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# TUNISIA - ICARDA COOPERATIVE PROGRAM ON FOOD LEGUME IMPROVEMENT

Progress Report 1985/86

INRAT

ICARDA

# NORTH AFRICAN REGIONAL PROJECT
# ON FOOD LEGUME IMPROVEMENT

## TUNISIA - ICARDA
## COOPERATIVE PROGRAM
## ON
## FOOD LEGUME IMPROVEMENT

PROGRESS REPORT

1985/86

INRAT
2080 ARIANA
TUNISIA

ICARDA
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# P R E F A C E

This report contains the results of a collaborative research program on food legumes between the Tunisian Program and ICARDA. The program was carried out within the Institut National de la Recherche Agronomique de Tunisie (INRAT), and conducted by:

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## 1. HIGHLIGHTS OF THE 1985/86 CROP SEASON

This report gives the results from the fifth year of a cooperative project on food legume improvement between INRAT (Institut National de la Recherche Agronomique de Tunisie) and ICARDA. The objective of this project is to identify superior genotypes and production techniques for faba beans, chickpeas and lentils, that together can ensure the farmer a more stable and improved economic return from the cultivation of these legume crops.

The highlights of 1985/86 season concern the breeding and the agronomy components.

### 1.1. Breeding

The highlights are the decision to release three chickpea lines and two lentil varieties.

a. Chickpea: three varieties are to be released: Two for winter sowing and one for spring planting. The first winter line is resistant/tolerant to Ascochyta blight under Beja conditions, has a reasonably good yielding capacity, reasonable seed size and a good height.

The second variety is a tall variety tolerant to Ascochyta blight and can be harvested mechanically. The seed size is however smaller than the other and is therefore recommended for pastry and coffee blending. Being a late variety, it is recommended strictly for

winter sowing and high rainfall areas.

The third variety is a spring variety; it is a selection from the local population Amdoun but yields 10 to 20% more. It is highly resistant to wilt; has an excellent seed size, but completely susceptible to Ascochyta blight, it is therefore recommended for spring sowing in wilt infested zones.

It must be stressed that the main objective of the chickpea breeding program is to produce varieties that combine resistance to wilt and ascochyta. The program has given priority to this and has made significant progress in this field. Resistant material to both diseases is being identified and should be available to farmers in the next few years.

b. Lentils: Two varieties will be released for farmers. These two lines have been consistently good yielders during the last three years. One is of the large seeded type and the second is of the intermediate seed type.

1.2. Agronomy

The program has now completed four years of agronomic work and recommendations concerning some of the agronomic practices will be made available to farmers. These recommendations cover the date and the density of planting as

well as the manual weed control for the major food legume crops. They will be presented in a pamphlet and distributed to the extension people.

## 2. THE RESEARCH PROGRAM

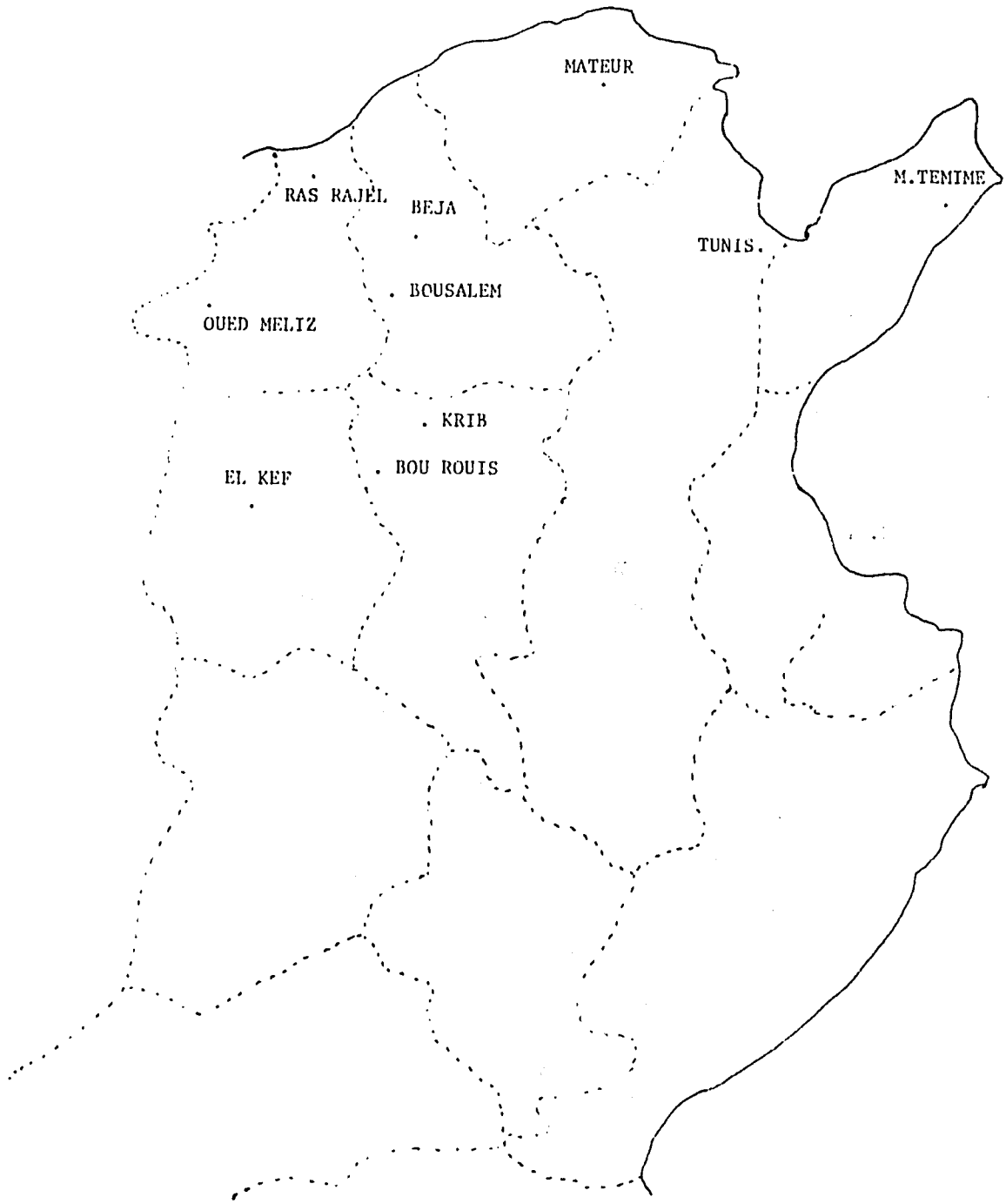
### 2.1. Experiments and locations

The INRAT breeding trials and nurseries and agronomic experiments were grown at one or more of eight locations at Tunis, Beja, Kef, Mateur, Oued Meliz, Ras Rajel, Bou Salem and Krib. Most of these locations are situated in the principal crop growing areas in the North and West of the country and are complemented by the Office des Cereales experimental sites which are: Menzel Temime, Mateur bis and Bourouis (Figure 1).

In the breeding program the experiments called "International" came from ICARDA and contained breeding lines and segregating populations for evaluation in replicated trials and non-replicated screening and disease nurseries. The advanced (AYT) and preliminary (PYT) yield trials contained lines selected for a superior performance last season. Generally lines in an AYT have already been tested for one or more seasons in a replicated trial whilst those in a PYT have been previously evaluated only in a non-replicated screening nursery.

Figure1 : Sites experimentaux utilises au cours de la campagne 1985/86

Figure1 : Locations of experimental trials and nurseries in Tunisia 1985/86.



In the following crop reports, however, the entries in the international, advanced and preliminary trials and screening nurseries are referred to simply as lines. The plot size in the majority of trials was $8m^2$ and in the screening nurseries $2m^2$ with $4m^2$ and $2m^2$ respectively harvested for yield evaluation.

The agronomic program covered all food legume crops including peas and continued to evaluate crop responses to different dates of sowing and differing levels of plant population, the effectiveness of a range of herbicides on natural weed populations, and crop/weed competition studies.

## 2.2. Analyses and Results

All the international trials were grown as randomised blocks and the advanced and preliminary trials as simple or triple lattices. The last two groups of trials have so far only been analysed as randomised blocks but lattice analyses will be undertaken once the new computer is operational. In discussing the results the term significant has been used to describe a probability level equal to or less than 0.05. Also only if the analysis of variance produced a significant ($P \leqslant 0.05$) 'F' value has a least significant difference been calculated, in order to assess whether the lines or populations had values that were significantly different from that of the checks.

The various abbreviations used in the report are defined in table 1.

## 2.3. Meteorological Data

Data on temperature and rainfall at all locations except Tunis, from which experimental data is given in the following report are given in figure 2 .

In general the growing season was characterized by a very dry autumn and by an important deficit in total rainfall at all locations except at Ras Rajel. The Kef station suffered the most from drought which has seriously affected the crops. Data from this station should consequently be used with caution.

Rainfall received during crop growth at Beja, Oued Meliz and Kef stations were 76%, 78% and 61% of the normal average rainfall, respectively.

**Tableau.1 : Abréviations utulisées dans le rapport**

**Table 1 : Abbreviations used in the report**

---

Locations/Sites

B - Béjà

OM - Oued Meliz

K - Kef

RR - Ras Rajel

BS - Bou Salem

M - Mateur

Kr - Krib

T - Tunis

Data/Results

- Seed yield expressed in Kg/ha / Rendements en Kg/ha
- Data values - those underlined were significantly ($P \leq 0.05$) superior to the Tunisian local check. Les soulignés sont statistiquement supérieurs à celui du temoin.
- M= Data missing/Résultat manquant
- NA = Data not analysed/Resultats non analyses
- NT = Not tested/Non testé

Statistics/Statistiques

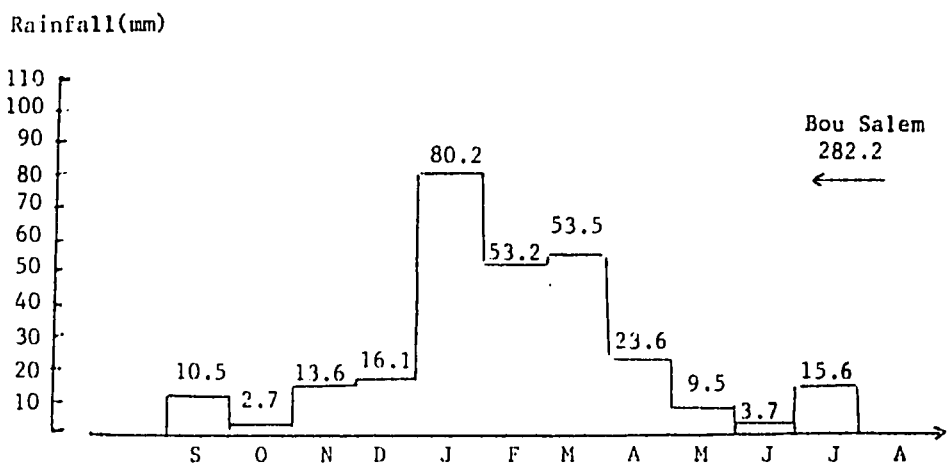
- CV % = Coefficient of variation expressed as a percentage/Coefficient de variation de l'essai
- SE ± = Standard error/Erreur standard

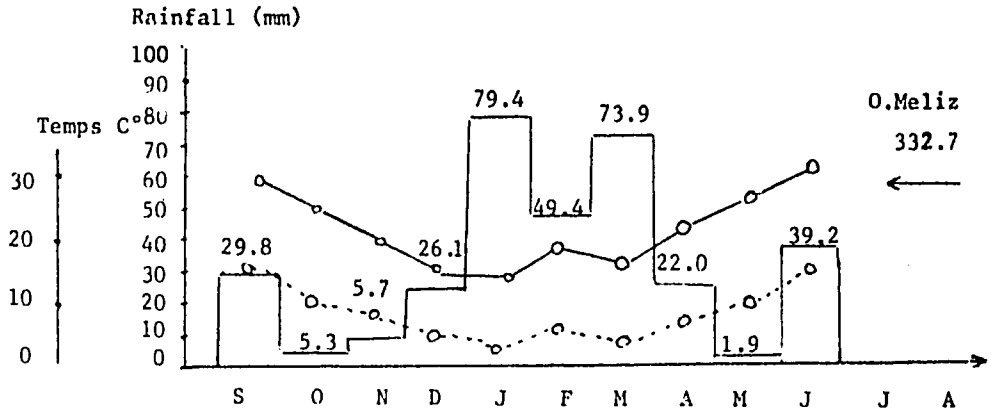
Others/Autres

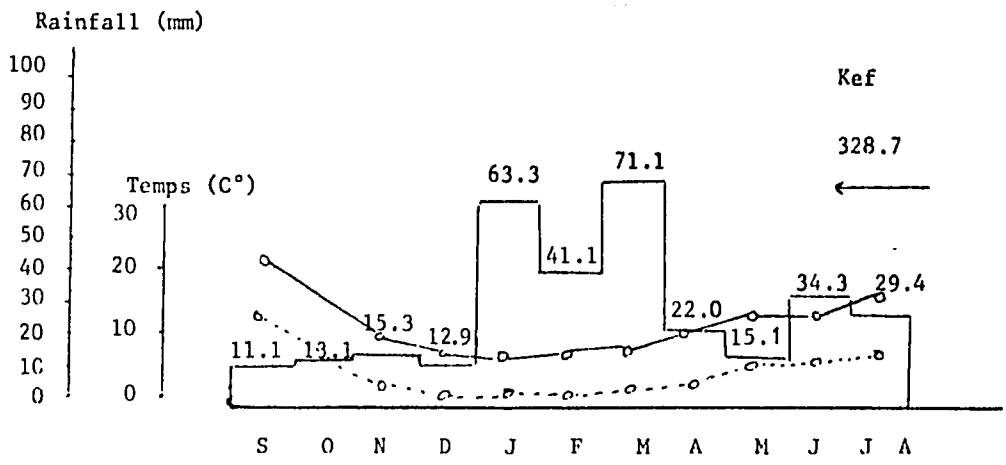
- D.P.P.T. = Date and Plant Population Trial/Date et Densité de Semis
- W = Winter/Hiver
- Sp. = Spring/Printemps
- P = Protected
- N.P = Non protected

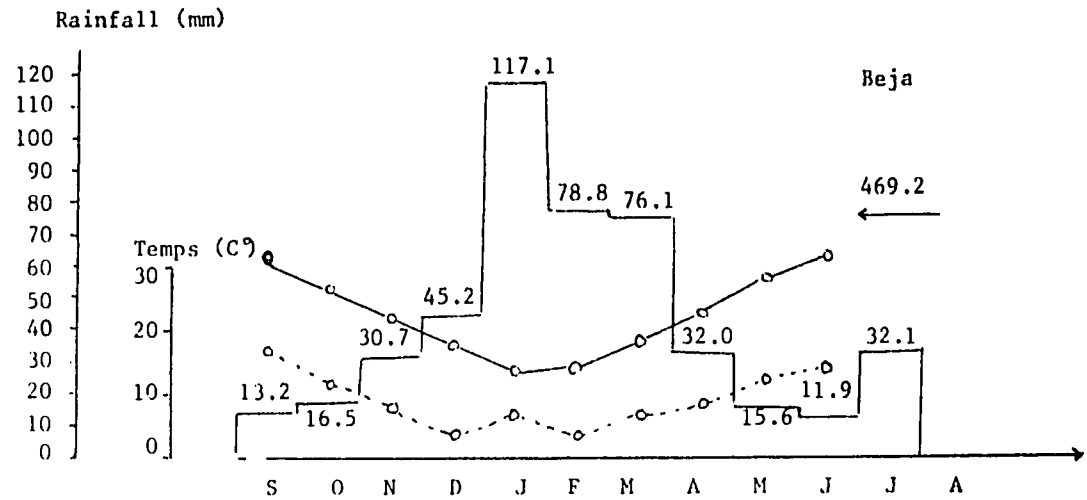
Fig 2 : Rainfall distribution (mm) and temperature at all experimental sites in Tunisia in 1985/86.

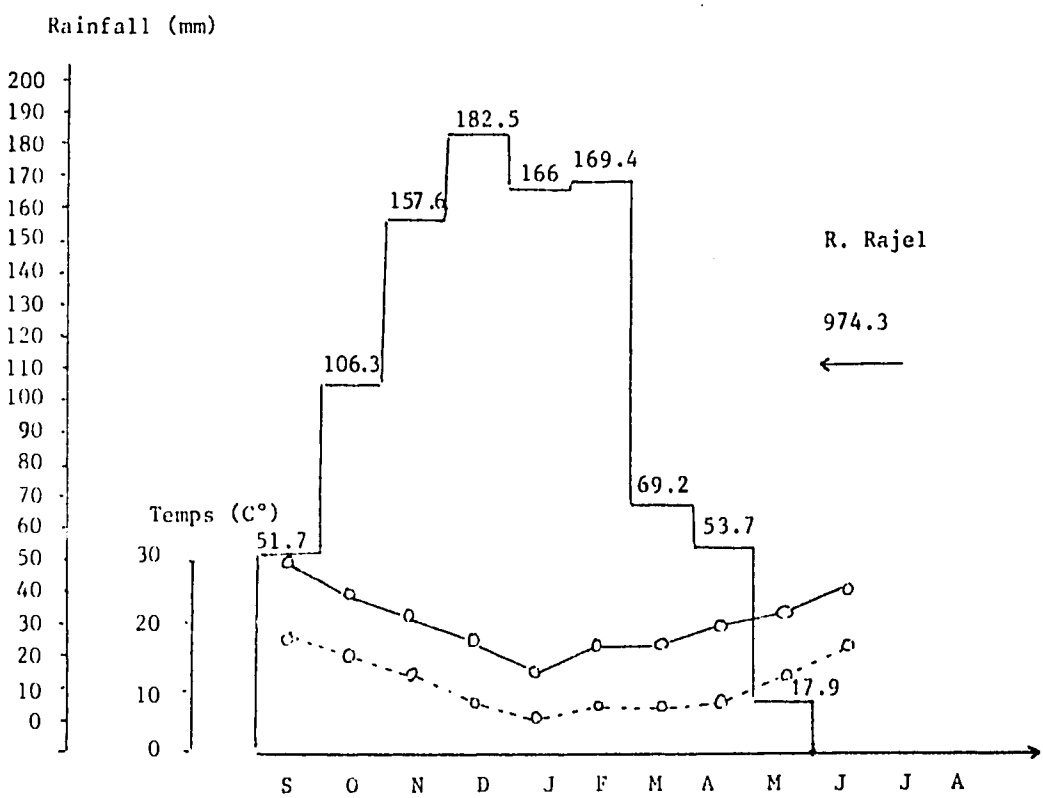
Fig 2 : Pluviométrie et température enregistrées sur les stations expérimentales en 1985/86.

