	577	232	21	587	326	457	397	358	385
C.V. %	D=24.8		P=15.7			D=27.1		P=42.9			D=45.6		P=20.3		
L.S.D. at 5%	D=321		P=182	D x P=365		D=127		P=NS	D x P=NS		D=140		P=NS	D x P=NS	
Date	Nov 4	Nov 24	Dec 8	Apr 13		Nov 12	Dec 15	Jan 17	Feb 12		Nov 11	Jan 1	Feb 22	Apr 5	

6.2. FERTILITY-CUM-INOCULATION TRIAL (FIT)

Introduction

This trial was conducted in 1981/82 for the third consecutive season. It was planned to study the responses of faba beans, lentils and chickpeas to the application of fertilizer nutrients and to inoculation with Rhizobium culture under different agro-ecological conditions in the region. The objectives of this trial have been to investigate :

(i) whether there is need for application of phosphate and potash,
(ii) whether the naturalized Rhizobia present in the soil were effective or there was a need for artificial inoculation,
(iii) whether the symbiotic nitrogen fixation was adequate in meeting the nitrogen need of the crop,
(iv) whether the symbiotic nitrogen fixation as reflected in terms of crop performance can be improved with starter nitrogen dressing,
(v) whether the symbiotic nitrogen fixation is affected by the application of phosphorus and/or potassium.

Material and Methods

The basic set of fertility and inoculation treatments was the same for all the three crops. These consisted of : (i) an unfertilized uninoculated control, (ii) 50 kg P_2O_5/ha, (iii) 60 kg K_2O/ha, (iv) inoculation, (v) inoculation + 50 kg P_2O_5/ha, (vi) inoculation + 60 kg K_2O/ha, (vii) inoculation + 50 kg P_2O_5/ha + 60 kg K_2O/ha and (viii) 100 kg N/ha + 50 kg P_2O_5/ha + 60 kg K_2O/ha. In Syria, additional treatments were used and these are presented in the appropriate tables.

The trial was designed as a randomized complete block and four replications were recommended. The cooperators could reduce the replications to three if land was limiting. The suggested plot sizes were : 18.0 m^2 (3.6m x 5.0m) for faba beans and chickpeas, and 13.5m^2 (2.7m x 5.0m)

for lentils. The net plot for harvesting was suggested to be comprised of the central rows 4 m long leaving one row at either side of the plot and 0.5 m at either end of row as borders.

6.2.1. FABA BEAN FERTILITY-CUM-INOCULATION TRIAL (FBFIT)

Results and Discussion

A total of 14 trials were sent to different locations in eight countries, but data were received from only five locations; namely Debre Zeit and Holetta in Ethiopia, Hudeiba in Sudan, and Tel Hadya and Lattakia in Syria. Results from Debre Zeit could not be included in this report because the treatments were drastically modified. The data of the other four locations are presented in Table 6.2.1. The highest seed yield (2884 kg/ha) was recorded at Tel Hadya and the lowest (2337 kg/ha) at Holetta.

The analysis of variance for the experimental design revealed that the mean squares due to treatments were significant for all the locations except for Hudeiba. Among the significant results, the control ranked 3,3 and 5 at Holetta, Tel Hadya and Lattakia respectively. Of all the treatments, only T_6 (inoculation + 60 kg K_2O/ha) at Holetta gave significantly higher yield over the control. Whereas at other locations there were not real differences between control and high yielding treatments.

Table 6.2.1. Seed yield (y = kg/ha) and rank (R) of different fertility-cum-inoculation treatments in FBFIT at various locations during 1981/82.

TREATMENT	LOCATION							
	ETHIOPIA		SUDAN		SYRIA			
	Holetta		Hudeiba		Tel Hadya		Lattakia	
	Y	R	Y	R	Y	R	Y	R
T_1 - Control	2278	3	2596	3	2953	3	2754	5
T_2 - 50kg P_2O_5/ha (P)	2951	2	2692	2	2689	10	3124	2
T_3 - 60kg K_2O/ha (K)	2142	5	2426	8	2864	5	2307	7
T_4 - Inoculation with Rhizobium (I)	2172	4	2558	5	2881	4	2117	8
T_5 - I + P	1857	8	2543	6	3114	2	2763	4
T_6 - I + K	3153	1	2460	7	2840	6	2544	6
T_7 - I + P + K	2058	7	2705	1	2801	7	3470	1
T_8* - 100kg N/ha + 50kg P_2O_5/ha + 60kg K_2O/ha	2087	6	2591	4	2701	9	2934	3
T_9 - 50kg P_2O_5/ha mixed with seeds					3202	1		
T_{10} - 50kg P_2O_5/ha mixed with seeds + I					2800	8		
Location mean	2337		2571		2884		2751	
C.V.%	20.6		9.0		9.1		21.5	
L.S.D at 5%	841		NS		379		868	

* At Tel Hadya 100 kg N/ha was given in two applications : 50kg at planting and 50kg at the beginning of flowering.

6.2.2. LENTIL FERTILITY-CUM-INOCULATION TRIAL (LFIT)

Results and Discussion

A total of 17 trials were sent to different locations in 11 countries and data were received from Carahue, Chile; Sids, Egypt; Karaj, Iran; Tel Hadya and Izra'a, Syria. These are presented in Table 6.2.2. The highest seed yield was recorded from Tel Hadya (1691 kg/ha) and the lowest from Izra'a (318 kg/ha). The very low yields at Izra'a could be attributed to the very dry conditions of the location.

The analysis of variance for the experimental design revealed that the mean squares due to treatments were significant only at Carahue in Chile, Karaj in Iran and Tel Hadya in Syria.

The results at Carahue and Tel Hadya revealed that the inoculation with 50 kg P_2O_5/ha gave the highest seed yields but the increase over control was not statistically significant. Similarly the highest yield at Karaj was obtained for inoculation + 60 kg P_2O_5/ha treatment and again the increase over control was not statistically significant.