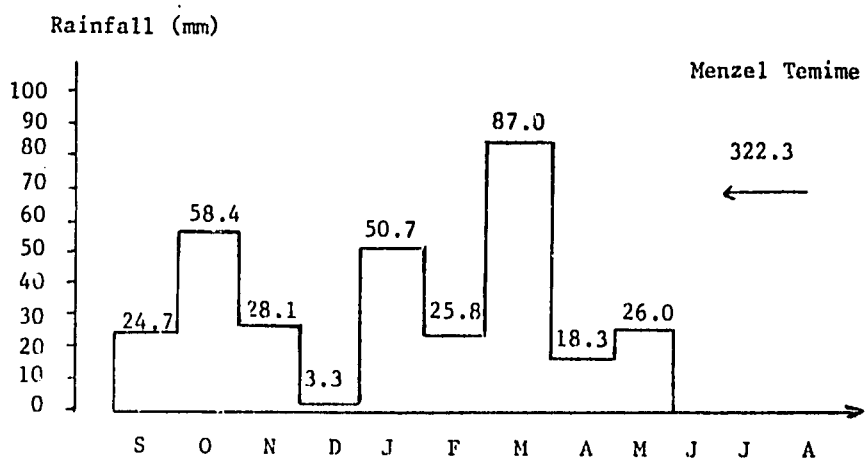



Rainfall (mm)
Temps C°
O.Meliz
332.7
29.8
5.3
5.7
26.1
79.4
49.4
73.9
22.0
1.9
39.2
S O N D J F M A M J J A


Rainfall (mm)
Temps (C°)
Kef
328.7
11.1
13.1
15.3
12.9
63.3
41.1
71.1
22.0
15.1
34.3
29.4
S O N D J F M A M J J A


Rainfall (mm)
Beja
469.2
Temps (C°)
117.1
78.8
76.1
45.2
30.7
32.0
32.1
13.2
16.5
15.6
11.9
S O N D J F M A M J J A


Rainfall (mm)
R. Rajel
974.3
Temps (C°)
182.5
166
169.4
157.6
106.3
69.2
53.7
51.7
17.9
S O N D J F M A M J J A


Rainfall (mm)
Menzel Temime
100
90
80
70
60
50
40
30
20
10
0
24.7
58.4
28.1
3.3
50.7
25.8
87.0
18.3
26.0
322.3
S
O
N
D
J
F
M
A
M
J
J
A

## 3. FABA BEAN IMPROVEMENT (H. Ben Salah)

### 3.1. Introduction

Both large and small seeded faba beans are cultivated in Tunisia and the program's objective is the improvement of both these types through the selection of heavier yielding lines and the identification of genetic sources of resistance to the prevalent diseases and pests. For diseases this season the aggressive stage of chocolate spot (*Botrytis fabae*) occurred in trials at the Ras Rajel location where an attack of rust (*Uromyces fabae*) was also observed. A high level of infestation of *Orobanche* spp. again occurred at the Beja location.

This season the farmer's crop was little affected by diseases but they are always a potential danger. Perhaps the most serious are chocolate spot, which can devastate the crop as occurred in the 1981/82 season, and soil infestation by the parasitic weed species of *Orobanche* which can make large areas impractical for faba bean cultivation for many growing seasons. Other diseases that have been noted are ascochyta blight (*A. fabae*), alternaria leaf spot (*A. tenuis*) and downy mildew (*Peronospora* spp.) and attacks of the stem nematode (*Ditylenchus dipsaci*) and the stem borer (*Lixus algirus*). The latter was also observed at Oued Meliz station.

Progress in achieving seed yield improvement over the local cultivars has so far been limited, and ideally any improvement should be stabilised by being combined with resistance/tolerance to the major diseases. Each season genetic material selected for resistance to chocolate spot, ascochyta blight, rust and orobanche by ICARDA is screened for resistance in Tunisia. With the irregularity of natural disease development, disease screening methods for developing epiphytotic conditions through artificial inoculation of ascochyta blight and chocolate spot nurseries took place this year in a plastic tunnel with irrigation facilities to ensure adequate levels of humidity and temperature for good disease development.

This crop report concentrates mainly on seed yield and table 2 provides a summary of the complete results from all trials and nurseries. The complete results are presented in tables 1 to 23 prefixed by the letter F.

In all the yield trials, screening and disease nurseries the local check was a large or small seeded local cultivar. This check was included as a single entry in the international yield trials but was repeated in the advanced and preliminary yield trials.

Table 2 : Summary of seed yield results of Faba bean lines and population tested in replicated yield trial (YT) and screening nurseries (SN) at Beja (B), Kef (K), Oued Meliz (OM) Ras Rajel (RR), Krib (Kr) and Mateur (M) locations in 1985/86.

| Trial designation (1) | | Number of lines/populations | | | | | | | | | | | | Coefficients of variation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Tested | Exceeding the local check at | | | | | | Significantly exceeding the local check at (2) | | | | | | | | | | |
| | | | B | K | OM | RR | Kr | M | B | K | OM | RR | Kr | M | B | K | OM | RR | Kr | M |
| International | YT-L | 17 | 13 | - | - | - | - | | NS | - | - | - | | | 24.13 | | | | | |
| | YT-LE | 35 | 6 | - | - | - | - | | NS | - | - | - | | | 24.65 | | | | | |
| | EJW-T.EEC | 12 | 8 | - | - | - | - | | 4 | - | - | - | | | 16.64 | | | | | |
| Advanced | YT-L | 21 | 12 | 16 | 17 | - | - | | NS | NS | NS | - | | | 17.78 | 19.79 | 14.20 | | | |
| | YT-$L_1/F_4$ | 23 | 7 | 12 | - | - | - | | NS | NS | - | - | | | 15.28 | 60.10 | | | | |
| | YT-$L_2/F_4$ | 13 | 2 | 5 | - | - | - | | NS | NS | - | - | | | 20.43 | 24.97 | | | | |
| | YT-$LS/F_5$ | 23 | 4 | 6 | - | - | - | | NS | NS | - | - | | | 15.17 | 26.17 | | | | |
| | YT-L/L | 8 | 6 | 5 | - | 3 | - | | NS | NS | - | NS | | | 17.09 | 43.68 | | 18.6 | | |
| | YT-LS/L | 14 | 12 | - | - | - | - | | NS | - | - | - | | | 17.83 | | | | | |
| Preliminary | YT-L | 22 | 1 | 11 | - | - | - | | 0 | NS | - | - | | | 18.90 | 32.45 | | | | |
| International | YT-S | 17 | 11 | - | - | - | - | | NS | - | - | - | | | 32.46 | | | | | |
| Advanced | YT-$S_1$ | 21 | 11 | 10 | 14 | - | - | | NS | 0 | 0 | - | | | 18.89 | 29.45 | 16.08 | | | |
| | YT-$S_2$ | 12 | 6 | 5 | 3 | - | - | | 3 | 1 | 0 | - | | | 14.23 | 63.62 | 16.08 | | | |
| | YT-S/L | 6 | 0 | 6 | - | - | | | NS | NS | | | | | 13.64 | 18.13 | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Preliminary | YT-$S_1$ | 21 | 17 | - | - | - | - | | NS |
| | YT-$S_2$ | 12 | 9 | - | - | - | - | | 5 |
| International | SN-L/S | 1100 | 255* | - | - | - | - | | |
| | SN-L | 33 | 23 | 19 | - | - | - | | |
| | SN-$F_3$ | 42 | 9 | 25 | 15 | 6 | - | | |
| | SN-SA | 58 | 26 | 6 | 5 | 0 | 22 | 7 | |

(1) - L = Large, S = Small, $F_1$, $F_4$, $F_5$, = populations, SN = Screening nursery, EEC = European Economic Community

(2) NS = F Test of treatments not significant ($P > 0.05$)

* Greater than the local check : Faba bean large.

## 3.2. Yield trials and nurseries

In the large seeded program 89 advanced breeding lines, 22 preliminary breeding lines, and 33 preliminary breeding lines in a non-replicated screening nursery, and the corresponding figures in the small seeded program were 74, 33 and 42 respectively were tested (Table 2). The trials and nurseries were conducted at one or more locations. An additional 23 F5 and 36 F4 populations were tested in one replicated yield trial at two locations, 43 F3 populations and 19 F2 progenies were tested in a non-replicated yield trial at one location. Also this year a screening nursery of 1100 pure lines coming from the germplasm collection at ICARDA were tested at Beja station.

Although a number of lines in the trials outyielded the local check at the locations, significant increases were only evident for seven small seeded lines, four lines in the EEC trial and three lines in the advanced yield trial of faba bean small No. 2 at Beja and among them only one was significant at the Kef station but none at Jendouba station. Yield data of these lines are given in table 3. The large coefficients of variation for certain trials (especially at the Kef station) due to the effect of climatic conditions had markedly affected the accuracy of these trials. Within the screening nurseries a large number of lines and F3 populations exceeded the check at individual location but further testing in replicated

trials is needed to confirm such yield advantage.

Some of the yield increases over the local check recorded in table 3 might appear encouraging. However, yield data in table 4 , on the heaviest yielding five large and three small seeded lines, tested over four seasons at two locations, clearly show the inadequacy of one season's testing in attempting to identify superior yielding genotypes, and although the value of statistical significance can be over estimated these results do indicate the poor progress so far achieved in identifying superior yielding lines

As a result of the above considerations increasing emphasis is being put on selection within and testing of early generation material from ICARDA's base program, and collection of and selection within Tunisian local landraces.

This season 255 lines were selected among 1100 pure lines from the base program at Aleppo. 52 single plant selections were selected among crosses made especially for North Africa regional program with selected parents from Morocco National program and ICARDA. Also, 19 crosses were made at ICARDA for our National program, with the objective of combining Botrytis and Ascochyta resistance with good yield. Next season this material will be evaluated for Botrytis and Ascochyta resistance at Ras Rajel under

Table 3 : Seed yield in Kg/ha of twelve superior yielding Faba bean lines at one and three locations respectively

| Trial | Entry | Location | | | |
|---|---|---|---|---|---|
| | | Beja | Kef | Jendouba | Mean |
| EEC | Brocal | 3033[a] | | | 3033 |
| | Palaelo | 3587 | | | 3587 |
| | Pam 1 | 3483 | | | 3483 |
| | Vt 1 | 3325 | | | 3325 |
| | Mean of Tunisian local check faba bean small and large | 2783.5 | | | 2783.5 |
| | Se ± | 441.7 | | | |
| | CV % | 16.6 | | | |
| PYT-S2 | ILB 1813 | 3625 | | | 3625 |
| | S 81 059 | 3137 | | | 3137 |
| | X 75 TA 10 | 3450 | | | 3450 |
| | X 77 TA 48 (80 S 43856) | 3412 | | | 3412 |
| | X 77 TA 48 (80 S 43859) | 3112 | | | 3112 |
| | ILB 3858 | 3087 | | | 3087 |
| | Tunisian local check | 2596.5 | | | 2596.5 |
| | Se ± | 324.7 | | | |
| | CV % | 11.2 | | | |
| AYT-S2 | X 77 TA 81 | 3669 | 537 | 2150 | 2119 |
| | X 77 TA 81 | 3763 | 850 | 2122 | 2245 |
| | X 77 TA 60 | 3719 | 869 | 2675 | 2421 |
| | Tunisian local check | 3382 | 673 | 2540 | 2198 |
| | Se ± | 419.1 | 159.1 | 351.4 | |
| | CV % | 14.2 | 26.3 | 16 | |

(a) Values underlined significantly ($P \leqslant 0.05$) outyielded the check

Table 4 : Seed yield expressed as a percentage of the local check cultivar of five large and three small seeded lines at two locations over four seasons

| Location | Season | ILB 10 (78 S 49907) | ILB 398 (76 TA 56264) | ILB 1266 (Aquadulce) | ILB 1217 (Reina Blanca) | ILB 1269 (New mammoth) |
|---|---|---|---|---|---|---|
| | | Large seeded lines | | | | |
| Beja | 1982/83 | 110 | 138 | 120 | 152[a] | 124 |
| | 1983/84 | 133 | 146 | 201 | 150 | 162 |
| | 1984/85 | 126 | 92 | 113 | 123 | 100 |
| | 1985/86 | 87 | 103 | 112 | 107 | 113 |
| Kef | 1982/83 | 93 | 101 | 82 | 135 | 94 |
| | 1983/84 | 107 | 131 | 96 | 102 | 95 |
| | 1984/85 | 78 | 81 | 80 | 86 | 68 |
| | 1985/86 | 98 | 127 | 88 | 110 | 116 |
| | Mean | 104 | 115 | 111.5 | 120.6 | 109 |

| Location | Season | X 77 Sa 11 (80 S 45676) | ILB 269 (74 TA 367) | ILB 269 (78 S 48821) |
|---|---|---|---|---|
| | | Small seeded lines | | |
| Beja | 1982/83 | 144 | ND[b] | 156 |
| | 1983/84 | 110 | 124 | 91 |
| | 1984/85 | 66 | 89 | 86 |
| | 1985/86 | 99.6 | ND | 109 |
| Kef | 1982/83 | 117 | 118 | 129 |
| | 1983/84 | 100 | 99 | 92 |
| | 1984/85 | 95 | 108 | 178 |
| | 1985/86 | 103 | ND | 103 |
| | Mean | 104 | 107.6 | 118 |

(a) Value significantly ($P < 0.05$) outyielded the local cultivar
(b) ND: no date available

natural conditions and for yield at Beja. For yield purpose also 159 single plant selections from the local landraces were made. Except the 1100 pure lines and the crosses made for our national program, all the other selections were made this season under insect-proof conditions. Next season the same material will be grown under insect proof conditions with the hope that more space will be allocated to this work.

3.3. Disease and pest nurseries

The four international disease nurseries grown this season were a nematode nursery, an ascochyta blight nursery, a chocolate spot nursery and an orobanche nursery. Natural infection was only recorded for nematodes at Krib and orobanche at Beja, whereas both the ascochyta blight and chocolate spot nurseries were artificially inoculated at Tunis in a plastic tunnel with irrigation facilities to ensure adequate levels of humidity and temperature for good disease development. The ascochyta nursery was evaluated at the adult stage however the artificial inoculation did not work for unknown reasons. For the chocolate spot nursery, the local check had a score of 6.1 and most of the germplasm showed a resistant reaction. This could be attributed to either the virulence of the pathogen or the germplasm assembled in this nursery originated or came from resistant material. In the orobanche nursery, the level of infection was so variable between the repeated checks that little useful information about the resistance

of the test lines could be obtained, and the results have thus been ommitted.

Next season inoculation of ascochyta blight and chocolate spot nurseries will continue under artificial facilities and more emphasis will be put for selection under insect proof conditions. Screening for nematode resistance will be conducted again this year at the Krib station for the 108 promising lines of this season.

Tableau 1 F : Essai avancé de rendement de Fêve (FBIYT)

Table 1 F : Seed yield of lines in the IAYT - Faba bean large

| Lignée/Line | Selection | Rendement/Yield |
|---|---|---|
| | | B |
| 1814 | Syrian local large | 1500 |
| X 79 S 74 | FLIP 82 - 25 FB | 2800 |
| X 79 S 131 | FLIP 82 - 27 FB | 3187 |
| 22 | FLIP 83 - 5 FB | 2237 |
| X 75 TA 43 | FLIP 83 - 8 FB | 2850 |
| 9 | 75 TA 22 | 2962 |
| 398 | 76 TA 246 | 2637 |
| 1814 | 79 S 4 | 2750 |
| 1814 | 79 S 546 | 2612 |
| 1814 | 79 S 653 | 2587 |
| 10 | 79 S 49907 | 2200 |
| X 79 S 72 | 80 S 80028 | 2537 |
| 3187 | ILB 3187 | 2987 |
| 1815 | Lattakia local | 2837 |
| 1269 | New Mammoth | 2275 |
| 1270 | Reina Blanca | 2862 |
| 1821 | Turkish local | 2387 |
| Local check | | 2275 |
| SE ± | | 623.2 |
| CV % | | 24.1 |

Tableau 2 F : Essai avancé de rendement de Fêve "Elite"

Table 2 F : Seed yield of lines in the Elite yield trial FB large

| Lignée/Line | Selection | Rendement/Yield |
|---|---|---|
| | | B |
| FLIP 84 - 1 FB | S 81 071 - 3 | 1925 |
| FLIP 84 - 2 FB | S 82 004 - 16 | 2917 |
| FLIP 84 - 3 FB | S 82 012 - 9 | 2225 |
| FLIP 84 - 4 FB | S 82 013 - 1 | 2692 |
| FLIP 84 - 5 FB | S 82 013 - 2 | 2483 |
| FLIP 84 - 6 FB | S 82 013 - 5 | 1992 |
| FLIP 84 - 7 FB | S 82 015 - 11 | 1808 |
| FLIP 84 - 8 FB | S 82 019 - 35 | 3058 |
| FLIP 84 - 9 FB | S 82 024 - 26 | 1892 |
| FLIP 84 - 10 FB | S 82 026 - 22 | 2392 |
| FLIP 84 - 11 FB | S 82 026 - 40 | 2515 |
| FLIP 84 - 12 FB | S 82 033 - 3 | 2958 |
| FLIP 84 - 13 FB | S 82 043 - 22 | 2408 |
| FLIP 84 - 14 FB | S 82 049 - 2 | 2217 |
| FLIP 84 - 15 FB | S 82 061 - 34 | 1908 |
| FLIP 84 - 16 FB | S 82 063 - 4 | 1475 |
| FLIP 84 - 17 FB | S 82 092 - 6 | 2117 |
| FLIP 84 - 18 FB | S 82 095 - 6 | 2567 |
| FLIP 84 - 19 FB | S 82 103 - 15 | 2250 |
| FLIP 84 - 20 FB | S 82 105 - 8 | 2925 |
| FLIP 84 - 21 FB | S 82 106 - 18 | 2283 |
| FLIP 84 - 22 FB | S 82 107 - 14 | 2083 |
| FLIP 84 - 23 FB | S 82 107 - 25 | 2083 |
| FLIP 84 - 24 FB | S 82 110 - 13 | 1950 |
| FLIP 84 - 25 FB | S 82 110 - 29 | 3383 |
| FLIP 84 - 26 FB | S 82 112 - 14 | 2783 |
| FLIP 84 - 27 FB | S 82 113 - 8 | 2742 |
| FLIP 84 - 28 FB | S 82 147 - 19 | 2367 |
| FLIP 84 - 29 FB | S 82 173 - 4 | 2575 |
| FLIP 84 - 30 FB | S 82 178 - 11 | 2467 |
| FLIP 84 - 31 FB | S 82 415 - 4 | 2492 |
| FLIP 84 - 32 FB | S 82 418 - 4 | 2300 |
| FLIP 84 - 33 FB | S 82 423 - 7 | 2958 |
| FLIP 84 - 34 FB | S 82 486 - 5 | 2775 |
| ILB 1814 | | 2050 |
| Local check | | 2800 |
| SE ± | | 598.9 |
| CV % | | 24.6 |

Tableau 3 F : Essai avancé de rendement de Fève

Table 3 F : Seed yield of lines in AYT - Faba bean large

| Lignée/Line | Selection | Rendement/Yield | | |
|---|---|---|---|---|
| | | B | K | OM |
| ILB 10 | 78 S 492 017 | 2640 | 694 | 2775 |
| 29 | 75 TA 26 062 | 3081 | 762 | 2853 |
| 268 | 78 S 484 26 | 3413 | 794 | 2678 |
| 282 | 79 SL 48 590 | 2706 | 550 | 2837 |
| 398 | 76 TA 56 246 | 3131 | 900 | 2550 |
| 1217 | Reina Blanca 1 | 3256 | 781 | 2794 |
| 1266 | Aquadulce | 3381 | 625 | 3353 |
| 1269 | New mammoth | 3425 | 825 | 2303 |
| 1799 | 79 MB | 3112 | 731 | 2559 |
| 1933 | Seville Giant | 3050 | 787 | 2678 |
| 26563 | | 3400 | 737 | 2572 |
| 1813 | Syrian local long pod | 3226 | 819 | 2759 |
| 1815 | Lattakia local | 3069 | 775 | 2750 |
| 1814 | 79 S 4 | 3113 | 594 | 2831 |
| 1815 | Lebaneese local large | 2681 | 800 | 2368 |
| 1821 | Turkish local | 3013 | 756 | 2516 |
| 31 | 74 TA 87 | 2725 | 781 | 3322 |
| 9 | 74 TA 22 | 2706 | 806 | 2687 |
| 1814 | 79 S 546 | 2475 | 756 | 2347 |
| 1814 | 79 S 653 | 2963 | 800 | 2756 |
| X 79 S 155 | 80 S 80 123 | 3006 | 706 | 2725 |
| Local check | - | 3619 | 712 | 2812 |
| Local check | - | 2588 | 687 | 2294 |
| Local Check | - | 2819 | 694 | 2341 |
| Local Check | - | 3100 | 750 | 2537 |
| SE ± | | 542.7 | 147.4 | 379.9 |
| CV % | | 17.7 | 19.7 | 14.2 |

Tab' au 4 F : Essai avancé de rendement de fève "Population Locale"

Table 4 F : Seed yield of lines in the AYT Faba bean large "local population"

| Selection | Rendement/Yield | | |
|---|---|---|---|
| | B | K | RR |
| Elite | 3275 | 412 | 3412 |
| Seville | 3408 | 300 | 3281 |
| FV - 83 - Kef | 3667 | 350 | 2314 |
| FV - 81 - Local | 3850 | 387 | 3115 |
| FV - 82 - Sahel 10 | 4100 | 287 | 2801 |
| FV - 82 - Sahel 11 | 4267 | 350 | 3024 |
| FV - 82 - Sahel 12 | 3800 | 425 | 3086 |
| FV - 82 - Sahel 13 | 3900 | 319 | 2992 |
| Local check large | 3592 | 287 | 3346 |
| Local check large | 3533 | 406 | 2821 |
| SE ± | 639 | 153.9 | 224.6 |
| CV % | 17.1 | 43.6 | 18.6 |

Tableau 5 F : Essai avancé de rendement No. 1 de Fève population F4

Table 5 F : Seed yield of F4 population No. 1 in the AYT - F4 Faba bean large.

| Population F4/F4 Population | Rendement/Yield | |
|---|---|---|
| | B | K |
| S 83 063 | 3250 | 617 |
| S 83 075 | 3408 | 533 |
| S 83 101 | 2958 | 483 |
| S 83 103 | 4592 | 308 |
| S 83 106 | 4367 | 267 |
| S 83 112 | 3353 | 542 |
| S 84 113 | 3817 | 412 |
| S 83 115 | 3508 | 500 |
| S 83 118 | 3883 | 442 |
| S 83 162 | 3092 | 392 |
| S 83 178 | 2733 | - |
| S 83 195 | 3467 | 433 |
| S 83 200 | 3008 | 508 |
| S 83 201 | 3250 | 467 |
| S 83 202 | 3200 | 400 |
| S 83 205 | 4033 | 567 |
| S 83 211 | 3558 | 450 |
| S 83 214 | 3642 | 483 |
| S 83 193 | 3567 | 408 |
| S 83 196 | 3517 | 333 |
| S 83 200 | 3692 | 650 |
| S 83 208 | 3067 | 325 |
| S 83 209 | 3333 | 433 |
| Fève local | 3517 | 383 |
| Fève local | 3617 | 500 |
| SE ± | 531.4 | 150.2 |
| CV % | 15.2 | 33 |

Tableau 6 F : Essai avancé de rendement No. 2 de Fève population F4

Table 6 F : Seed yield of F4 population No. 2 in the AYT - F4 Faba bean large

| Population F4/F4 Population | Rendement/Yield | |
|---|---|---|
| | B | K |
| S 83 210 | 3175 | 325 |
| S 83 170 | 2450 | 342 |
| S 83 175 | 2100 | 308 |
| S 83 176 | 2575 | 483 |
| S 83 180 | 2450 | 342 |
| S 83 119 | 2575 | 342 |
| S 83 222 | 2492 | 450 |
| S 83 224 | 2542 | 383 |
| S 83 226 | 2800 | 291 |
| S 83 227 | 2917 | 450 |
| S 83 232 | 2542 | 433 |
| S 83 233 | 2758 | 317 |
| S 83 092 | 3133 | 342 |
| Fève local | 2967 | 317 |
| Fève local | 3133 | 375 |
| Fève local | 3183 | 442 |
| SE ± | 588.8 | 92.7 |
| CV % | 20.4 | 24.9 |

Tableau 7 F: Essai avancé de rendement de fèvérole (FBIYT-S)

Table 7 F: Seed yield of lines in the IAYT - Faba bean small

| Lignée/Line | Selection | Rendement/Yield |
|---|---|---|
| | | B |
| ILB 1812 | Syrian local short pod | 2272 |
| 1819 | Giza 3 | 1987 |
| X 77 Sd 100 | FLIP 82 - 24 FB | 2675 |
| 22 | FLIP 83 - 2 FB | 2187 |
| 32 | 74 TA 91 | 2812 |
| 33 | 74 TA 95 | 3150 |
| 285 | 78 S 48476 | 3000 |
| 112 | 78 S 49288 | 2225 |
| X 77 Sd 70 | 80 S 46121 | 2725 |
| X 75 TA 150 | 80 S 50088 | 2837 |
| X 77 TA 60 | 80 S 43977 | 2937 |
| X 77 Sd 11 | 80 S 45676 | 2850 |
| X 77 TA 66 | 80 S 44056 | 3125 |
| X 75 TA 3 | 80 S 43064 | 1712 |
| X 77 Sd 13 | 80 S 45727 | 2812 |
| X 77 Sd 92 | 80 S 46593 | 2450 |
| 3188 | ILB 3188 | 600 |
| Local check | | 2362 |
| Local check | | 2300 |
| Local check | | 2625 |
| SE ± | | 811.4 |
| CV % | | 32.5 |

Tableau 8 F : Essai avancé de rendement de Féverole No. 1

Table 8 F : Seed yield of lines in the AYT - Faba bean small No. 1

| Lignée/Line | Selection | Rendement/Yield | | |
|---|---|---|---|---|
| | | B | K | OM |
| X 75 TA 3 | 80 S 4 3064 | 2475 | 481 | 1350 |
| 33 | 80 S 4 3651 | 3437 | 331 | 3071 |
| X 77 TA 48 | 80 S 4 3856 | 2787 | 544 | 2759 |
| 82 | 80 S 4 4371 | 3312 | 593 | 2778 |
| 148 | 80 S 4 5579 | 2850 | 569 | 2694 |
| X 77 Sd 13 | 80 S 4 5727 | 3075 | 337 | 2872 |
| 33 | 74 TA 95 | 3038 | 375 | 2447 |
| 269 | 78 S 4 8821 | 3100 | 637 | 2975 |
| 287 | 77 MS 88323 | 4087 | 750 | 2472 |
| 1555 | Rostate | 3212 | 625 | 2925 |
| 203154 | | 3112 | 650 | 5884 |
| PBI Cambridge 63 | | 3525 | 612 | 2669 |
| X 77 TA 88 | 80 S 4 4539 | 2612 | 581 | 2731 |
| X 77 Sd 11 | 80 S 4 5676 | 2825 | 637 | 3112 |
| 382 | | 3100 | 669 | 2362 |
| 470 | | 3350 | 575 | 2994 |
| X 77 TA 7 | 78 S 3 3011 | 3462 | 725 | 3131 |
| X 75 TA 10 | 80 S 4 3238 | 3287 | 681 | 2700 |
| X 75 TA 33 | 80 S 4 3651 | 2862 | 581 | 2606 |
| X 77 TA 60 | 80 S 4 3971 | 3787 | 769 | 3078 |
| X 77 TA 81 | FLIP 82-20 FB | 3625 | 675 | 2894 |
| Local check | | 3175 | 619 | 3125 |
| Local check | | 2650 | 756 | 2984 |
| Local check | | 3075 | 562 | 3106 |
| Local check | | 2437 | 537 | 2831 |
| SE ± | | 504 | 175.2 | 450.6 |
| CV % | | 18.8 | 29.4 | 16 |

Tableau 9 F : Essai avancé de rendement de Féverole No. 2

Table 9 F : Seed Yield of lines in the AYT - Faba bean small No. 2

| Lignée/Line | Section | Rendement/Yield | | |
|---|---|---|---|---|
| | | B | K | OM |
| X 77 TA 81 | FLIP 82 - 19 FB | 3669 | 537 | 2150 |
| X 77 Sd 11 | 80 S 45 676 | 3325 | 562 | 2245 |
| X 77 TA 70 | 80 S 44 150 | 2863 | 681 | 2590 |
| X 77 TA 81 | 80 S 44 358 | 3763 | 850 | 2122 |
| ILB 112 | 78 S 49 288 | 3419 | 744 | 2490 |
| ILB 285 | 78 S 48 476 | 3550 | 625 | 202 |
| X 77 Sd 70 | 80 S 46 121 | 3613 | 825 | 2862 |
| X 77 TA 60 | 80 S 43 977 | 3719 | 369 | 2675 |
| Cagnotte | | 1088 | 200 | 1270 |
| Alfied | | 938 | 287 | 1222 |
| Pilote | | 806 | 187 | 629 |
| Talo | | 2825 | 644 | 2217 |
| Local check | | 3587 | 600 | 2302 |
| Local check | | 3156 | 637 | 2822 |
| Local check | | 3375 | 662 | 2250 |
| Local check | | 3412 | 794 | 2805 |
| SE ± | | 419.1 | 159.1 | 351.4 |
| CV % | | 14.2 | 26.3 | 16. |

Tableau 10 F : Essai avancé de rendement de fève et féverole "Population Locale"

Table 10 F : Seed yield of lines in the AYT Faba bean large and small "Local Population"

| Selection | Rendement/Yield |
|---|---|
| | B |
| FVL CO 8 EM 83 | 2425 |
| ST 81 - violet | 3492 |
| FVL 81 brune | 3142 |
| FVL 83 Béjà | 2900 |
| FVL 83 Kef | 3292 |
| FVL 81 blanc | 2667 |
| Elite | 2367 |
| Seville | 3000 |
| FV 83 - Kef | 3608 |
| FV 81 - Local | 2975 |
| FV PL - Sahel - 10 | 3450 |
| FV PL - Sahel - 11 | 3183 |
| FV PL - Sahel - 12 | 3533 |
| FV PL - Sahel - 13 | 3131 |
| Local check small | 2642 |
| Local check large | 2233 |
| SE ± | 534.5 |
| CV % | 17.8 |

Tableau 11 F : Essai avancé de rendement de Fêve et Féverole "CEE"

Table 11 F : Seed yield of lines in the Faba bean EEC Joint winter trial.

| Lignée/Line | Rendement/Yield |
|---|---|
| | E |
| Alto | 3033 |
| Brocal | 3317 |
| Chiaro T.L. | 1608 |
| Gemini | 3108 |
| Palaelo | 3587 |
| Polycarpi | 1225 |
| Troy | 1342 |
| MS 125 | 3167 |
| Pam 1 | 3483 |
| R 29 T | 1692 |
| Vt 1 | 3325 |
| ILB 1814 | 3100 |
| Local feve | 2575 |
| Local feverole | 2992 |
| SE ± | 441.7 |
| CV % | 16.6 |

Tableau 12 F : Essai avancé de rendement de féverole "population locale"

Table 12 F : Seed yield of lines in the AYT-Faba bean small "local population"

| Lignee/Line | Rendement/Yield | |
|---|---|---|
| | B | K |
| Féverole cosem 83 | 3737 | 494 |
| ST - 81 violet | 3962 | 569 |
| Féverole - 81 brune | 3762 | 544 |
| Féverole - 83 Beja | 3900 | 550 |
| Féverole - 83 Kef | 3825 | 519 |
| Féverole - 81 blanc | 3550 | 600 |
| Féverole locale | 4717 | 475 |
| Féverole locale | 4129 | 437 |
| Féverole locale | 4419 | 506 |
| SE ± | 540.7 | 94.5 |
| CV % | 13.6 | 18.1 |

Tableau 13 F: Essai avancé de rendement de Fève et Féverole Population F5

Table 13 F: Seed yield of F5 Population in the AYT-F5 Faba bean large and small

| Population F5/F5 Population | Rendement/Yield | |
|---|---|---|
| | B | K |
| S 82 098 | 2433 | 625 |
| S 82 121 | 3767 | 641 |
| S 82 368 | 3267 | 558 |
| S 82 144 | 3417 | 325 |
| S 82 106 | 3408 | 833 |
| S 82 134 | 3300 | 558 |
| S 82 170 | 2692 | 517 |
| S 82 117 | 3458 | 383 |
| S 82 415 | 3508 | 592 |
| S 82 166 | 3025 | 600 |
| S 82 375 | 2992 | 575 |
| S 82 008 | 3625 | 492 |
| S 82 015 | 3142 | 667 |
| S 82 017 | 3400 | 708 |
| S 82 018 | 3467 | 617 |
| S 82 076 | 3492 | 583 |
| S 82 027 | 4408 | 558 |
| S 82 029 | 3433 | 650 |
| S 82 077 | 3233 | 767 |
| S 82 085 | 3075 | 625 |
| S 82 088 | 3958 | 525 |
| S 82 151 | 3225 | 500 |
| S 82 054 | 3492 | 775 |
| Fève Local | 3442 | 733 |
| Fève Local | 3708 | 562 |
| SE ± | 514.9 | 160.9 |
| CV % | 15.2 | 26.1 |