Table 6.2.2. Yield (Y=kg/ha) and rank (R) of different fertilizer-cum-inoculation treatments in LFIT at various locations during 1981/82.

TREATMENT	LOCATION									
	CHILE Carahue		EGYPT Sids		IRAN Karaj		SYRIA Tel Hadya		SYRIA Izra'a	
	Y	R	Y	R	Y	R	Y	R	Y	R
T_1 - Control	1250	5	1050	5	1011	4	1692	6	395	
T_2 - 50 kg P_2O_5/ha (P)	1081	6	1058	4	899	7	1672	8	292	7
T_3 - 60 kg K_2O/ha (K)	1042	8	1116	2	1023	2	1593	10	302	5
T_4 - Inoculation with Rhizobium (I)	1063	7	865	7	1007	5	1627	9		4
T_5 - I + P	1382	1	1076	3	918	6	1776	1	301	6
T_6 - I + K	1313	3	1021	6	1305	1	1726	3	368	2
T_7 - I + P + K	1360	2	861	8	876	8	1737	2	257	8
T_8* - 100 kgN/ha+50kg P_2O_5/ha + 60kg K_2O/ha	1299	4	1136	1	1015	3	1695	5	315	3
T_9 - 50 kg P_2O_5/ha mixed with seeds							1679	7		
T_{10} - 50 kg P_2O_5/ha mixed with seeds + I							1714	4		
Location mean	1224		1023		1007		1691		318	
C.V.%	16.6		24.1		25.1		5.2		34.9	
L.S.D. at 5%	299		NS		372		126		NS	

* At Tel Hadya 100 kg N/ha was given in two applications : 50kg at planting and 50kg at the beginning of flowering.

6.2.3. CHICKPEA FERTILITY-CUM-INOCULATION TRIAL (CFIT)

Results and Discussion

A total of 27 trials were sent to different locations in 16 countries and data were received from seven locations: Carahue, Chile; Sids, Egypt; Karaj, Iran; Kallurkot, Pakistan; Gelline, Jinderis and Tel Hadya in Syria. The results for these locations are presented in Table 6.2.3. The highest seed yield of chickpeas was recorded at Tel Hadya (2233 kg/ha) and lowest at Gelline (294 kg/ha).

The analysis of variance for the experimental design revealed that the mean squares due to treatments were significant only for four locations, namely Carahue, Sids, Karaj and Kallurkot.

At Carahue four treatments, namely, T_4 (inoculation), T_5 (inoculation + 50 kg P_2O_5/ha), T_6 (inoculation + 60 kg K_2O/ha) and T_7 (inoculation + 50 kg P_2O_5/ha + 60 kg K_2O/ha) gave significantly higher yield than the control (T_1), however, there were very little differences in yield among themselves. This suggested that a suitable inoculation alone can help in improving the seed yield of chickpeas at Carahue.

At Sids in Egypt the effects of different treatments were well pronounced and it was observed that five treatments namely T_6 (inoculation + 60 kg K_2O/ha), T_8 (100 kg N/ha + 50 kg P_2O_5/ha + 60 kg K_2O/ha), T_4 (inoculation), T_7 (inoculation + 50 kg P_2O_5/ha + 60 kg K_2O/ha) and T_5 (inoculation + 50 kg P_2O_5/ha) gave significantly higher yields over control. The increase in yield over the control was maximum (120.5%) with inoculation + 60 kg K_2O/ha (T_6).

At Karaj and Kallurkot none of the treatments exhibited statistical superiority over the control.

Table 6.2.3. Yield (Y= kg/ha) and rank (R) of differnt fertilizer-cum-inoculation treatments in CFIT at various locations during 1981/82.

TREATMENT	LOCATION													
	CHILE		EGYPT		IRAN		PAKISTAN		SYRIA					
	Carahue		Sids		Karaj		Kallurkot		Gellein		Jinderis		Tel Hadya	
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R
T_1-Control	689	7	819	6	1923	3	1592	3	319	3	1484	1	2413	3
T_2-50 kg P_2O_5/ha placed (P)	703	6	753	7	1940	2	1425	6	267	6	1189	10	2269	5
T_3-60 kg K_2O/ha placed (K)	680	8	705	8	1768	5	1488	4	316	4	1415	4	2369	4
T_4-Inoculation (I)	859	3	1512	3	1381	7	1771	1	250	7	1477	2	1783	10
T_5- I + P	877	1	1431	5	2007	1	933	8	317	2	1348	6	2053	8
T_6- I + K	875	2	1806	1	1254	8	1438	5	362	1	1246	9	1999	9
T_7- I + P + K	857	4	1488	4	1857	4	1629	2	296	5	1443	3	2160	7
*T_8-100 kg N /ha + 50 kg P_2O_5/60 kg K_2O/ha	800	5	1642	2	1594	6	1000	7	224	8	1334	8	2222	6
T_9-50 kg P_2O_5/ha mixed with seeds											1365	5	2533	2
T_{10}-50 kg P_2O_5/ha mixed with seeds + I.											1345	7	2527	1
Location mean	792		1270		1715		1409		294		1365		2233	
C.V. %	14.3		22.9		19.3		32.7		25		29		21	
L.S.D. at 5%	166		427		489		679		NS		NS		NS	

* At Jinderis and Tel Hadya, 100 kgN/ha. was given in two applications: 50 kg at planting and 50 kg at the beginning of flowering.

6.3. WEED CONTROL TRIAL (WCT)

Introduction

The trial aimed at finding out the magnitude of yield loss that occurs in faba bean, lentil and chickpea crops owing to the presence of weeds. It also aimed at assessing the relative merit of some selected weed control treatments under the different agro-ecological conditions in the three crops in the ICARDA region.

Material and Methods

The basic treatments involved weedy check, weed free by repeated hand weeding, hand weeding twice (30-40, 70-80 days after emergence) and herbicide application treatments. The details of these treatments are given in the appropriate tables.