Tableau 14 F : Essai préliminaire de rendement de fève

Table 14 F : Seed yield of lines in the P.Y.T. - Faba bean large

| Lignée/Line | Selection | Rendement/Yield | |
|---|---|---|---|
| | | B | K |
| X 79 S 178 | FLIP 82 - 28 FB | 2279 | 550 |
| X 79 L 25 | FLIP 82 - 29 FB | 2817 | 608 |
| ILB 41 | FLIP 82 - 54 FB | 2733 | 458 |
| X 79 S 12 | FLIP 83 - 3 FB | 3075 | 658 |
| ILB 22 | FLIP 83 - 5 FB | 2325 | 600 |
| ILB 29 | FLIP 83 - 6 FB | 2700 | 508 |
| S 81 079 | FLIP 83 - 12 FB | 2233 | 733 |
| S 81 066 | FLIP 83 - 17 FB | 2817 | 325 |
| S 81 055 | FLIP 83 - 18 FB | 3075 | 450 |
| S 81 062 | FLIP 83 - 20 FB | 2583 | 383 |
| S 81 060 | FLIP 83 - 21 FB | 2875 | 578 |
| S 81 055 | FLIP 83 - 32 FB | 2417 | 567 |
| S 81 062 | FLIP 83 - 37 FB | 2142 | 433 |
| ILB 33 | FLIP 33 - 41 FB | 2733 | 608 |
| ILB 24 | 74 TA 63 | 3125 | 417 |
| ILB 41 | 76 TA 56 397 | 2517 | 700 |
| 282 | 76 TA 56 356 | 2633 | 683 |
| X 75 TA 115 | 78 TA 33 200 | 2583 | 483 |
| X 77 TA 31 | 80 S 43 587 | 2517 | 667 |
| X 77 TA 64 | 80 S 44 027 | 1842 | 517 |
| X 77 TA 72 | 80 S 44 178 | 2450 | 417 |
| X 79 S 171 | 80 S 80 135 | 2533 | 558 |
| Local large | | 2500 | 517 |
| Local large | | 3737 | 625 |
| Local large | | 3025 | 475 |
| SE ± | | 501.0 | 174.4 |
| CV % | | 18.9 | 32.4 |

Tableau 15F:Essai préliminaire de rendement de Févérole No. 1

Table 15F:Seed yield of lines in the PYT - small No. 1

| Lignée/Line | Sélection | Rendement/Yield |
|---|---|---|
| | | B |
| X 75 TA 105 | FLIP 82 - 12 FB | 2475 |
| X 75 Sd 48 | FLIP 82 - 13 FB | 3437 |
| X 77 TA 72 | FLIP 82 - 17 FB | 2787 |
| X 77 TA 81 | FLIP 82 - 19 FB | 3312 |
| X 77 TA 85 | FLIP 82 - 21 FB | 2850 |
| X 75 TA 8 | FLIP 82 - 33 FB | 3075 |
| X 75 TA 14 | FLIP 82 - 34 FB | 3038 |
| X 75 TA 14 | FLIP 82 - 35 FB | 3100 |
| X 75 TA 26062 | FLIP 83 - 7 FB | 4087 |
| 79 S 33120 | FLIP 82 - 9 FB | 3212 |
| S 81 047 | FLIP 83 - 50 FB | 3112 |
| S 81 065 | FLIP 83 - 68 FB | 3525 |
| S 81 072 | FLIP 83 - 75 FB | 2612 |
| S 81 036 | FLIP 83 - 78 FB | 2825 |
| S 81 217 | FLIP 83 - 85 FB | 3100 |
| S 81 056 | FLIP 83 - 89 FB | 3350 |
| Sd 77 061 | FLIP 83 - 95 FB | 3462 |
| Sd 77 061 | FLIP 83 - 96 FB | 3287 |
| 80 S 44 358 | FLIP 81 - 100 FB | 2862 |
| 79 S 30 403 | FLIP 83 - 102 FB | 3787 |
| 79 S 33 024 | FLIP 83 - 105 FB | 3625 |
| Févérole local | | 3175 |
| Févérole local | | 2650 |
| Févérole local | | 3075 |
| Févérole local | | 2437 |
| SE± | | 523.9 |
| CV% | | 16.7 |

Tableau 16 F : Essai préliminaire de rendement de féverole No. 2

Table 16 F : Seed yield of lines in the PYT - small No. 2

| Lignée/Line | Selection | Rendement/Yield |
|---|---|---|
| | | B |
| ILB 1814 | FLIP 83 - 106 FB | 3625 |
| 10 | FLIP 83 - 107 FB | 2812 |
| S 81 059 | FLIP 83 - 114 FB | 3137 |
| 1055 | FLIP 83 - 128 FB | 2362 |
| 1817 | 76 TA 56 267 | 2462 |
| 352 | 77 MS 88 158 | 2962 |
| 18 | 77 TA 800 23 | 2500 |
| 1816 | 78 S 48 561 | 2912 |
| X 75 TA 10 | 80 S 43 238 | 3450 |
| X 77 TA 48 | 80 S 43 856 | 3412 |
| X 77 TA 48 | 80 S 43 859 | 3112 |
| ILB 2858 | | 3087 |
| Féverole local | | 2825 |
| Féverole local | | 2637 |
| Féverole local | | 2387 |
| Féverole local | | 2537 |
| SE ± | | 324.7 |
| CV % | | 11.2 |

Tableau 17 F: Pépinière de selection de fêves (FBISN-L)

Table 17 F: Seed yield of lines in the ISN-Faba bean large

| Lignée/Line | Selection | Rendement/Yield | |
|---|---|---|---|
| | | B | K |
| X 79 S 101 B | FLIP 82 - 26 FB | 2750 | 300 |
| X 79 S 178 | FLIP 82 - 28 FB | 3700 | 500 |
| X 79 L 25 | FLIP 82 - 29 FB | 3450 | 500 |
| X 79 L 130 | FLIP 82 - 30 FB | 4000 | 600 |
| X 75 TA 209 | FLIP 82 - 39 FB | 2850 | 400 |
| ILB 1817 | FLIP 82 - 45 FB | 3300 | 400 |
| ILB 1817 | FLIP 82 - 46 FB | 2040 | 500 |
| ILB 1817 | FLIP 82 - 48 FB | 4050 | 500 |
| ILB 23 | FLIP 82 - 53 FB | 3850 | 500 |
| ILB 41 | FLIP 82 - 54 FB | 4400 | 500 |
| ILB 12 | FLIP 83 - 4 FB | 4350 | 200 |
| ILB 29 | FLIP 83 - 6 FB | 3350 | 400 |
| S 81 066 | FLIP 82 - 17 FB | 3850 | 500 |
| S 81 055 | FLIP 83 - 18 FB | 2400 | 200 |
| S 81 062 | FLIP 83 - 37 FB | 3550 | 500 |
| 80 L 90 222 | FLIP 83 - 43 FB | 2750 | 500 |
| 78 S 33 201 | FLIP 83 - 44 FB | 3300 | 600 |
| 78 S 33 202 | FLIP 83 - 45 FB | 3500 | 200 |
| ILB 24 | 7' TA 63 | 2500 | 400 |
| ILB 37 | 74 TA 109 | 4650 | -- |
| ILB 17 | 78 S 49 044 | 2700 | 600 |
| X 77 TA 31 | 80 S 43 587 | 2800 | 400 |
| X 77 TA 64 | 80 S 44 027 | 4000 | 500 |
| X 77 TA 72 | 80 S 44 178 | 3050 | 300 |
| X 79 S 70 | 80 S 80 026 | 4000 | 600 |
| X 79 S 103 | 80 S 80 064 | 4900 | 300 |
| X 79 S 155 | 80 S 80 123 | 2950 | 400 |
| X 79 S 171 | 80 S 80 135 | 5300 | 600 |
| X 79 L 153 | 80 S 81 054 | 3100 | 600 |
| ILB 1266 | Aquadulce | 3650 | 300 |
| ILB 1933 | Seville Giant | 3350 | 600 |
| Syrian local large | | 3400 | 700 |
| " | | 2350 | 450 |
| " | | 3150 | 400 |
| Reina Blanca | | 3400 | 600 |
| " | | 3300 | 300 |
| " | | 2400 | 700 |
| Fêve local | | 2850 | 200 |
| " | | 3750 | 600 |
| " | | 2300 | 500 |

Tableau 18 F : Pépinière de sélection de féverole

Table 18 F : Seed yield of lines in the I S N - Faba bean small

| Lignée/Line | Selection | Rendement/Yield | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | K | OM | RR | Kr | M |
| X 75 TA 14 | FLIP 82 - 1FB | 1550 | 300 | 3700 | 935 | 800 | 1600 |
| X 75 TA 43 | - 9FB | 2250 | 200 | 2650 | 1160 | 850 | 2550 |
| X 77 TA 51 | - 11FB | 3550 | 350 | 270 | 1035 | 1250 | 2450 |
| X 75 TA 105 | - 12FB | 3400 | 200 | 3200 | 1610 | 1050 | 2250 |
| X 77 Sd 48 | - 13FB | 1400 | 50 | 2700 | 610 | 750 | 2250 |
| X 75 TA 16 | - 15FB | 2500 | 150 | 2350 | 855 | 1050 | 2150 |
| X 77 TA 72 | - 17FB | 2950 | 200 | 2200 | 1785 | 950 | 2600 |
| X 77 TA 81 | - 19FB | 3300 | 150 | 1750 | 1185 | 1050 | 2050 |
| X 77 TA 81 | - 20FB | 2000 | 200 | 3750 | 960 | 1400 | 2300 |
| X 77 TA 85 | - 21FB | 2800 | 300 | 2150 | 1035 | 850 | 1700 |
| X 75 TA 8 | - 33FB | 2500 | 300 | 4000 | 1060 | 950 | 2850 |
| X 75 TA 14 | - 34FB | 1850 | 200 | 1100 | 1210 | 1000 | 1850 |
| X 75 TA 14 | - 35FB | 2200 | 200 | 3050 | 985 | 1100 | 2100 |
| X 75 TA 20 | - 36FB | 2550 | 150 | 1000 | 1510 | 1400 | 1500 |
| 5 | - 1FB | 2600 | 400 | 2200 | 2400 | 1250 | 3300 |
| X 79 S 12 | - 3FB | 2900 | 250 | 2650 | 1310 | 1000 | 3050 |
| S 81 054 | FLIP 83 - 48FB | 1800 | 250 | 2550 | 1435 | 1050 | 2350 |
| S 81 047 | - 50FB | 3150 | 300 | 2500 | 1360 | 1300 | 2050 |
| S 81 012 | - 60FB | 1650 | - | 800 | 1260 | 1150 | 1250 |
| S 81 065 | - 68FB | 1850 | 100 | 1750 | 1860 | 1000 | 1900 |
| S 81 072 | - 75FB | 1400 | 300 | 2450 | 1160 | 600 | 1650 |
| S 81 211 | - 84FB | 2700 | 300 | 1900 | 835 | 1150 | 2100 |
| S 81 217 | - 85FB | 2000 | 100 | 1750 | 1760 | 1500 | 2350 |
| S 81 232 | - 88FB | 1850 | 350 | 2800 | 1125 | 900 | 1400 |
| Sd 77 061 | - 95FB | 3200 | - | 1100 | 860 | 1450 | 3100 |
| Sd 77 061 | - 96FB | 3150 | 300 | 2850 | 1060 | 1000 | 2200 |
| Sd 77 061 | - 97FB | 3050 | 350 | 2350 | 2035 | 900 | 4100 |
| 80 S 44358 | - 100FB | 1900 | 400 | 2600 | 1735 | 1000 | 3050 |
| 79 S 30403 | - 102FB | 2600 | 300 | 2600 | 1385 | 1150 | 2100 |
| 79 S 33024 | - 105FB | 2900 | 400 | 2650 | 1935 | 1500 | 3900 |
| 1814 | - 106FB | 2950 | 250 | 2800 | 985 | 1400 | 3000 |
| 10 | - 107FB | 3600 | 300 | 3100 | 1160 | 1150 | 4400 |
| 1266 | - 127FB | 2900 | 300 | 2750 | 1285 | 1200 | 2450 |
| 1817 | 76 TA 56267 | 3190 | 400 | 2750 | 1710 | 1050 | 3050 |
| 407 | 78 S 49395 | 2150 | 250 | 3300 | 1235 | 1000 | 2850 |
| X 75 TA 33 | 80 S 43651 | 2750 | - | 2700 | 1810 | 1150 | 2850 |
| X 79 S 160 | 80 S 80128 | 2950 | 100 | 2750 | 2485 | 1600 | 2250 |
| 2858 | ILB 2898 | 150 | 400 | 950 | 210 | 1050 | 1050 |
| 2864 | 73 RM 70 | 400 | 300 | 1500 | 485 | 1600 | 1350 |
| 2865 | Outlook | 150 | 250 | 350 | 410 | 100 | 1250 |
| S 81 036 | FLIP 83 - 78FB | 2550 | 350 | 3100 | 760 | 950 | 2150 |
| S 81 056 | - 89FB | 2400 | 200 | 2300 | 1185 | 1000 | 2500 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 79 S 30424 | | - | 101FB | 2800 | 300 | 2300 | 1410 | 1050 | 550 |
| S | 81 059 | | - | 114FB | 1600 | 350 | 2850 | 1760 | 1200 | 4750 |
| | 1812 | | - | 126FB | 2750 | 300 | 3400 | 835 | 1050 | 1550 |
| | 1055 | | - | 128FB | 1800 | 300 | 3000 | 1335 | 1250 | 3000 |
| S | 82 002 | FLIP 84 | - | 38FB | 1700 | 350 | 2350 | 1635 | 1100 | 1900 |
| S | 82 018 | | - | 41FB | 2700 | 300 | 3050 | 2085 | 850 | 2500 |
| S | 82 061 | | - | 43FB | 3300 | 250 | 2950 | 1160 | 1100 | 1500 |
| S | 82 083 | | - | 45FB | 2300 | 300 | 3200 | 760 | 950 | 1600 |
| S | 82 097 | FLIP 84 | - | 46FB | 2750 | 350 | 3800 | 1385 | 1400 | 2950 |
| S | 82 099 | | - | 48FB | 4200 | 300 | 2900 | 2910 | 1560 | 4200 |
| S | 82 150 | | - | 57FB | 1800 | 400 | 2250 | 2035 | 1200 | 1400 |
| S | 82 154 | | - | 58FB | 3150 | 300 | 2850 | 2285 | 1500 | 3350 |
| S | 82 166 | | - | 59FB | 2250 | 250 | 2650 | 935 | 1250 | 3150 |
| S | 82 448 | | - | 65FB | 1800 | 250 | 2600 | 960 | 1250 | 1350 |
| ILB | 1814 | | | | 2200 | 300 | 3250 | 1055 | 1500 | 2050 |
| | 1814 | | | | 2500 | 400 | 3550 | 2560 | 1600 | 3000 |
| | 1814 | | | | 3600 | 250 | 3500 | 2110 | 1450 | 3350 |
| | 1814 | | | | 3700 | 350 | 4300 | 2150 | 2250 | 4200 |
| | 1814 | | | | 4400 | 100 | 2850 | 2360 | 1950 | 3850 |
| ILB | 1270 | Reina Blanca | | | 1950 | 400 | 3300 | 1510 | 1000 | 2000 |
| | 1270 | Reina Blanca | | | 2750 | 350 | 3750 | 1685 | 1000 | 2450 |
| | 1270 | Reina Blanca | | | 4800 | 300 | 3800 | 885 | 1500 | 700 |
| | 1270 | Reina Blanca | | | 4200 | 300 | 2950 | 3110 | 1800 | 3050 |
| | 1270 | Reina Blanca | | | 3700 | - | 3950 | 3110 | 1700 | 1700 |
| Févérole | local | | | | 1850 | 400 | 3950 | 1710 | 1100 | 2250 |
| | " | | | | 2350 | 350 | 3050 | 1960 | 1200 | 3350 |
| | " | | | | 2300 | 350 | 3700 | 2285 | 1100 | 3750 |
| | " | | | | 3650 | 350 | 3100 | 2560 | 1250 | 4050 |
| | " | | | | 3050 | 400 | 3700 | 4035 | 1250 | 4350 |

Tableau 19 F : Pépinière d'observation de fève et féverole 86 "Rendement des lignées sélectionnées"

Table 19 F : Faba bean screening nursery 1986. "Seed yield of selected lines"

| Selection | Rendement/Yield |
|---|---|
| | B |
| S 82 004 - 33 | 3650 |
| S 82 013 - 14 | 3150 |
| S 82 015 - 8 | 3450 |
| S 82 048 - 4 | 3750 |
| S 82 050 - 66 | 3200 |
| S 82 114 - 33 | 3250 |
| S 82 138 - 3 | 2350 |
| S 82 166 - 22 | 2450 |
| S 82 087 - 6 | 3700 |
| S 82 114 - 32 | 3700 |
| S 82 166 - 20 | 4250 |
| S 82 041 - 23 | 4500 |
| S 82 165 - 19 | 2600 |
| S 82 013 - 23 | 4050 |
| S 82 018 - 33 | 3150 |
| S 82 030 - 1 | 2850 |
| S 82 030 - 18 | 3800 |
| S 82 042 - 5 | 3100 |
| S 82 044 - 11 | 2600 |
| S 82 049 - 3 | 3300 |
| S 82 085 - 42 | 3950 |
| S 82 120 - 6 | 4650 |
| S 82 148 - 31 | 3800 |
| S 82 148 - 10 | 2950 |
| S 82 425 - 19 | 3450 |
| S 82 452 - 30 | 4400 |
| S 82 471 - 7 | 2650 |
| S 82 482 - 14 | 2600 |
| S 82 382 - 10 | 3200 |
| S 82 041 - 20 | 3200 |
| S 82 041 - 53 | 2920 |
| S 82 041 - 62 | 2100 |
| S 82 381 - 8 | 3400 |
| S 82 381 - 52 | 2800 |
| S 82 381 - 90 | 3900 |
| S 82 381 -114 | 2750 |
| L 81 001 - 8 | 3800 |
| L 81 004 - 6 | 3650 |
| L 81 006 - 9 | 3000 |
| L 81 023 - 12 | 2300 |
| L 81 033 - 16 | 3650 |
| L 81 034 - 7 | 4200 |

| | |
|---|---|
| L 81 034 - 13 | 4200 |
| 5084 - 33 | 1600 |
| 5023 - 1 - 2 | 3600 |
| 5080 - 3 - 4 | 3150 |
| 5004 - 1 - 1 | 2350 |
| 5036 - 1 - 1 | 3255 |
| 5087 - 5 | 3850 |
| 30471 - 2 - 1 | 2150 |
| S 82 011 - 5 | 4050 |
| S 82 029 - 63 | 3100 |
| S 82 482 - 9 | 2000 |
| S 82 381 - 36 | 3800 |
| S 82 019 - 35 | 3750 |
| S 82 10 - 25 | 3000 |
| S 82 113 - 8 | 3250 |
| S 81 056 - 7 | 3300 |
| S 82 009 - 6 | 3450 |
| S 82 011 - 4 | 3400 |
| S 82 037 - 23 | 3350 |
| S 82 049 - 25 | 3400 |
| S 82 061 - 21 | 1550 |
| S 82 116 - 7 | 2250 |
| S 82 118 - 5 | 3750 |
| S 82 427 - 10 | 1750 |
| S 82 431 - 7 | 3150 |
| S 82 437 - 11 | 2800 |
| S 82 439 - 6 | 1700 |
| S 82 067 - 17 | 2450 |
| S 82 348 - 6 | 3150 |
| S 81 061 - 7 | 2450 |
| S 82 154 - 11 | 3300 |