The trials were designed as randomized complete blocks with four replications. The plot size was 18.0 m^2 (3.6 m x 5.0 m) for all the three crops. At harvest time the two outside rows and 0.5 m at either end of the central rows were discarded. Thus the seed yields described in this report came from the central rows of 4 m length.

6.3.1. FABA BEAN WEED CONTROL TRIAL (FBWCT)

Results and Discussion

A total of 18 trials were sent to different locations in 11 countries and data were received back from seven locations : three in Egypt; one in Ethiopia and Lebanon; and two in Syria. These are presented in Table 6.3.1. The highest seed yield was from Sids (6936 kg/ha) followed by Hama (4630 kg/ha). This was attributed to irrigation at both locations. The lowest yield (1507 kg/ha) came from Tel Hadya.

In five out of the seven locations, seed losses due to weeds were quite substantial. The losses were estimated at 56.3, 43.3, 42.4, 38.1 and 26.5% at Terbol, Sakha, Bahtim, Hama and Tel Hadya respectively.

With the exception of Sids (Egypt) and Terbol (Lebanon) there were significant differences amongst treatments affecting the seed yield. Generally, continuous hand weeding was the most effective means of weed control. At Bahtim, four herbicidal treatments namely T_{10}, T_{11}, T_{12} (Igran at 2.0, 2.5 and 3.0 kg ai/ha respectively), and T_9 (Tribunil at 2.5 kg ai/ha), and at Sakha two namely T_{11} and T_{12}, gave significantly higher yield than the weedy check. At Hama, all weed control treatments significantly outyielded the weedy check and the most effective herbicidal treatments were Tribunil at 3.5 kg ai/ha (T_9) and Igran at 2.0 kg ai/ha (T_{10}); these treatments outyielded the weedy check by 60.4 and 58.8% respectively. Their effect was comparable to weed free situation obtained by continuous hand weeding. At Holetta in Ethiopia and Tel Hadya in Syria none of the treatments significantly outyielded the weedy check except that of hand weeding (T_2) at Tel Hadya.

Across locations, Igran applied at the rate of 2.5 kg a.i./ha was the most effective herbicide. On the other hand, in locations where irrigation was applied more frequently namely Sids and Hama, Tribunil at 3.5 kg ai/ha was the best herbicide. Results from this trial clearly show that yield losses due to weeds in faba beans can be heavy and that some herbicides appear promising at controlling the weeds. In the 1980/81 international nursery report, Igran at 2.5 kg ai/ha was again the best herbicide across three different locations: Sakha in Egypt, Nicosia in Cyprus and Terbol in Lebanon.

Table 6.3.1. Yield (kg/ha) of faba beans as affected by weed control treatments in FBWCT at various locations during 1981/82.

TREATMENT	LOCATION														Rank across location for the first 12 treatments
	EGYPT						ETHIOPIA		LEBANON		SYRIA				
	Bahtim		Sakha		Sids		Holetta		Terbol		Hama		Tel Hadya		
	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	Y	R	
T_1-Weed check	2653	7	1182	10	6896	8	2283	3	1075	20	3196	12	1290	12	12
T_2-Weed free by repeated hand weeding	4608	1	2084	2	7578	1	2174	4	2459	2	5163	1	1754	1	1
T_3-Hand weeding twice (30-40 & 70-80 DAE)	4432	2	1809	4	7003	5	2145	5	2152	6	4450	10	1628	2	2
T_4-Pre-emergence application of chlorbromuron (Maloran) at 1.0 kg ai/ha	2590	8	1322	8	7054	4	1914	8	1378	18	4597	8	1628	2	7
T_5-Chlorbromuron at 1.5 kg ai/ha	2278	12	1166	12	6877	9	1612	11	1319	19	4898	4	1510	5	11
T_6-Chlorbromuron at 2.0 kg ai/ha	2319	10	1167	11	6906	7	2038	7	2194	5	4574	9	1489	7	8
T_7-Pre-emerg. appl. of methanbenzthiazuron (Tribunil) at 2.5 kg ai/ha	2302	11	1376	6	6967	6	1679	10	1617	16	4821	5	1419	9	9
T_8-Methabenzthiazuron at 3.0 kg ai/ha	2497	9	1317	9	6839	10	1685	9	1775	12	4391	11	1610	4	10
T_9-Methabenzthiazuron 3.5 kg ai/ha	2965	6	1358	7	7229	2	1444	12	1641	15	5127	2	1510	5	4
T_{10}-Pre-emerg. appln. of terbutryne (Igran) at 2.0 kg ai/ha	3036	5	1614	5	6436	11	2086	6	1875	8	5074	3	1374	11	6
T_{11}-Terbutryne at 2.5 kg ai/ha	3208	4	2183	1	7059	3	2631	1	1715	14	4608	7	1406	10	3
T_{12}-Terbutryne at 3.0 kg ai/ha	3601	3	1885	3	6389	12	2372	2	1588	17	4657	6	1469	8	5
T_{13}-Pre-emerg. appl. of ciyanazine (Bladex) at 0.5 kg ai/ha									1931	7					
T_{14}- " " " 1.0 " "									1834	9					
T_{15}- " " " 2.0 " "									2427	3					
T_{16}-Pre-emerg. appl. of chlorbromuron at 1.5 kg ai/ha + 0.5 kg ai/ha of Pronamide									1819	10					
T_{17}-Pre-emerg. appl. of methabenzthiazuron at 3.0 kg ai/ha + 0.5 kg ai/ha "									2276	4					
T_{18}- " " of Terbutryne at 3.0 kg ai/ha + 0.5 kg ai/ha of Pronamide									2759	1					
T_{19}-Pre-emergence appl. of ciyanazine at 1.0 kg ai/ha + 0.5 kg ai/ha "									1814	11					
T_{20}- " " " chlorbromuron at 1.0 kg ai/ha + 0.5 kg ai/ha Pronamide + 0.5 kg ai/ha of ciyanazine									1747	13					
Location mean	3041		1539		6936		2005		1870		4630		1507		
C.V. %	2.9		25.4		10.5		24.9		35.1		10.1		12.0		
L.S.D. at 5%	127		564		NS		854		NS		670		348		

6.3.2. LENTIL WEED CONTROL TRIAL (LWCT)

Resutls and Discussion

Twenty seven trials were sent to different locations in 14 countries and data were received from four locations listed in Table 6.3.2. The highest seed yield was recorded from Mallawi (2941 kg/ha) and the lowest from Kallurkot (376 kg/ha).