Tableau 20F:Pépinière de sélection de population $F_3$ (FBI $F_3N$)

Table 20F:Seed yield of $F_3$ populations in the $IF_3N$-Faba bean large and small

| Population $F_3/F_3$ population | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | K | OM | RR |
| S 84 053 | 3550 | 350 | 2570 | 3205 |
| S 84 059 | 3200 | 150 | 1770 | 1122 |
| S 84 062 | 3075 | 200 | 2040 | 992 |
| S 84 063 | 4025 | 350 | 3280 | 817 |
| S 84 064 | 2501 | 350 | 2330 | 2730 |
| S 84 065 | 3750 | 250 | 1270 | 1092 |
| S 84 066 | 3900 | 200 | 2190 | 967 |
| S 84 070 | 3250 | 200 | 2210 | 1542 |
| S 84 073 | 3375 | 300 | 1900 | 1142 |
| S 84 075 | 4200 | 250 | 2600 | 1017 |
| S 84 077 | 3625 | 200 | 1420 | 817 |
| S 84 078 | 2875 | 150 | 2200 | 1917 |
| S 84 081 | 2775 | 350 | 2100 | 2680 |
| S 84 083 | 2550 | 200 | 2200 | 1917 |
| S 84 101 | 2925 | 450 | 2760 | 1417 |
| S 84 102 | 2550 | 450 | 2050 | 1905 |
| S 84 104 | 3375 | 150 | 2290 | 1605 |
| S 84 110 | 4000 | 275 | 3000 | 1355 |
| S 84 113 | 3100 | 275 | 2110 | 2255 |
| S 84 114 | 3350 | 250 | 2640 | 692 |
| S 84 115 | 3450 | 275 | 1730 | 942 |
| S 84 117 | 3750 | 150 | 3020 | 730 |
| S 84 118 | 3550 | 200 | 1980 | 2737 |
| S 84 122 | 3225 | 250 | 1610 | 957 |
| S 84 127 | 3650 | 425 | 2190 | 3155 |
| S 84 133 | 3800 | 350 | 2780 | 1760 |
| S 84 145 | 4050 | 250 | 1740 | 2270 |
| S 84 153 | 3350 | 275 | 2160 | 2030 |
| S 84 158 | 3425 | 200 | 1880 | 995 |
| S 84 170 | 4525 | 275 | 2260 | 2442 |
| S 84 171 | 3175 | 200 | 2000 | 1930 |
| S 84 174 | 3576 | 275 | 1780 | 1780 |
| S 84 179 | 3325 | 250 | 1930 | 1880 |
| S 84 181 | 3250 | 225 | 1840 | 2130 |
| S 84 182 | 3400 | 150 | 2500 | 632 |
| S 84 183 | 2950 | 150 | 2050 | 1295 |
| S 84 187 | 2325 | 250 | 1780 | 1030 |
| S 84 199 | 3100 | 300 | 1770 | 1192 |
| S 84 205 | 3275 | 250 | 1770 | 1505 |
| S 84 210 | 2900 | 200 | 1880 | 1367 |
| Syrian local large | 4300 | 190 | 1840 | 1192 |
| " | 4000 | 450 | 2000 | 1605 |
| " | 3475 | 100 | 2980 | 1730 |

| Population $F_3/F_3$ Population | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | K | OM | RR |
| Syrian local large | 3450 | 350 | 2310 | 1405 |
| Reina Blanca | 3475 | 350 | 2610 | 1317 |
| " | 3800 | 450 | 1880 | 1880 |
| " | 4075 | 350 | 2830 | 3367 |
| " | 4500 | 350 | 2690 | 2442 |
| Feve local | 4600 | 150 | 910 | 1005 |
| | 3700 | 325 | 3140 | 2217 |
| " | 3700 | 275 | 2150 | 2392 |
| | 3175 | 150 | 2600 | 3442 |

Tableau 21 F : Lecture de l'ascochyta sur fève et féverole

Table 21 F : Ascochyta blight scores (ABS) for entries in the international ascochyta blight nursery.

| Lignée/Line | Selection | ABS(1) | |
|---|---|---|---|
| | | STEM | PODS |
| BPL 74 | 79 Lat. 70015 - 1 | 1 | 1 |
| BPL 365 | 80 Lat. 14336 | 2 | 1 |
| BPL 436 | 80 Lat. 14399 | 3 | 1 |
| BPL 460 | 80 Lat. 14422 - 1 | 3 | 1 |
| BPL 465 | 80 Lat. 14427 | 1 | 1 |
| BPL 471 | 80 Lat. 14434 - 3 | 3 | 1 |
| BPL 472 | 80 Lat. 14435 - 1 | 2 | 2 |
| BPL 472 | 80 Lat. 14435 - 2 | 3 | 1 |
| BPL 472 | 80 Lat. 14435 - 3 | 3 | 1 |
| BPL 266 | 80 Lat. 14986 - 1 | 3 | 1 |
| ILB 752 | 80 Lat. 15035 - 1 | 1 | 1 |
| ILB 752 | 80 Lat. 15035 - 2 | 1 | 1 |
| - | 80 Lat. A2 | | 1 |
| - | IB 18 - 1/3 | 1 | 1 |
| ILB 1820 | Giza 4 | 4 | 1 |
| ILB 1814 | Syrian local large | 3 | 2 |
| Local check fève* | | 2.4 | 2.4 |
| Local check féverole*+ | | 2 | 1 |

(1) Echelle 1 à 9 avec 1 = pas de lésions et 9 = lésions très etendues et beaucoup de plantes mortes.
(1) 1 to 9 scale where 1 = no lesions and 9 = lesions extensive and many plants killed.
* Répété cinq fois
* Repeated five times

*+ Répété quatre fois
*+ Repeated four times

Tableau 22 F : Lecture du botrytis sur fève et féverole

Table 22 F : Chocolate spot scores (CSS) for entries in the international chocolate spot nursery

| Lignée/Line | Selection | CSS (1) |
|---|---|---|
| BPL 110 | 81 Lat. 24638 - 1 | 2.5 |
| BPL 112 | 81 Lat. 24640 - 1 | 3 |
| BPL 112 | 81 Lat. 24640 - 2 A | 3 |
| BPL 112 | 81 Lat. 24640 - 2 B | 2 |
| BPL 261 | 81 Lat. 24694 - 1 A | 2 |
| BPL 261 | 81 Lat. 24694 - 1 B | 3 |
| BPL 261 | 81 Lat. 24694 - 2 A | 2 |
| BPL 261 | 81 Lat. 24694 - 2 B | 3 |
| BPL 266 | 81 Lat. 24698 - 1 | 3 |
| BPL 274 | 81 Lat. 24701 - 2 | 4 |
| BPL 658 | 81 Lat. 24833 | 4 |
| BPL 710 | 81 Lat. 24857 - 1 | 2 |
| BPL 710 | 81 Lat. 24857 - 2 | 2 |
| BPL 1056 | 81 Lat. 24901 - 2 | 1 |
| BPL 1179 | 81 Lat. 24948 - 1 A | 3 |
| BPL 1179 | 81 Lat. 24948 - 1 B | 2 |
| BPL 1179 | 81 Lat. 24948 - 6 | 3 |
| BPL 1278 | 81 Lat. 24957 | 2 |
| BPL 1538 | 81 Lat. 24996 | 4 |
| BPL 1546 | 81 Lat. 25003 | 4 |
| BPL 1547 | 81 Lat. 25004 | 4 |
| BPL 1548 | 81 Lat. 25005 - 2 | 4 |
| - | S 81 077 - 1 | 3 |
| BPL 1752 | 81 Lat. 25090 | 3 |
| BPL 1764 | 81 Lat. 25100 | 1.5 |
| BPL 1802 | 81 Lat. 25111 | 3 |
| BPL 1821 | 81 Lat. 25114 - 1 | 4 |
| BPL 1832 | 81 Lat. 25117 | 4 |
| ILB 365 | Rebaya 40 | 6 |
| ILB 1814 | Syrian local large | 7 |
| Local check fève (2) | - | 6.1 |
| local check féverole | - | 6 |

(1) Echelle 1 à 9 avec 1 = pas de lésions et 9 = lésions très étendues et beaucoup de plantes mortes
(1) 1 to 9 scale where 1 = no lesions and 9 = lesions extensive and many plants killed
(2) Répété huit fois
(2) Repeated eight times

Tableau 23 F : Lecture de nématode (NS) sur fève"BPL"

Table 23 F : Nematode scores (NS) for the Faba bean "BPL" nematode trial

| BPL | NS(1) | BPL | NS(1) |
|---|---|---|---|
| 1 | 3 | 101 | 5 |
| 3 | 3 | 104 | 3 |
| 4 | 3 | 110 | 3 |
| 5 | 3 | 113 | 1 |
| 6 | 3 | 114 | 5 |
| 9 | 3 | 115 | 5 |
| 10 | 3 | 118 | 1 |
| 11 | 5 | 119 | 5 |
| 13 | 3 | 128 | 5 |
| 17 | 3 | 129 | 6 |
| 18 | 1 | 133 | 5 |
| 19 | 3 | 134 | 3 |
| 22 | 3 | 136 | 5 |
| 24 | 3 | 137 | 3 |
| 25 | 3 | 142 | 3 |
| 30 | 5 | 144 | 7 |
| 31 | 5 | 147 | 3 |
| 32 | 5 | 148 | 3 |
| 35 | 6 | 149 | 5 |
| 36 | 3 | 150 | 5 |
| 40 | 6 | 157 | 5 |
| 42 | 7 | 158 | 5 |
| 43 | 3 | 159 | 1 |
| 44 | 1 | 160 | 3 |
| 46 | 1 | 164 | 3 |
| 47 | 5 | 165 | 5 |
| 48 | 5 | 168 | 5 |
| 50 | 5 | 170 | 5 |
| 52 | 5 | 171 | 5 |
| 53 | 6 | 176 | 3 |
| 56 | 3 | 177 | 3 |
| 58 | 5 | 180 | 3 |
| 60 | 5 | 181 | 1 |
| 63 | 3 | 182 | 3 |
| 64 | 3 | 183 | 5 |
| 66 | 5 | 184 | 5 |
| 67 | 5 | 185 | 7 |
| 68 | 3 | 186 | 5 |
| 70 | 3 | 188 | 3 |
| 74 | 2 | 189 | 7 |
| 77 | 5 | 190 | 3 |
| 78 | 3 | 191 | 3 |
| 79 | 3 | 192 | 7 |
| 81 | 5 | 193 | 3 |
| 84 | 3 | 194 | 3 |
| 86 | 3 | 195 | 5 |
| 92 | 5 | 196 | 3 |
| 98 | 1 | 197 | 6 |

| | | | |
|---|---|---|---|
| 198 | 3 | 609 | 3 |
| 201 | 3 | 610 | 3 |
| 202 | 3 | 612 | 5 |
| 204 | 3 | 613 | 3 |
| 207 | 3 | 614 | 3 |
| 208 | 3 | 615 | 3 |
| 209 | 5 | 618 | 3 |
| 210 | 3 | 619 | 7 |
| 211 | 5 | 620 | 5 |
| 214 | 3 | 621 | 3 |
| 215 | 3 | 622 | 3 |
| 217 | 7 | 623 | 7 |
| 218 | 3 | 624 | 3 |
| 220 | 5 | 625 | 3 |
| 221 | 3 | 627 | 3 |
| 224 | 2 | 628 | 5 |
| 225 | 5 | 629 | 3 |
| 226 | 5 | 630 | 5 |
| 227 | 5 | 632 | 5 |
| 228 | 5 | 636 | 5 |
| 229 | 3 | 637 | 5 |
| 234 | 5 | 640 | 2 |
| 235 | 3 | 643 | 1 |
| 238 | 3 | 646 | 5 |
| 239 | 3 | 647 | 3 |
| 240 | 3 | 649 | 5 |
| 245 | 7 | 650 | 5 |
| 247 | 3 | 653 | 3 |
| 249 | 5 | 657 | 5 |
| 250 | 5 | 658 | 5 |
| 251 | 5 | 659 | 6 |
| 253 | 3 | 660 | 5 |
| 254 | 7 | 662 | 1 |
| 258 | 3 | 663 | 3 |
| 259 | 2 | 664 | 3 |
| 260 | 5 | 665 | 1 |
| 583 | 3 | 666 | 3 |
| 584 | 5 | 673 | 5 |
| 586 | 3 | 674 | 5 |
| 587 | 5 | 676 | 5 |
| 588 | 7 | 677 | 5 |
| 589 | 3 | 680 | 5 |
| 596 | 5 | 686 | 1 |
| 597 | 3 | 692 | 3 |
| 600 | 3 | 696 | 3 |
| 601 | 7 | 698 | 3 |
| 602 | 3 | 700 | 5 |
| 603 | 7 | 702 | 2 |
| 604 | 5 | 703 | 5 |
| 606 | 3 | 704 | 3 |
| 607 | 5 | 705 | 3 |
| 608 | 3 | 713 | 7 |
| | | Local check* | 4.33 |

(1) Echelle 1 à 9 avec 1 = pas d'infection et 9 = arrêt de croissance, nécrose et déformation des tiges, défiolation sévère avec mort des plantes (jusqu'à 50%)

(1) 1 to 9 scale where 1 = no infection and 9 = severe stunting, giant necrotic stem swellings, severe defoliation and death of more than 50% of the plants.

(*) Répété 51 fois
(*) Repeated 51 times

# 4. CHICKPEA IMPROVEMENT (H. HALILA)

## 4.1. Variety release

At present the chickpea crop is only planted during spring in the farmers'fields. The chickpea breeding program is, however, oriented for both winter and spring sown crops.

Sowing date trials conducted this year by INRAT and the Office des Cereales (Cereals Office) again confirmed the yield advantage of winter versus spring sowing.

The research program conducted during the last five years has permitted the identification of genetic material suited for winter and for spring planting, and the program has decided to release three chickpea varieties, two of them for winter sowing and the third for spring planting. General informations on these varieties have already been given earlier in this report (1985/86 Highlights) and detailed informations are presented in table 5.
These varieties as well as the winter planting practices will be extensively tested and demonstrated in farmers' fields by the extension services of the D/PV (Production Vegetale) and the Office des Cereales, next season.

## 4.2. Introduction

This season the winter planted, and some early planted trials gave excellent yields at Beja and Oued Meliz stations. Winter sowing did not, however, give any substantial advantage over the spring at Kef because of the severe drought that

Table 5: Main Characteristics of the Chickpea lines to be released for farmers

| Lines | Origin | Type of sowing | Diseases | | Maturity | Habit | | | Seed | | | Utilisation | Yield | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AB(1) | Wilt | | Type | Height cm(2) | Lodging | Type | Color | 100 seed weight(4)g | | A+W- | A-W+ |
| ILC 3279 | RUSSIA | Winter | 4.25 | Susceptible | Late | Erect | 77 | Resistant | Pea | Beige | 29.0 | Pastry-Coffe blending | Good | Nil |
| FLIP 83-46 C | ICARDA | Winter | 3.75 | Susceptible | Semi-early | Semi-erect | 61 | Resistant | Owl | Beige | 33.4 | Polyvalent | Good | Nil |
| PL-Se-Be-81-48 | TUNISIA | Spring | 9.0 | Resistant | Semi-early | Spreading | 35(3) | Susceptible | Owl | Cream | 46.0 | Polyvalent | Nil | Good |
| Local "Amdoun" | Local check | Spring | 9.0 | Susceptible | Semi-early | Semi-Spreading | 55 | Susceptible | Owl | Cream | 44.2 | Polyvalent | Nil | Nil |

(1) Ascochyta rating on a 1-9 scale where: 1 = complete resistance and 9=complete kill.

(2) Average of two stations - 1985/86

(3) Average of two stations. Spring sowing 1985/86

(4) Average of two/or three stations 1985/86

(5) A+ W- = Presence of Ascochyta and absence of Wilt .

A- W+ = Absence of Ascochyta and presence of Wilt.

had occurred at that station this year. The two main diseases of chickpea continued to be Ascochyta blight and wilt. Ascochyta blight resistance is a pre-requisite for varieties to be winter planted and the spring planting can also be severely affected by the disease. Accordingly most of the genetic material received from ICARDA should have tolerance to blight. This season a natural infection of Ascochyta blight occurred spomdically at Beja and Ras Rajel experiment stations but it was not observed in farmers's fields. An excellent and uniform natural infection of AB was observed in our AB sick plot at Beja station and it was possible to make a very good screening in the advanced lines.