There were treatment differences at all locations except at Mallawi where the differences were not statistically significant. At Sids, Karaj and Kallurkot, the presence of weeds reduced seed yields by 74, 59, and 52% respectively. Three herbicidal treatments at Sids, 8 at Karaj and none at Kallurkot significantly outyielded the weedy check.

At Sids, the application of Gesagard at 2.0 (T_9) and 1.5 kg (T_8) ai/ha outyielded the weedy check by 174.8 and 152.3% respectively. These treatments were not as effective as continuous hand weeding (T_2). but were better than hand weeding twice (T_3).

At Karaj, the best herbicidal treatments was Tribunil at 1.0 kg ai/ha (T_{10}) which was followed by Maloran at 2.0 kg ai/ha (T_6). These treatments outyielded the weedy check by 159.3 and 154.3% respectively and were almost as effective as hand weeding (T_2). At this location Gesagard at 1.5 (T_8) and 2.0 (T_9) kg ai/ha and Tribunil at 2.0 kg ai/ha were also effective for controlling weeds.

At Kallurkot, none of the herbicidal treatments exceeded the weedy check by a significant margin.

The present data reveal that weeds can cause heavy seed yield losses to lentils and a number of herbicides appear to be quite promising at controlling weeds. Across locations, Gesagard at 1.5 kg ai/ha (T_8) proved the most effective herbicide. The same herbicide at the same rate was the best in 1980/81 trials across six different locations namely Al Minia and Bahtim in Egypt; AUB and Kafardan in Lebanon; Khomaltar in Nepal and Islamabad in Pakistan.

Table 6.3.2. Yield (kg/ha) of lentils from different weed control treatments in LWCT at various locations during 1981/82.

TREATMENT	LOCATION								Rank(R) across locations
	EGYPT				IRAN		PAKISTAN		
	Mallawi		Sids		Karaj		Kallurkot		
	Y	R	Y	R	Y	R	Y	R	
T_1-Weedy check	2954	6	622	8	440	12	273	11	12
T_2-Weed free by Rpt. weeding	2194	11	2392	1	1072	4	565	1	2
T_3-Hand weeding twice (30-40 & 70-80 DAE)	3449	3	1509	4	821	10	340	9	7
T_4-Chlorbromuron (Maloram) at 1.0 kg ai/ha	2588	9	681	7	925	7	269	12	10
T_5-Chlorbromuron at 1.5 kg ai/ha	2718	7	587	9	915	9	396	5	8
T_6-Chlorbromuron at 2.0 kg ai/ha	3352	4	734	6	1119	2	342	8	3
T_7-Brometryne (Gesagard) at 1.0 kg ai/ha	4292	1	1010	5	917	8	374	7	5
T_8-Prometryne at 1.5 kg ai/ha	3454	2	1569	3	1097	3	393	6	1
T_9-Prometryne at 2.0 kg ai/ha	2500	10	1819	2	959	6	430	2	3
T_{10}-Methabenzthizuron (Tribunil) at 1.0 kg ai/ha	2602	8	514	12	1141	1	417	4	6
T_{11}-Methabenzthizuron at 1.5 kg ai/ha	3116	5	534	11	695	11	422	3	8
T_{12}-Methabenzthizuron at 2.0 kg ai/ha	2069	12	563	10	1019	5	292	10	11
Location mean	2941		1045		926		376		
C.V. %	39.7		10.0		29.6		49.8		
L.S.D. at 5%	NS		151		396		269		

6.3.3. CHICKPEA WEED CONTROL TRIAL (CWCT)

Results and Discussion

Thirty one trials were sent to different locations in 15 countries and data were received from five locations listed in Table 6.3.3. The highest seed yield was obtained from Karaj (1298 kg/ha) and lowest from Kathmandu (498 kg/ha).

The presence of weeds reduced seed yield significantly at all the locations except at Karaj and Jinderis. The weedy check plots yielded 12.2, 25.3, and 35.1% of the weed free plots at Sids, Terbol and Kathmandu respectively, thus suggesting that yield losses were different from location to location.

Across locations, continuous hand weeding provided the most effective means of controlling the weeds; even hand weeding twice was more effective than most herbicides. Nonetheless, Igran at 2.0 kg ai/ha at Jinderis and at 4.0 kg ai/ha at Karaj produced higher seed yield than continuous hand weeding.

Comparing the yields from weedy check and yields from plots receiving various herbicide treatments, a number of herbicides improved seed yield significantly. At Sids, Igran at 2.0 (T_{10}), 3.0 (T_{11}) and 4.0 kg ai/ha (T_{12}) increased the yield 3.49, 3.91 and 4.19 times respectively. The yield levels in general, were low at this location. At Karaj significant increase in yields (65.0%) were effected by applying Igran at 4.0 kg ai/ha (T_{12}). At Terbol, a number of herbicides controlled the weeds well enough to outyield the weedy check. The most effective treatment was Igran at 2.0 kg ai/ha plus Kerb at 0.5 kg ai/ha (T_{19}); yields from this treatment were 3.36 times those from the weedy check. At Kathmandu and Jinderis none of the herbicidal treatments gave significantly superior yield to that of weedy check.

The data collected this season clearly indicate that weeds can reduce seed yield of chickpea crop significantly; the results also show that a number of herbicides seem promising at controlling the weeds. Across location Igran at 4.0 kg ai/ha was the most effective herbicide. This herbicide was as good as hand weeding twice. The 1980/81 international nursery results also show that Igran at 4.0 kg ai/ha was again the best across six different locations (Terbol, Kafardan in Lebanon; Islamabad in Pakistan; Kafr Antoon, and Jinderis in Syria). In this year, Igran at 4.0 kg ai/ha was even better than hand weeding twice.