During the previous three seasons wilt symptoms have been observed at Beja experiment station and on farmer's fields. This year a survey conducted in the spring with the assistance of an ICRISAT chickpea pathologist, Dr. Haware, in the main chickpea growing areas have shown the rapid expansion of wilt diseases. New fields were getting infested and the incidence of the disease was assessed. Moreover, observations made in the ICRISAT ICWRR Nursery planted in the wilt sick plot (WSP) at Beja indicated that some of the varieties are showing a reaction to Fusarium/wilt different from that observed at Hyderabad, in India, implying the existence of a Tunisian race of F.O. different from the one prevailing

at ICRISAT Center.

It is now definitely felt that wilt disease in chickpea is potentially as important a constraint to production as Ascochyta blight.

From the foregoing it is clear that the objectives of the breeding program must be the development of lines adapted to the local environmental conditions and possessing resistance to ascochyta blight and wilt. At the present time lines have been selected with resistance to either blight or wilt and some progress made in developing lines with dual resistance. A further objective is that the resistant lines so developed should have a plant structure amenable to mechanical harvesting and a good seed size.

This crop report provides a summary of the complete results from all trials. These are in tables prefixed by the letter C. In all trials, screening and disease nurseries, the local check was the local Landrace/cultivar "Amdoun". This check was included three times in the IYT but was repeated at least four times in the advanced and preliminary yield trials.

## 4.3. Winter planted yield trials and nurseries

Seed yield results are available from testing 176 advanced breeding lines and 46 F4 populations in 11 replicated trials at one to four locations (Table 6 ). The relevant complete results are in tables 1C to 16C. It should be noted that in table 6 the 'International Yield Trial' - Sp (IYT-Sp) and - Nsp (IYN-Sp) were respectively the IYT for spring planting, although planted in winter as it contained ascochyta blight resistant lines, and the international screening nursery grown as a replicated trial. In the IYTs three local checks were included and not protected against ascochyta blight, whereas in the advanced (AYT) and preliminary (PYT) trials two of the check entries were protected through fungicide application and two were unprotected.

Statistically the yield of the test lines have been compared against the average yield of all checks, protected and unprotected. Because of the high coefficients of variation observed with the trials at Ras Rajel, due probably to the heterogeneity of the soil, and the severe drought which has prevailed in the season at Kef station, the data from these two stations are presented for information only and will not be discussed. Almost all the winter planted test lines and a large number of them at Beja and O. Meliz respectively, have outyielded the local check.

Table 6 : • Summary of the seed yield results of winter planted chickpea lines and populations tested in replicated yield trial (YT) at Beja (B), Kef (K), Oued Meliz (OM), Ras Rajel (RR) locations in 1985/86.

| Trial designation (1) | | Number of lines/populations | | | | | | | | | Coefficients of variation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Tested | Exceeding the local check at | | | | Significantly exceeding the local check at (2) | | | | | | | |
| | | | B | K | OM | RR | B | K | OM | RR | B | K | OM | RR |
| International | YT-MR | 23 | 23 | 0 | 16 | 2 | 22 | 0 | 2 | 2 | 15.2 | 27.2 | 16.6 | 58.9 |
| | YT-STR | 23 | 23 | 2 | 15 | 9 | 20 | 1 | 5 | 5 | 16.9 | 26.3 | 18.2 | 49.3 |
| | YT-Sp | 23 | 21 | 8 | 18 | 13 | 7 | NS | 7 | NS | 21.8 | 30.0 | 11.0 | 41.5 |
| Advanced | YT-W-E | 23 | 20 | 1 | 15 | 4 | 7 | 0 | NS | 3 | 18.1 | 21.2 | 19.9 | 66.6 |
| | YT-$W_1$ | 21 | 12 | 2 | 10 | 19 | 4 | 0 | 0 | 14 | 22.2 | 32.1 | 16.0 | 30.3 |
| | YT-$W_2$ | 21 | 10 | 1 | 4 | 12 | 2 | 0 | 0 | 8 | 18.8 | 30.1 | 14.0 | 41.0 |
| | YT-$W_3$ | 21 | 18 | 1 | 20 | 13 | 3 | 0 | NS | 7 | 17.2 | 21.4 | 31.1 | 37.1 |
| | YT-$W_4$ | 21 | 21 | 7 | 12 | 17 | 13 | 0 | 0 | NS | 18.4 | 20.1 | 25.5 | 39.5 |
| International | YT-$F_4$,A | 23 | 23 | 15 | 23 | - | 10 | 5 | NS | - | 18.3 | 25.3 | 35.9 | - |
| | YT-$F_4$,B | 23 | 8 | - | - | - | NS | - | - | - | 26.8 | - | - | - |
| International | SN.W | 63 | 51 | 13 | 3 | - | | | | | | | | |
| | SN.Sp | 50 | 38 | 18 | 4 | - | | | | | | | | |

(1) MR = Mediterrannean region; STR = Sub. tropical region; S = Spring; W = Winter; $F_4$ = $F_4$ population; SN = Screening nursery grown as replicated trial.

(2) NS = 'F' test of treatment not significant statistically.

At Beja where the local checks were seriously hit by Ascochyta Blight a relatively high number of lines, compared to last year, have significantly exceeded the check. A part from the IYT-F4.B, a minumum of two and as much as 22 lines have outyielded, significantly, the local check in all the replicated yield trials (Table 6). At Oued Meliz station, however, where Ascochyta blight was absent, the number of test entries exceeding significantly the check is much lower and was only noticed in the IYT-MR, IYT-STR and IYT-Sp.

The two lines in the IYT-MR, and the five lines in the IYT-STR which significantly outyielded the local at O. Meliz did also so at Beja. In the IYT-Sp, out of the seven there was only three that performed equally good at both stations. Yield data of all these lines across the two locations are given in table 7.

These lines should theoretically have Ascochyta blight resistance and used safely by the farmers for winter planting. They are however, all susceptible to wilt.

Wilt is a problem in both winter and spring planting and the objective of the program is still to identify material with dual resistance to Ascochyta and wilt.

Table 7 : Seed yield and wilt reaction of the lines exceeding significantly the local check at Beja and O. Meliz stations in 1985/86.

Tableau 7 : Rendements moyens des lignées dépassant significativement le local Amdoun.

| Trial/ Essai | Line/Lignée | Locations | | Wilt incidence% W. S.P. Beja | Mean/ Moyenne |
|---|---|---|---|---|---|
| | | Beja | O. Meliz | | |
| IYT-MR | FLIP 82-128C | 2213 | 2461 | 93 | 2337 |
| | FLIP 83- 47C | 2188 | 2850 | 78 | 2519 |
| | LOCAL CHECK | 1204 | 2047 | 100 | 1625 |
| | MEAN | | | | |
| | SE ± | 313.0 | 357.6 | | |
| | CV % | 15.2 | 16.6 | | |
| IYT-STR | FLIP 82-150C | 2612 | 3712 | 90 | 3162 |
| | FLIP 82-239C | 2363 | 3300 | 90 | 2831 |
| | FLIP 83- 22C | 2487 | 3328 | 100 | 2907 |
| | FLIP 83- 50C | 2087 | 3395 | 100 | 2741 |
| | ILC 482 | 2668 | 3057 | 100 | 2862 |
| | LOCAL CHECK | 1357 | 2495 | 100 | 1926 |
| | MEAN | | | | |
| | SE ± | 356.6 | 497.5 | | |
| | CV % | 16.9 | 18.2 | | |
| IYT-Sp | FLIP 83- 26C | 1800 | 2587 | 99 | 2193 |
| | FLIP 83- 53C | 1781 | 2737 | 64 | 2184 |
| | ILC 482 | 1818 | 2737 | 100 | 2277 |
| | LOCAL CHECK | 1224 | 2124 | 100 | 1674 |
| | MEAN | | | | |
| | SE ± | 338.3 | 255.0 | | |
| | CV % | 21.8 | 11.0 | | |

Tableau 8 : Résumé des résultats du triage des variétés de pois chiche pour la résistance au wilt à Béja.

Table 8 : Summary of wilt screening at Beja wilt sick plot (WSP) during 1985/86 season.

| Trials/Essais | Total number of lines Nombre total des lignes | Number of lines/wilt incidence | | |
|---|---|---|---|---|
| | | 0-20% | 21-50% | 51-100% |
| ICARDA Nurs. | 512 | 76 | 58 | 378 |
| ICRRWN | 51 | 49 | 1 | 1 |
| EARPC. E-W | 27 | 0 | 2 | 25 |
| EARPC 1-W | 25 | 0 | 1 | 24 |
| EARPC 2-W | 25 | 0 | 6 | 19 |
| EARPC 3-W | 25 | 0 | 1 | 24 |
| EARPC 4-W | 25 | 0 | 0 | 25 |
| CIYT-W-MR | 24 | 0 | 0 | 24 |
| CIYT-W-STR | 24 | 0 | 1 | 23 |
| CIYT-Sp | 24 | 0 | 3 | 21 |
| CISN-W | 53 | 4 | 6 | 43 |
| CISN-Sp | 40 | 3 | 4 | 32 |
| CISN-W 85 | 16 | 0 | 3 | 13 |
| CISN-Sp 85 | 14 | 0 | 4 | 10 |
| CIABN. A | 41 | 1 | 0 | 39 |
| CIABN-B | 51 | 0 | 0 | 51 |
| CILMN | 26 | 0 | 4 | 22 |
| EAR 1-Sp | 23 | 12 | 5 | 6 |
| EAR 2-Sp | 23 | 0 | 3 | 20 |
| EAR 3-Sp | 21 | 2 | 6 | 13 |
| EAR 4-Sp | 22 | 18 | 3 | 1 |
| CIYT-L | 24 | 0 | 2 | 22 |
| F6 | 44 | 12 | 0 | 32 |
| F5 | 17 | 0 | 0 | 17 |
| F4 | 21 | 1 | 5 | 15 |
| PF/Hors prog. | 33 | 0 | 1 | 32 |
| **Total** | **1231** | **178** | **119** | **932** |

The advanced lines of the AYT and IYT, screened in the Beja WSP using the wilt incidence (%) rating rather than the wilt score (1⟶ 9 scale) rating were susceptible to this disease. Only 4 lines in ISN-W, 3 in the ISN-Sp and 1 in the CIABN, did show a reasonable level of tolerance (0-20%) and those selected for good yielding and good seed size will be retested again for wilt reaction next year (Table 8).

4.4. Spring planted yield trials

Seed yield results are available from testing 92 advanced breeding lines in four replicated trials at four locations (Table 9). A summary of the yield data for each trial is also given in table 9. The relevant tables of complete results are presented in tables 17 C to 24 C. The same remarks made earlier on the winter trials at Ras Rajel and the Kef apply also for the spring trials at the same locations. At Kef there was in some trials, nothing to harvest and even those trials harvested have had a large number of missing plots.

At Beja, O. Meliz and Bou Salem and in all trials, a number of lines outyielded the local check but very few of them did so significantly.

However, in the AYT 1 and 4 there were 32 lines tested that stemmed from single plant selections made

Table 9 : Summary of the yield results of spring planted lines tested in replicated yield trials (YT) at Beja (B), Kef (K), Ras Rajel (RR), Oued Meliz (OM) and Bou Salem (BS) locations in 1985/86.

| Trial designation (1) | | Number of lines/populations | | | | | | | | | | | Coefficients of variation | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Tested | Exceeding the local check at | | | | | Significantly exceeding the local check at (2) | | | | | | | | | |
| | | | B | K | OM | RR | BS | B | K | OM | RR | BS | B | K | OM | RR | BS |
| International | YT-L | 23 | 20 | 6 | 16 | 18 | - | 4 | NA | 1 | NS | - | 32.8 | NA | 29.3 | 49.4 | - |
| | -CAT | 16 | 1 | - | - | - | - | 0 | - | - | - | - | 33.7 | - | - | - | - |
| Advanced | YT-Sp1 | 23 | 18 | 18 | 23 | 7 | 16 | 3 | NA | 0 | NS | 2 | 20.1 | NA | | 40.2 | 13.9 |
| | YT-Sp2 | 23 | 9 | 16 | 9 | 7 | - | 0 | NA | NS | 3 | - | 21.9 | NA | 45.8 | 41.0 | - |
| | YT-Sp3 | 23 | 16 | 0 | 12 | 11 | - | 2 | NA | NS | 6 | - | 36.1 | NA | 26.4 | 42.4 | - |
| | YT-Sp4 | 23 | 22 | - | - | - | - | NA | NA | - | - | - | NA | NA | - | - | - |
| | YT-Sp/W1 | 23 | 9 | - | 11 | - | - | 0 | - | 0 | - | - | 25.2 | - | 20.5 | - | - |
| | YT-Sp/W2 | 14 | 4 | - | 9 | - | - | NS | - | NS | - | - | 25.3 | - | 26.5 | - | - |

(1) IYT-L = International large seeded yield trial

ICAT = International adaptation yield trial

Sp = Spring

W/Sp = Winter/spring

(2) NS = "F" test of treatments not significant ($P>0.05$)

NA = Not analysed due to a large number of missing plots

in the local cultivar/landrace 'Amdoun' for resistance to wilt. Out of these lines 27 have shown and kept a high level of resistance in the wilt sick plot (WSP) at Beja during this and the previous seasons, and in the last two seasons have significantly outyielded the local check by a large margin when grown in replicated trials in the WSP. The 32 lines were grown in wilt free land this season at Beja and 16 out of them at O. Meliz and Bou Salem. Five wilt resistant lines of the cultivars tested in the AYT 1 outyielded significantly the local check cultivar Amdoun at Beja and Bou Salem. Data on the six lines that have been tested over four seasons in both wilt infected and wilt free land are given in table 10. Since wilt is considered a major constraint to production, and as these lines have proved to be resistant and possess a seed yield and seed quality characters (particularly large seed size) similar to the local cultivar, one of them, PL-Se-Be-81-48, have been selected to be released to farmers for spring sowing in wilt infested areas.

## 4.5. Disease research work

The disease research work is conducted within a collaborative program with the Plant Breeding and Pathology Laboratory at INAT.

Tableau 10 : Rendement (kg/ha) de six variétés de pois chiche résistantes au wilt au cours des quatre dernieres années.

Table 10 : Seed yield (kg/ha) of six wilt resistant chickpea lines selected out of the local cultivar "Amdoun" over four seasons.

| Liné | 82/83 | | 83/84 | | 84/85 | | 85/86 | | | Mean | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | K(1) | B | K | B | K | B | OM | BS | SY(2) | % Lo |
| PL-Se-Be - 81 - 6 | 1193 | 1370 | 1391 | 1281 | 1775 | 690 | 1394 | 1375 | 800 | 1259 | 100 |
| PL-Se-Be - 81 - 11 | 1243 | 1413 | 1635 | 1713 | 1775 | 706 | 1675 | 1573 | 1000 | 1414 | 112 |
| PL-Se-Be - 81 - 48 | 1600 | 970 | 1737 | 1725 | 2000 | 784 | 1500 | 1921 | 987 | 1516 | 120 |
| PL-Se-Be- 81 - 87 | 1360 | 1200 | 1875 | 1819 | 1975 | 865 | 1013 | 1984 | 962 | 1456 | 116 |
| PL-Se-Be - 81 - 103 | 1490 | 950 | 1793 | 1600 | 1450 | 861 | 1325 | 1531 | 968 | 1336 | 106 |
| PL-Se-Be - 81 - 120 | 1520 | 1580 | 1653 | 1363 | 1700 | 657 | 1675 | 1583 | 931 | 1411 | 112 |
| Local Amdoun | - | 1275 | - | 1413 | 2062 | 657 | 1200 | 1314 | 871 | 1254 | |
| CV % | 14,4 | 30,2 | 22,6 | 20,5 | 10,8 | 21,5 | 20,1 | | 13,9 | | |

(1) B = Béjà, K = Kef , OM = Oued Meliz, BS = Bou Salem

(2) SY = Seed yield.

Ascochyta rabiei

The work on Ascochyta disease consisted of creating an AB sick plot at Beja where the international ascochyta blight nurseries (CIABN) and a sample of the advanced lines tested in replicated yield trials were grown and artificially inoculated with a local isolate from Beja.

The second component of the work on this disease was done under laboratory controlled conditions and the same CIABN and the advanced lines were artificially inoculated at the seedling stage, with a mixture of three isolates collected from Beja, Mateur and Kef areas.

The CIABN was also grown at O. Meliz, Ras Rajel and Kef, no serious infection, however was observed. A good level of infection occurred at Beja and Ascochyta blight ratings were made using the 1 to 9 scale. Results of the CIABN-A and the CIABN-B are given in tables 14C and 15C. Ratings of the advanced lines will be detailed in a separate document but the distribution of the lines according to their reactions is presented in table 11.

Fusarium/Wilt

Starting last year, the program has made it a standard routine procedure the systematic screening for wilt resistance of all finished material, collected locally or introduced, which is tested in the nurseries and the replicated yield trials. The objective is to identify a maximum number of sources of resistance to this disease. The

Tableau 11 : Distribution des lignées avancées selon leur réaction à l'ascochyta blight (AR) à Béja en 1985/86.

Table 11 : Distribution of the advanced lines according to their ascochyta blight ratings (AR).

| Trials/Essais | Lines/categories of AR<br>Lignées/catégories d'AR | | | Total |
|---|---|---|---|---|
| | ≤ 4 | ≥ 4.25-6.0 | ≥ 6.0-9.0 | |
| AYT - E/EAR - E | 6 | 14 | 7 | 27 |
| AYT - W1/EAR - W1 | 2 | 16 | 7 | 25 |
| AYT - W2/EAR - W2 | 2 | 13 | 10 | 25 |
| AYT - W3/EAR - W3 | 6 | 12 | 7 | 25 |
| AYT - W4/EAR - W4 | 5 | 8 | 12 | 25 |

screening is done at our wilt sick plot (WSP) at Beja station. In addition the program started, this year, to screen for resistance to wilt the chickpea germplasm collection maintained at Aleppo. For this 1989 "ILC" lines were sent and due to limited space in the WSP, only 500 lines were screened this year. The others will be tested in 1987 and 1988.

The detailed results of this screening will be presented in a separate document, only a summary is given in table 8.

Up to 1985 the wilt disease rating scale used is the one to nine (1 = no symptoms and 9 = complete kill), starting this year the scale has changed to the wilt incidence scale expressed as a percentage of killed plants over the total number of germinated plants. We then used the ICRISAT classification for wilt susceptibility and resistance.

An attempt was made during the last two years to survey the major areas grown to chickpeas in terms of wilt incidence. The results are being put together and will be published this year. In addition a survey of the wilt sick plot at Beja was done and showed that Fusarium oxysporium is the major pathogen with 37.4% of the plants tested, 1.8% of the plants tested showed Verticillium alboatrum only and 2.8% of Fusarium solani

The remaining plants (58%) showed Fusarium and Verticillium simultaneously. This indicates that field screening at the Beja sick plot is done against these two pathogens simultaneously.

In addition four advanced chickpea yield trials were evaluated in terms of their resistance to Fusarium oxysporum and Verticillium sp separately. This test was done at the seedling stage under controlled environment conditions. The results of this work show that this technique is usefull in screening out early wilters but of little value in detecting germplasm with late wilting character. An attempt will be made next year to improve the technique and to circumvent this handicap.

Dual resistance to Ascochyta and wilt diseases

Work on dual resistance this season involved the screening of F4, F5 and F6 progenies, derived from ICARDA population trials and having theoretically resistance to A.B. in the the WSP in combination with artificial inoculation by a locally occurring strain of Ascochyta blight. The infection was not uniform and screening was made for wilt mainly and whenever possible for both wilt and ascochyta. Twelve F4 progenies from 22 crosses were selected for a good level of resistance to both diseases.

Four F6 progenies coming from the cross ILC 237 x ILC 191 which was an entry in the 1982/83 F3 populations have been keeping their resistance for wilt and will be retained for further tests although their seed size is rather small.

Crosses requested by our program, between ascochyta resistant lines with heaviest yield in Tunisia and wilt resistance Amdoun selections, with the aim of combining dual resistance with a large seed size in a locally well adapted background have been undertaken by the base program at Aleppo in 1983 and 1984. The resulted F1 and F2 populations were advanced in wilt free land at Terbol and Kef and the F3 progenies were screened this year for wilt and partly for ascochyta. Around 80 F3 progenies out of 1620 were selected based on their wilt reaction, earliness, erectness and seed size.

All the selected F4, F6 and F3's will be screened again for Ascochyta resistance in wilt free land and tested as bulks for yield. Furthermore 29 new crosses were undertaken this season at Aleppo for our program.

Tableau 1 C : Essai avancé de rendement de pois chiche d'hiver-E

Table 1 C : Seed yield of lines in the AYT-W-E of chickpea at four locations

| Lignée/Line | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | OM | K | RR |
| ILC 195 | 2062 | 2534 | 254 | 131 |
| FLIP 81 - 079 | 2367 | 2803 | 308 | 131 |
| FLIP 82 - 61 C | 2169 | 2515 | 191 | 81 |
| FLIP 82 - 117 C | 1956 | 2818 | 387 | 175 |
| FLIP 81 - 312 C | 2650 | 3031 | 258 | 219 |
| FLIP 81 - 71 C | 2212 | 3103 | 320 | 125 |
| FLIP 82 - 1 C | 1794 | 2853 | 287 | 81 |
| FLIP 83 - 13 C | 2387 | 3137 | 362 | 32 |
| FLIP 83 - 45 C | 2037 | 2093 | 279 | 92 |
| FLIP 83 - 46 C | 2388 | 2709 | 350 | 417 |
| FLIP 83 - 50 C | 1962 | 3275 | 425 | 133 |
| FLIP 83 - 60 C | 2506 | 2621 | 250 | 50 |
| FLIP 83 - 71 C | 2150 | 2818 | 362 | 181 |
| FLIP 83 - 76 C | 2256 | 2678 | 208 | 206 |
| FLIP 82 - 79 C | 2106 | 2184 | 283 | 100 |
| FLIP 82 - 98 C | 1762 | 2746 | 300 | 124 |
| FLIP 83 - 100 C | 2425 | 2718 | 308 | 369 |
| FLIP 82 - 121 C | 1662 | 2471 | 354 | 225 |
| FLIP 82 - 159 C | 2025 | 2503 | 250 | 237 |
| FLIP 82 - 180 C | 2013 | 2375 | 266 | 131 |
| FLIP 82 - 259 C | 1812 | 2803 | 350 | 312 |
| ILC 482 | 2593 | 2509 | 350 | 406 |
| ILC 3279 | 1775 | 2681 | 275 | 237 |
| Local P | 2418 | 2656 | 1170 | 362 |
| Local P | 2343 | 2891 | 445 | 200 |
| Local N.P | 1406 | 2337 | 366 | 241 |
| Local N.P | 962 | 2471 | 395 | 287 |
| SE ± | 378.1 | 533.7 | 67.5 | 132.5 |
| CV % | 18.1 | 19.9 | 21.2 | 66.6 |

Tableau 2 C : Essai avancé de rendement de pois chiche d'hiver No. 1

Table 2 C : Seed yield of lines in the AYT-W at four locations

| Lignee/Line | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | OM | K | RR |
| ILC 484 | 2941 | 1025 | 162 | 1394 |
| FLIP 81 - 004 | 2800 | 2158 | 150 | 1587 |
| FLIP 81 - 003 | 2933 | 2020 | 106 | 1555 |
| FLIP 81 - 0024 | 2291 | 1620 | 191 | 1200 |
| FLIP 81 - 0026 | 2108 | 1800 | 208 | 1180 |
| FLIP 81 - 0029 | 2341 | 1808 | 219 | 1242 |
| FLIP 81 - 0068 | 2675 | 2208 | 170 | 1067 |
| FLIP 81 - 0071 | 1958 | 2025 | 270 | 992 |
| FLIP 81 - 00269 | 1800 | 2083 | 212 | 1175 |
| FLIP 81 - 00293 | 1333 | 1708 | 225 | 1337 |
| FLIP 81 - 0029 W | 2233 | 2345 | 154 | 1075 |
| FLIP 81 - 0059 W | 1316 | 1991 | 112 | 875 |
| FLIP 81 - 0010 C | 2408 | 1791 | 187 | 1062 |
| FLIP 81 - 0075 C | 2008 | 1754 | 287 | 1257 |
| FLIP 81 - 00293 C | 1625 | 1820 | 166 | 1050 |
| FLIP 82 - 40 C | 2016 | 1725 | 120 | 1137 |
| FLIP 82 - 85 | 1966 | 2166 | 112 | 1755 |
| FLIP 82 - 86 | 2162 | 2050 | 233 | 887 |
| FLIP 82 - 27 | 2225 | 2329 | 287 | 1212 |
| ILC 482 | 1625 | 2170 | 175 | 1537 |
| ILC 3279 | 1783 | 1745 | 183 | 1550 |
| Local P | 2116 | 1920 | 222 | 987 |
| Local P | 1875 | 1804 | 275 | 1417 |
| Local N.P | 1191 | 1870 | 304 | 762 |
| Local N.P | 1775 | 2354 | 293 | 480 |
| SE ± | 450.7 | 310.0 | 62.5 | 357.5 |
| CV % | 22.2 | 16.0 | 32.1 | 30.3 |

Tableau 3 C: Essai avancé de rendement de pois chiche d'hiver No. 2

Table 3 C: Seed yield of lines in the AYT - W2 at four locations

| Lignée/Line | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | OM | K | RR |
| FLIP 82 - 34 W | 2587 | 1950 | 179 | 592 |
| FLIP 82 - 57 W | 2456 | 2687 | 225 | 123 |
| FLIP 82 - 9 W | 2306 | 2808 | 156 | 1137 |
| FLIP 82 - 25 C | 1625 | 2529 | 254 | 392 |
| FLIP 82 - 26 C | 1625 | 2325 | 133 | M |
| FLIP 82 - 64 C | 1918 | 2333 | 325 | 675 |
| FLIP 82 - 73 C | 2437 | 2279 | 141 | 1167 |
| FLIP 82 - 87 C | 2762 | 2904 | 187 | 1430 |
| FLIP 82 - 91 C | 2093 | 3004 | 179 | 1017 |
| FLIP 82 - 96 C | 1668 | 2595 | 220 | 812 |
| FLIP 82 - 98 C | 2156 | 2760 | 212 | 580 |
| FLIP 82 - 100 C | 1868 | 2429 | 206 | 817 |
| FLIP 82 - 101 C | 1537 | 2254 | 187 | 1375 |
| FLIP 82 - 112 C | 1993 | 2637 | 131 | 1262 |
| FLIP 82 - 127 C | 1793 | 3062 | 212 | 1080 |
| FLIP 82 - 128 C | 2212 | 2658 | 150 | 1117 |
| FLIP 82 - 130 C | 2075 | 2345 | 200 | 962 |
| FLIP 82 - 133 | 1712 | 2762 | 191 | 675 |
| FLIP 82 - 138 C | 1600 | 2695 | 237 | 950 |
| ILC 482 | 2162 | 2966 | 262 | 1087 |
| ILC 3279 | 2025 | 2333 | 208 | 1000 |
| Local P | 1856 | 2716 | 262 | 1155 |
| Local P | 2068 | 2754 | 316 | 1157 |
| Local N.P | 1750 | 2908 | 304 | 300 |
| Local N.P | 2306 | 2862 | 295 | 725 |
| SE ± | 384.0 | 370.0 | 63.7 | 380.0 |
| CV % | 18.8 | 14.0 | 30.1 | 41.0 |

Tableau 4 C : Essai avancé de rendement de pois chiche d'hiver No.3

Table 4 C : Seed yield of lines in the AYT - W3 at four locations

| Lignée/Line | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | OM | K | RR |
| FLIP 82 - 144 C | 2363 | 2493 | 316 | 403 |
| FLIP 82 - 150 C | 2213 | 3158 | 312 | 967 |
| FLIP 82 - 152 C | 2250 | 2856 | 250 | 1265 |
| FLIP 82 - 165 C | 1481 | 2321 | 216 | 1015 |
| FLIP 82 - 43 C | 1931 | 2440 | 200 | 1480 |
| FLIP 82 - 175 C | 2119 | 2877 | 262 | 605 |
| FLIP 82 - 181 C | 2288 | 3250 | 163 | 1075 |
| FLIP 82 - 186 C | 1788 | 3025 | 120 | 780 |
| FLIP 81 - 56 W | 1856 | 3452 | 279 | 930 |
| FLIP 82 - 195 C | 1906 | 2908 | 133 | 475 |
| FLIP 82 - 196 C | 1900 | 2656 | 176 | 850 |
| FLIP 82 - 197 C | 1604 | 2893 | 154 | 1075 |
| FLIP 82 - 208 C | 1881 | 3675 | 140 | 1365 |
| FLIP 82 - 213 C | 1744 | 3815 | 156 | 844 |
| FLIP 82 - 228 C | 1525 | 2687 | 325 | 637 |
| FLIP 82 - 232 | 1875 | 3781 | 300 | 850 |
| FLIP 82 - 234 C | 1969 | 3346 | 166 | 1150 |
| FLIP 82 - 239 C | 2325 | 2537 | 262 | 1082 |
| FLIP 82 - 243 C | 1950 | 2675 | 225 | 1025 |
| ILC 482 | 2319 | 3227 | 312 | 1137 |
| ILC 3279 | 1838 | 2856 | 258 | 1437 |
| Local P | 2181 | 2302 | 216 | 1175 |
| Local P | 1931 | 1987 | 325 | 625 |
| Local N.P | 1381 | 2581 | 350 | 875 |
| Local N.P | 1712 | 2427 | 375 | 850 |
| SE ± | 335.7 | 902.5 | 52.5 | 176.1 |
| CV % | 17.2 | 31.2 | 21.4 | 37.1 |

Tableau 5 C : Essai avancé de rendement de pois chiche d'hiver No.4

Table 5 C : Seed yield of lines in the AYT - W4 at four locations

| Lignée/Line | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | OM | K | RR |
| FLIP 82 - 254 C | 2188 | 878 | 283 | 450 |
| FLIP 82 - 261 C | 2394 | 2450 | 345 | 800 |
| FLIP 83 - 1 C | 1919 | 2321 | 175 | 725 |
| FLIP 83 - 5 C | 1944 | 2521 | 333 | 830 |
| FLIP 83 - 12 C | 1944 | 1828 | 350 | 525 |
| FLIP 83 - 15 C | 2713 | 2346 | 354 | 700 |
| FLIP 83 - 16 C | 1969 | 2703 | 358 | 637 |
| FLIP 83 - 19 C | 2513 | 2765 | 287 | 825 |
| FLIP 83 - 22 C | 2394 | 1990 | 175 | 930 |
| FLIP 83 - 24 C | 2288 | 1862 | 293 | 687 |
| FLIP 83 - 73 C | 2613 | 2475 | 250 | 767 |
| FLIP 83 - 47 C | 2356 | 2881 | 262 | 900 |
| FLIP 83 - 48 C | 2400 | 2806 | 316 | 955 |
| 82 TH 77 | 2363 | 2465 | 350 | 787 |
| 82 TH 78 | 2575 | 2040 | 216 | 1087 |
| 83 TH 5 | 2025 | 2709 | 281 | 630 |
| 83 TH 114 | 1975 | 2721 | 295 | 675 |
| 83 TH 136 | 1606 | 2625 | 275 | 700 |
| 83 TH 482 | 2356 | 2212 | 354 | 850 |
| ILC 482 | 2538 | 2334 | 312 | 812 |
| ILC 3279 | 2206 | 1975 | 341 | 780 |
| Local P | 1906 | 2431 | 237 | 600 |
| Local P | 1918 | 2265 | 295 | 792 |
| Local N.P | 975 | 2284 | 416 | 612 |
| Loxal N.P | 1200 | 2346 | 387 | 667 |
| SE ± | 394.2 | 607.5 | 60.0 | 290.0 |
| CV % | 18.4 | 25.5 | 20.1 | 39.1 |

Tableau 6 C : Essai de rendement de pois chiche d'hiver (CIYT-MR)

Table 6 C : Seed yield of lines in the IYT-MR at four locations

| Lignée/Line | | | Rendement/Yield | | | |
|---|---|---|---|---|---|---|
| | | | B | OM | K | RR |
| FLIP | 81 - | 293 C | 2094 | 1878 | 212 | 233 |
| FLIP | 82 - | 101 C | 2119 | 2378 | 183 | 230 |
| FLIP | 82 - | 115 C | 2194 | 2270 | 195 | 582 |
| FLIP | 82 - | 121 C | 1869 | 2075 | 193 | 200 |
| FLIP | 82 - | 127 C | 2413 | 1643 | 250 | 116 |
| FLIP | 82 - | 128 C | 2213 | 2461 | 275 | 190 |
| FLIP | 82 - | 138 | 2225 | 2266 | 291 | 166 |
| FLIP | 82 - | 154 C | 1425 | 2112 | 158 | 131 |
| FLIP | 82 - | 161 C | 2131 | 2066 | 237 | 150 |
| FLIP | 82 - | 169 C | 2213 | 2237 | 200 | 129 |
| FLIP | 82 - | 172 C | 1938 | 1645 | 250 | 151 |
| FLIP | 82 - | 186 C | 2044 | 1691 | 254 | 91 |
| FLIP | 82 - | 232 C | 2350 | 2431 | 266 | 166 |
| FLIP | 83 - | 7 C | 1881 | 2153 | 250 | 216 |
| FLIP | 83 - | 41 C | 2281 | 1735 | 91 | 183 |
| FLIP | 83 - | 47 C | 2188 | 2850 | 150 | 166 |
| FLIP | 83 - | 48 C | 2669 | 2237 | 250 | 100 |
| FLIP | 83 - | 49 C | 2319 | 2332 | 208 | 400 |
| FLIP | 83 - | 71 C | 2050 | 2216 | 308 | 116 |
| FLIP | 83 - | 97 C | 2256 | 2303 | 240 | 100 |
| FLIP | 83 - | 98 C | 2531 | 2491 | 233 | 191 |
| ILC | 482 | | 2900 | 2282 | 256 | 143 |
| ILC | 3279 | | 1588 | 2125 | 150 | 163 |
| Local | | | 1194 | 2112 | 237 | 419 |
| Local | | | 1863 | M | 375 | 265 |
| Local | | | 556 | 1982 | 441 | 166 |
| | SE ± | | 313.0 | 357.6 | 63.7 | 115.0 |
| | CV % | | 15.2 | 16.6 | 27.2 | 58.9 |

Tableau 7 C : Essai de rendement de pois chiche d'hiver (CIYT-STR)