Table 6.3.3. Yield (kg/ha) of chickpeas from different weed control treatments in CWCT at various locations during 1981/82.

TREATMENT	LOCATION										Rank across location using the 1st 12 treatments
	EGYPT		IRAN		LEBANON		NEPAL		SYRIA		
	Sids		Karaj		Terbol		Kathmandu		Jinderis		
	Y	R	Y	R	Y	R	Y	R	Y	R	
T_1-Weedy check	144	9	1021	11	399	20	263	11	1275	5	12
T_2-Weed free by repeated hand weeding.	1184	1	1418	4	1575	1	750	2	1333	3	1
T_3-Hand weeding twice (30-40 & 70-80 DAE)	1150	2	1237	8	1296	3	963	1	1236	6	2
T_4-Chlorbromuron (Maloran) at 1.5 kg ai/ha.	-		1074	9	446	19	413	8	1293	4	8
T_5-Chlorbromuron (Maloran) at 2.5 kg ai/ha	-		1372	5	987	6	600	3	1368	2	4
T_6-Chlorbromuron (maloran) at 3.5 kg ai/ha	-		1001	12	1057	5	313	10	718	12	11
T_7-Methabenzthiazuron (Tribunil) 2.5 kg ai/ha	200	7	1257	7	620	13	394	9	1161	9	7
T_8-Methabenzthiazuron (Tribunil) 3.0 kg ai/ha	194	8	1524	3	514	17	250	12	1119	11	10
T_9-Methabenzthiazuron (Tribunil) 3.5 kg ai/ha	237	6	1042	10	545	15	450	7	1155	10	9
T_{10}-Terbutryne (Igran) 2.0 kg ai/ha	503	5	1587	2	505	18	538	5	1382	1	5
T_{11}-Terbutryne (Igran) 3.0 kg ai/ha	563	4	1361	6	944	7	494	6	1221	8	6
T_{12}-Terbutryne (Igran) 4.0 kg ai/ha	603	3	1685	1	1136	4	550	4	1236	6	2
T_{13}-Cianazine (Bladex) 1.0 kg ai/ha					515	16					
T_{14}-Ciyanazine (Bladex) 1.5 kg ai/ha					663	12					
T_{15}-Ciyanazine (Bladex) 2.0 kg ai/ha					568	14					
T_{16}-Methazole 2.0 kg ai/ha					685	11					
T_{17}-Chorbromuron 1.5 kg ai/ha + Pronamide (Kerb) 0.5 kg ai/ha					775	10					
T_{18}-Methabenzthiazuron 2.0 kg ai/ha + " "					932	8					
T_{19}-Terbutryne 2.0 kg ai/ha + " " "					1340	2					
T_{20}-Ciyanazine 1.0 kg ai/ha + " "					863	9					
Location mean	531		1298		818		498		1208		
C.V.	10.8		30.7		39.5		59.5		17.0		
L.S.D. at 5%	84		571		458		428		295		

7. ACKNOWLEDGEMENTS

Our thanks are due to all the donors of ICARDA, and in particular the IDRC, for making this cooperative research effort possible.

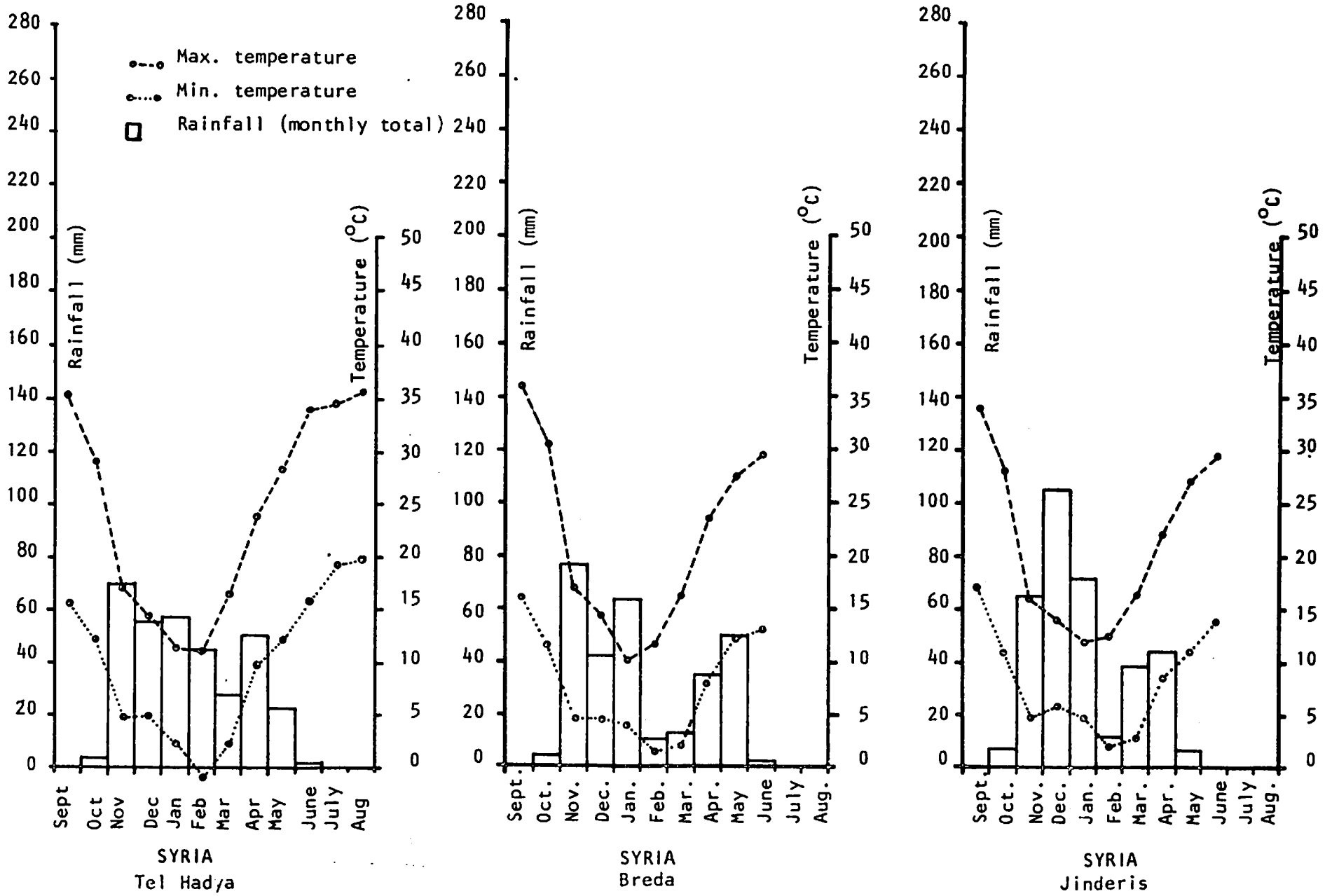
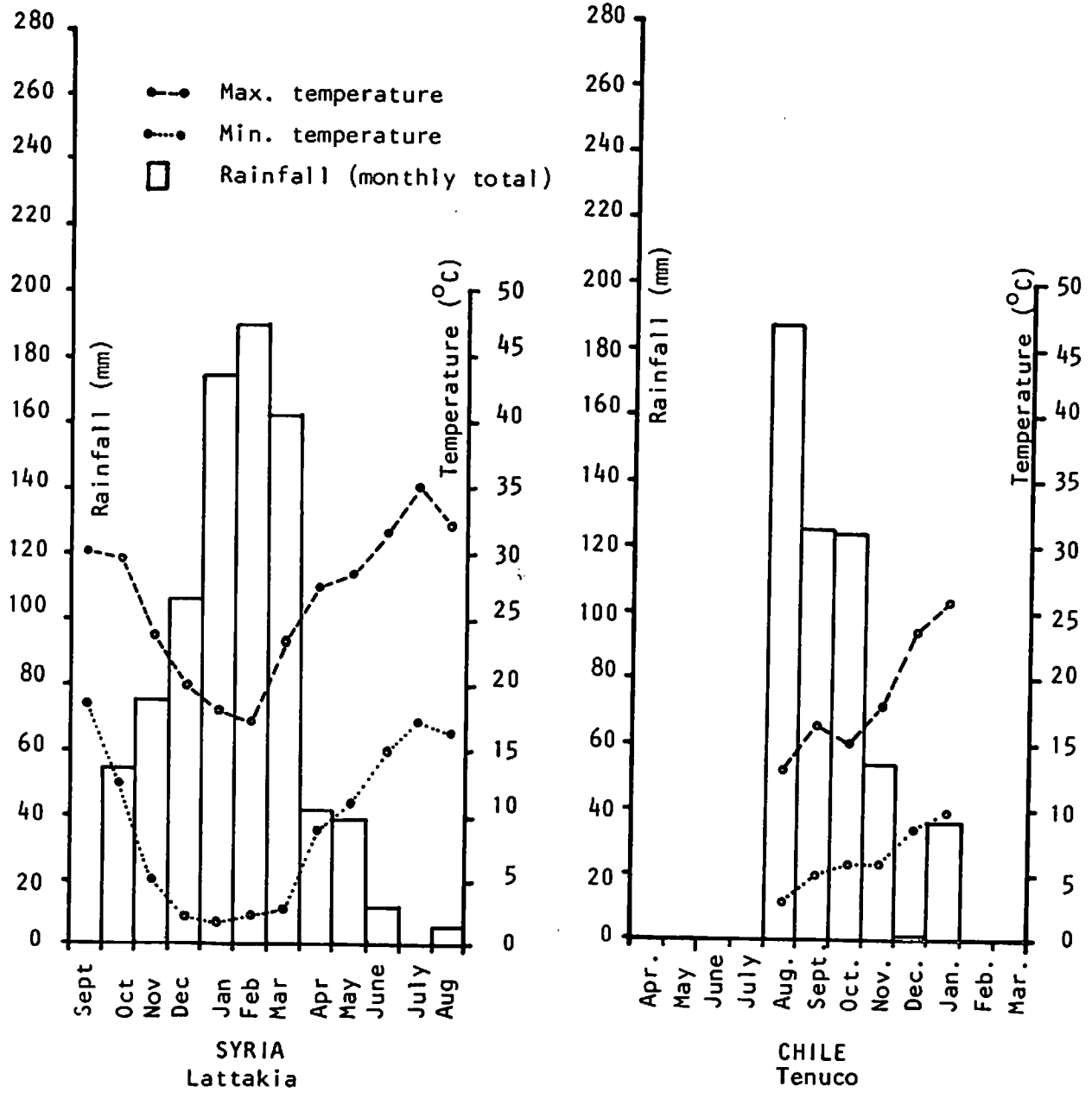
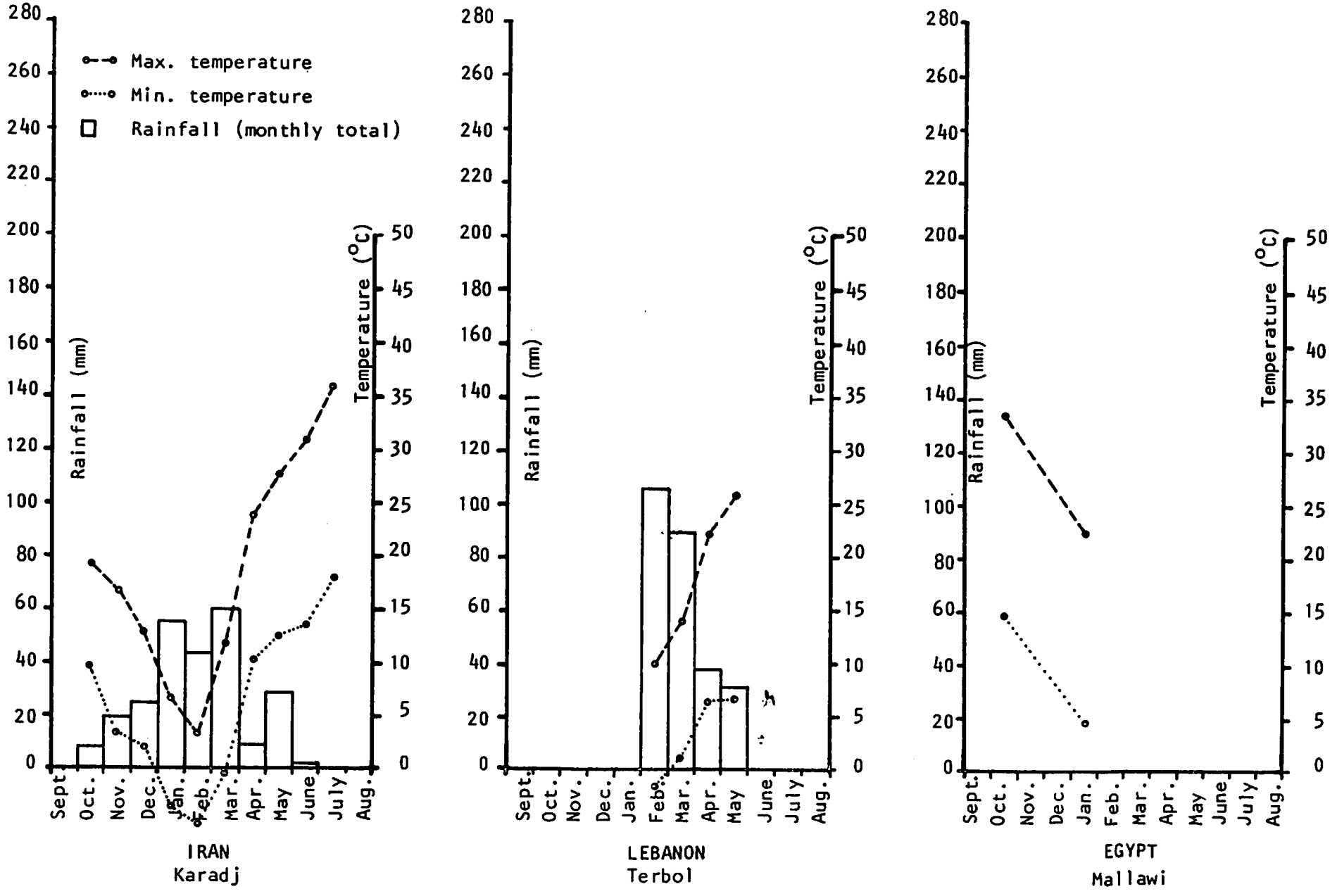
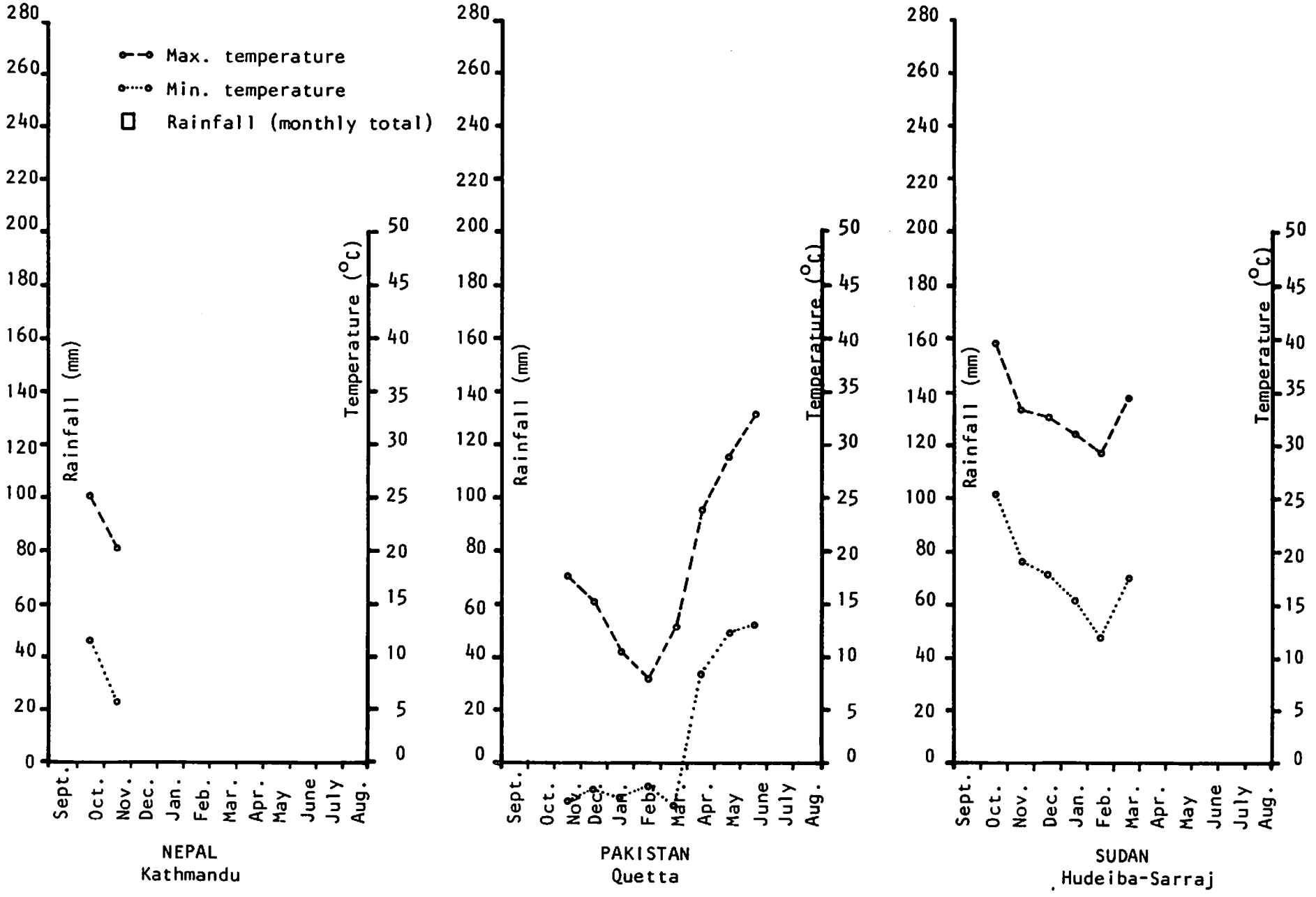
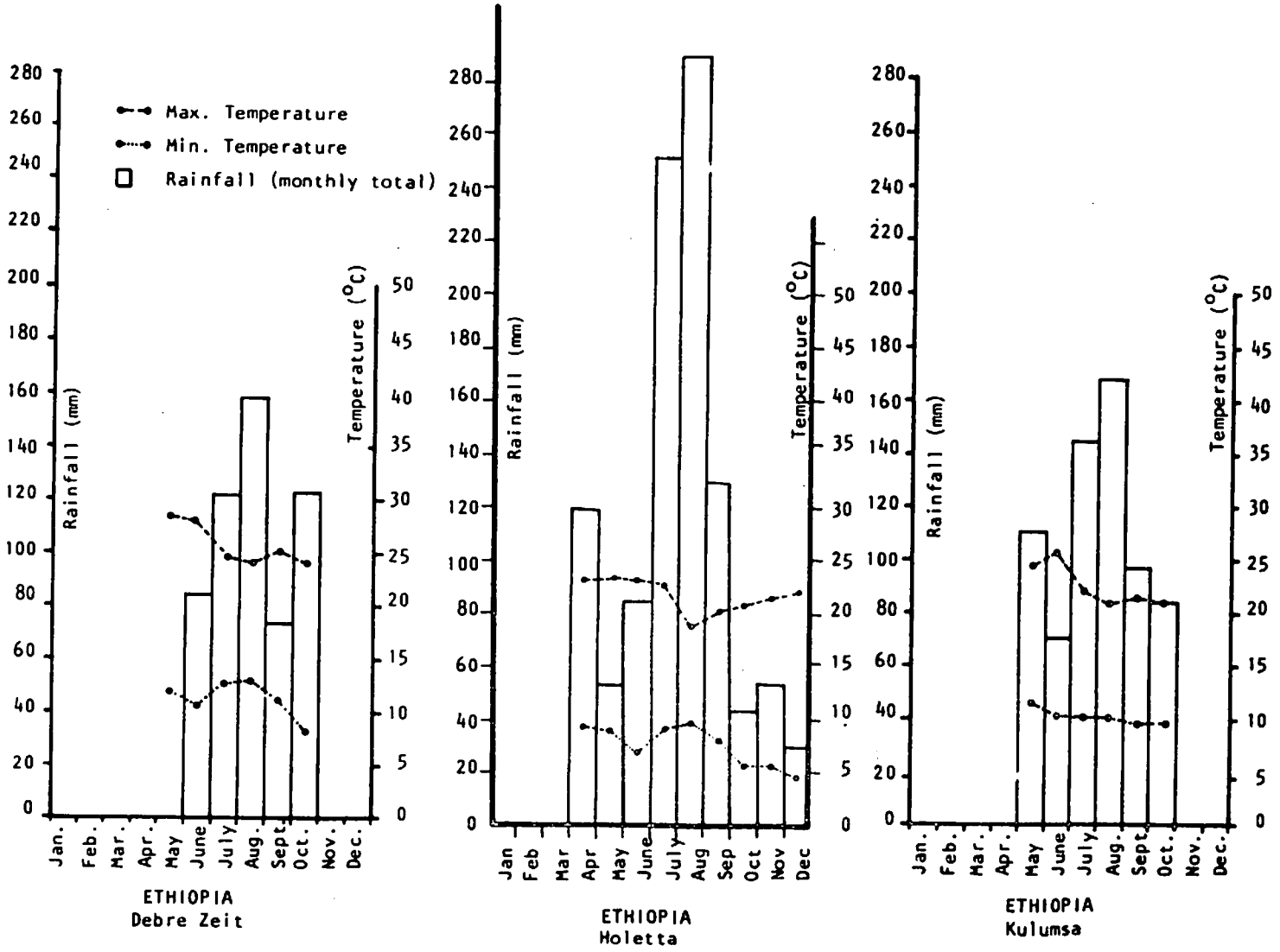


Fig. 1. Monthly maximum and minimum temperature and monthly total rainfall during the cropping season at different locations.


Max. temperature
Min. temperature
Rainfall (monthly total)
Rainfall (mm)
Temperature (°C)
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
50
45
40
35
30
25
20
15
10
5
0
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
SYRIA
Lattakia
Apr.
May
June
July
Aug.
Sept
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
CHILE
Tenuco


Max. temperature
Min. temperature
Rainfall (monthly total)
Rainfall (mm)
Temperature (°C)
Sept.
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
IRAN
Karadj
LEBANON
Terbol
EGYPT
Mallawi


Max. temperature
Min. temperature
Rainfall (monthly total)
Rainfall (mm)
Temperature (°C)
Sept.
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
NEPAL
Kathmandu
PAKISTAN
Quetta
SUDAN
Hudeiba-Sarraj


Max. Temperature
Min. Temperature
Rainfall (monthly total)
Rainfall (mm)
Temperature (°C)
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
ETHIOPIA
Debre Zeit
Jan Feb Mar Apr May June July Aug Sep Oct Nov Dec
ETHIOPIA
Holetta
ETHIOPIA
Kulumsa