Table 7 C : Seed yield of lines in IYT-STR at four locations

| Lignée/Line | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | OM | K | RR |
| FLIP 81 - 26 W | 2231 | 2378 | 250 | 292 |
| FLIP 82 - 104 C | 2281 | 2900 | 512 | 657 |
| FLIP 82 - 130 C | 2206 | 2075 | 287 | 307 |
| FLIP 82 - 160 C | 2612 | 3712 | 216 | 425 |
| FLIP 82 - 162 C | 2212 | 2362 | 250 | 717 |
| FLIP 82 - 219 C | 1675 | 3112 | 337 | 275 |
| FLIP 82 - 228 C | 2150 | 2891 | 162 | 113 |
| FLIP 82 - 239 C | 2363 | 3300 | 325 | 407 |
| FLIP 82 - 258 C | 2012 | 1987 | 258 | 307 |
| FLIP 82 - 259 C | 1713 | 2307 | 241 | 767 |
| FLIP 82 - 266 C | 1856 | 3041 | 212 | 492 |
| FLIP 83 - 16 C | 1937 | 2750 | 275 | 507 |
| FLIP 83 - 22 C | 2487 | 3328 | 275 | 467 |
| FLIP 83 - 23 C | 2391 | 2470 | 318 | 457 |
| FLIP 83 - 24 C | 2300 | 2812 | 262 | 400 |
| FLIP 83 - 46 C | 2418 | 3037 | 350 | 500 |
| FLIP 83 - 60 C | 2087 | 3395 | 308 | 167 |
| FLIP 83 - 72 C | 2375 | 2007 | 262 | 275 |
| FLIP 83 - 73 C | 2268 | 2928 | 250 | 132 |
| FLIP 83 - 76 C | 1950 | 2982 | 237 | 807 |
| FLIP 83 - 77 C | 2318 | 2970 | 179 | 450 |
| ILC 482 | 2668 | 3457 | 325 | 792 |
| ILC 3271 | 2008 | 2275 | 333 | 157 |
| Local | 1243 | 2520 | 316 | 550 |
| Local | 1462 | M | 354 | 532 |
| Local | 1351 | 2470 | 358 | 292 |
| SE ± | 356.6 | 497.5 | 73.7 | 255.0 |
| CV % | 16.9 | 18.2 | 26.3 | 49.3 |

Tableau 8 C : Essai de rendement de pois chiche d'hiver (CIYT-Sp)

Table 8 C : Seed yield of lines in the IYT-Sp at four locations

| Lignée/Line | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | OM | K | RR |
| FLIP 81 - 29 W | 1231 | 2500 | 206 | 550 |
| FLIP 81 - 40 W | 1550 | 2630 | 179 | 917 |
| FLIP 82 - 73 C | 1456 | 2107 | 212 | 817 |
| FLIP 82 - 79 C | 1593 | 2056 | 216 | 557 |
| FLIP 82 - 96 C | 1687 | 2275 | 191 | 832 |
| FLIP 82 - 112 C | 1637 | 2175 | 229 | 757 |
| FLIP 82 - 133 C | 1718 | 2278 | 866 | 775 |
| FLIP 82 - 180 C | 1800 | 2395 | 276 | 592 |
| FLIP 82 - 189 C | 1275 | 2262 | 268 | 717 |
| FLIP 82 - 195 C | 1993 | 2012 | 393 | 557 |
| FLIP 82 - 197 C | 1318 | 2366 | 237 | 267 |
| FLIP 82 - 236 C | 1668 | 2350 | 287 | 757 |
| FLIP 83 - 2 C | 1612 | 2525 | 218 | 957 |
| FLIP 83 - 10 C | 1650 | 2078 | 220 | 632 |
| FLIP 83 - 26 C | 1800 | 2587 | 204 | 957 |
| FLIP 83 - 27 C | 1000 | 2141 | 187 | 492 |
| FLIP 83 - 42 C | 1850 | 2450 | 218 | 742 |
| FLIP 83 - 53 C | 1781 | 2737 | 287 | 832 |
| FLIP 83 - 69 C | 1812 | 2153 | 360 | 457 |
| FLIP 83 - 99 C | 1675 | 2412 | 196 | 417 |
| FLIP 83 - 101 C | 1675 | 1947 | 143 | 367 |
| ILC 482 | 1818 | 2737 | 366 | 525 |
| ILC 1929 | 606 | 2778 | 237 | 667 |
| Local | 2062 | 2120 | 195 | 717 |
| Local | 750 | 2075 | 281 | 400 |
| Local | 856 | 2178 | 241 | 707 |
| SE ± | 338.3 | 255.0 | 72.5 | 270.0 |
| CV % | 21.8 | 11.0 | 30.0 | 41.5 |

Tableau 9 C : Essai de rendement de populations F4 de pois chiche d'hiver (CIF4T-A)

Table 9 C : Seed yield of F4 populations in the IF4T-A at three locations

| Population | Rendement/Yield | | |
|---|---|---|---|
| | B | OM | K |
| X 83 TH 20 | 1708 | 2362 | 116 |
| X 83 TH 21 | 2050 | 2443 | 225 |
| X 83 TH 23 | 2300 | 2543 | 125 |
| X 83 TH 25 | 2158 | 2518 | 258 |
| X 83 TH 45 | 1858 | 2281 | 215 |
| X 83 TH 47 | 2050 | 3481 | 112 |
| X 83 TH 99 | 1808 | 1737 | 231 |
| X 83 TH 105 | 1817 | 2681 | 125 |
| X 83 TH 111 | 1858 | 2293 | 187 |
| X 83 TH 115 | 1908 | 1262 | 154 |
| X 83 TH 116 | 1800 | 2181 | 262 |
| X 83 TH 135 | 1950 | 2731 | 175 |
| X 83 TH 142 | 1583 | 2987 | 170 |
| X 83 TH 164 | 1925 | 2231 | 220 |
| X 83 TH 218 | 1700 | 3443 | 225 |
| X 83 TH 267 | 2133 | 2781 | 225 |
| X 83 TH 325 | 2175 | 2156 | 166 |
| X 83 TH 331 | 1608 | 1687 | 204 |
| X 83 TH 335 | 2192 | 1606 | 150 |
| X 83 TH 336 | 2250 | 2156 | 156 |
| X 83 TH 337 | 2000 | 1562 | 254 |
| ILC 482 | 2283 | 3112 | 162 |
| ILC 3279 | 1500 | 2387 | 287 |
| Local | 1275 | 1625 | 175 |
| Local | 1900 | 650 | 141 |
| Local | 900 | 1031 | 175 |
| SE ± | 343.1 | 812.5 | 47.5 |
| CV % | 18.3 | 35.8 | 25.3 |

Tableau 10 C : Essai de rendement de populations F4 de pois chiche d'hiver (CIF4T-B)

Table 10 C : Seed yield of F4 populations in the IF4T-B at one location

| Populations | Rendement/Yield |
|---|---|
| | B |
| X 83 TH 1 | 1300 |
| X 83 TH 2 | 1533 |
| X 83 TH 3 | 1266 |
| X 83 TH 4 | 1292 |
| X 83 TH 5 | 1933 |
| X 83 TH 7 | 1792 |
| X 83 TH 24 | 1867 |
| X 83 TH 26 | 1575 |
| X 83 TH 58 | 1608 |
| X 83 TH 64 | 1992 |
| X 83 TH 82 | 1358 |
| X 83 TH 89 | 1208 |
| X 83 TH 97 | 1358 |
| X 83 TH 117 | 1558 |
| X 83 TH 120 | 1575 |
| X 83 TH 121 | 2100 |
| X 83 TH 123 | 1892 |
| X 83 TH 136 | 1467 |
| X 83 TH 338 | 1908 |
| X 83 TH 341 | 2133 |
| X 83 TH 366 | 1200 |
| ILC 482 | 1542 |
| ILC 3279 | 1942 |
| Local | 1783 |
| Local | 2108 |
| Local | 1633 |
| SE ± | 443.2 |
| CV % | 26.8 |

Tableau 11 C : Pépinière de sélection de pois chiche (CISN-W)

Table 11 C : Seed yield of lines in the ISN-W at three locations

| Lignée/Line | Rendement/Yield | | |
|---|---|---|---|
| | B | OM | K |
| FLIP 84 - 20 C | 2350 | 2950 | 300 |
| FLIP 84 - 22 C | 1850 | 2350 | 100 |
| FLIP 84 - 32 C | 1470 | 3150 | 200 |
| FLIP 84 - 33 C | 2075 | 600 | 175 |
| FLIP 84 - 39 C | 2300 | 2500 | 300 |
| FLIP 84 - 41 C | 1400 | 1950 | 250 |
| FLIP 84 - 42 C | 2100 | 2250 | 250 |
| FLIP 84 - 43 C | 3050 | 1750 | 300 |
| FLIP 84 - 46 C | 1700 | 2050 | 300 |
| FLIP 84 - 48 C | 2100 | 3150 | 250 |
| FLIP 84 - 56 C | 2150 | 1850 | 300 |
| FLIP 84 - 60 C | 2675 | 2350 | 350 |
| FLIP 84 - 67 C | 1675 | 1650 | 200 |
| FLIP 84 - 68 C | 2075 | 2250 | 300 |
| FLIP 84 - 69 C | 2225 | 2500 | 350 |
| FLIP 84 - 70 C | 2500 | 1000 | 200 |
| FLIP 84 - 71 C | 2325 | 2500 | 225 |
| FLIP 84 - 73 C | 1275 | 1950 | 200 |
| FLIP 84 - 74 C | 1300 | 2750 | 200 |
| FLIP 84 - 79 C | 1675 | 2050 | 200 |
| FLIP 84 - 80 C | 2525 | 2250 | 200 |
| FLIP 84 - 81 C | 2350 | 2050 | 200 |
| FLIP 84 - 86 C | 3050 | 800 | 350 |
| FLIP 84 - 96 C | 2525 | 2600 | 450 |
| FLIP 84 - 104 C | 2625 | 2550 | 200 |
| FLIP 84 - 109 C | 2300 | 1650 | 250 |
| FLIP 84 - 111 C | 1150 | 850 | 250 |
| FLIP 84 - 112 C | 2525 | 2800 | 350 |
| FLIP 84 - 116 C | 1775 | 3250 | 250 |
| FLIP 84 - 117 C | 2525 | 1200 | 250 |
| FLIP 84 - 119 C | 1675 | 3150 | 200 |
| FLIP 84 - 120 C | 1975 | 1200 | 200 |
| FLIP 84 - 121 C | 3000 | 1650 | 250 |
| FLIP 84 - 122 C | 2350 | 1650 | 350 |
| FLIP 84 - 124 C | 2075 | 1050 | 350 |
| FLIP 84 - 133 C | 1650 | 2900 | 200 |
| FLIP 84 - 137 C | 2075 | 2000 | 150 |
| FLIP 84 - 138 C | 2175 | 3200 | 200 |
| FLIP 84 - 148 C | 2325 | 2250 | 400 |
| FLIP 84 - 152 C | 2650 | 3050 | 350 |
| FLIP 84 - 158 C | 2500 | 3450 | 350 |

| | | | | | |
|---|---|---|---|---|---|
| FLIP | 84 - | 159 C | 2875 | 2400 | 225 |
| FLIP | 84 - | 161 C | 2325 | 750 | 250 |
| FLIP | 84 - | 167 C | 1675 | 2000 | 300 |
| FLIP | 84 - | 168 C | 2500 | 1000 | 250 |
| FLIP | 84 - | 175 C | 1200 | 2100 | 250 |
| FLIP | 84 - | 176 C | 1850 | 2850 | 350 |
| FLIP | 84 - | 178 C | 2275 | 2200 | 300 |
| FLIP | 84 - | 181 C | 1050 | 2400 | 400 |
| FLIP | 84 - | 182 C | 2350 | 800 | 300 |
| FLIP | 84 - | 188 C | 2350 | 1650 | 250 |
| ILC | 482 | | 2065 | 1850 | 400 |
| ILC | 482 | | 1300 | 2950 | 300 |
| ILC | 482 | | 975 | 1800 | 400 |
| ILC | 482 | | 1800 | 2500 | 350 |
| ILC | 3279 | | 1675 | 1550 | 300 |
| ILC | 3279 | | 1800 | 2050 | 150 |
| ILC | 3279 | | 1575 | 2750 | 200 |
| ILC | 3279 | | 1900 | M | 300 |
| Local | Amdoun | | 125 | 2550 | 350 |
| Local | Amdoun | | 625 | 2250 | 350 |
| Local | Amdoun | | 175 | 2750 | 450 |
| Local | Amdoun | | 1325 | 2550 | 350 |

Tableau 12 C : Pépinière de sélection de pois chiche (CISN-Sp)

Table 12 C : Seed yield of lines in the ISN-Sp at three locations

| Lignée/Line | Rendement/Yield | | |
|---|---|---|---|
| | B | OM | K |
| FLIP 84 - 26 C | 1825 | 3450 | 100 |
| FLIP 84 - 28 C | 2600 | 1100 | 100 |
| FLIP 84 - 53 C | 2300 | 3050 | 200 |
| FLIP 84 - 54 C | 2400 | 1900 | 100 |
| FLIP 84 - 55 C | 2025 | 1750 | 200 |
| FLIP 84 - 58 C | 2125 | 1550 | 150 |
| FLIP 84 - 62 C | 2500 | 2960 | 100 |
| FLIP 84 - 64 C | 1575 | 2200 | 150 |
| FLIP 84 - 66 C | 1425 | 2150 | 200 |
| FLIP 84 - 72 C | 2475 | 2100 | 100 |
| FLIP 84 - 75 C | 1800 | 1750 | 175 |
| FLIP 84 - 78 C | 1975 | 1750 | 200 |
| FLIP 84 - 82 C | 2150 | 1350 | 100 |
| FLIP 84 - 83 C | 2375 | 3050 | 150 |
| FLIP 84 - 85 C | 1575 | 1750 | 150 |
| FLIP 84 - 87 C | 2300 | 2450 | 250 |
| FLIP 84 - 91 C | 1675 | 1450 | 400 |
| FLIP 84 - 92 C | 2925 | 2500 | 250 |
| FLIP 84 - 93 C | 1050 | 3100 | 150 |
| FLIP 84 - 99 C | 2025 | 1800 | 200 |
| FLIP 84 - 102 C | 1950 | 2650 | 200 |
| FLIP 84 - 115 C | 2750 | 2050 | 200 |
| FLIP 84 - 116 C | 2550 | 2350 | 175 |
| FLIP 84 - 123 C | 1925 | 2150 | 200 |
| FLIP 84 - 126 C | 1750 | 2350 | 100 |
| FLIP 84 - 143 C | 2900 | 2660 | 100 |
| FLIP 84 - 144 C | 2900 | 2900 | 100 |
| FLIP 84 - 145 C | 3325 | 2950 | 200 |
| FLIP 84 - 146 C | 2600 | 2700 | 275 |
| FLIP 84 - 149 C | 2400 | 2350 | 125 |
| FLIP 84 - 153 C | 1825 | 1900 | 150 |
| FLIP 84 - 154 C | 2675 | 2750 | 200 |
| FLIP 84 - 155 C | 2400 | 2300 | 200 |
| FLIP 84 - 163 C | 2075 | 2300 | 100 |
| FLIP 84 - 164 C | 2375 | 1050 | 200 |
| FLIP 84 - 181 C | 1550 | 1950 | 75 |
| FLIP 84 - 182 C | 2825 | 2050 | 200 |
| FLIP 84 - 185 C | 2450 | 1100 | 150 |
| ILC 482 | 2250 | 4200 | 200 |
| ILC 482 | 3150 | 2950 | 250 |
| ILC 482 | 2525 | 1850 | 100 |

| | | | | |
|---|---|---|---|---|
| ILC | 482 | 2175 | 2950 | 200 |
| ILC | 1929 | 1000 | 1750 | 250 |
| ILC | 1929 | 850 | 2550 | 250 |
| ILC | 1929 | 1200 | 2100 | 200 |
| ILC | 1929 | 1225 | M | 200 |
| Local | Amdoun | 1625 | 3480 | 150 |
| Local | Amdoun | 1025 | 1850 | 250 |
| Local | Amdoun | 1775 | 1850 | 250 |
| Local | Amdoun | 925 | 1600 | 300 |

Tableau 13 C : Pépinière de sélection pour la résistance à A. blight (CIABN-A)

Table 13 C : Seed yield of lines in the CIABN-A at three locations

| Lignée/Line | Rendement/Yield | | |
|---|---|---|---|
| | OM | K | RR |
| ILC 72 | 1750 | 125 | 5.0 |
| ILC 182 | 1500 | 400 | 10.0 |
| ILC 200 | 1600 | 150 | 10.0 |
| ILC 202 | 2075 | 50 | 10.0 |
| ILC 215 | 1750 | 125 | 5.0 |
| ILC 482 | 2550 | 150 | 7.5 |
| ILC 3279 | 1900 | 100 | 12.5 |
| ILC 3856 | 2100 | 50 | 10.0 |
| ILC 3868 | 2300 | 125 | 7.5 |
| ILC 3870 | 1425 | 325 | 15.0 |
| ILC 4424 | 1825 | 125 | 10.0 |
| FLIP 81 - 70 | 1700 | 125 | 27.5 |
| FLIP 81 - 293 | 1850 | 125 | 12.5 |
| FLIP 82 - 1 C | 1925 | 125 | 12.5 |
| FLIP 82 - 52 C | 2050 | 100 | 10.0 |
| FLIP 82 - 64 C | 2225 | 100 | 7.5 |
| FLIP 82 - 74 C | 1675 | 250 | 7.5 |
| FLIP 82 - 93 C | 2025 | 200 | 25.0 |
| FLIP 82 - 104 C | 2550 | 175 | 20.0 |
| FLIP 82 - 127 C | 2350 | 150 | 10.0 |
| FLIP 82 - 128 C | 1950 | 150 | 20.0 |
| FLIP 82 - 130 C | 1950 | 125 | 15.0 |
| FLIP 82 - 144 C | 2100 | 125 | 17.5 |
| FLIP 82 - 150 C | 2200 | 250 | 5.0 |
| FLIP 82 - 191 C | 2500 | 125 | 5.0 |
| FLIP 82 - 243 C | 1700 | 125 | 10.0 |
| FLIP 82 - 258 C | 1350 | 100 | 17.5 |
| FLIP 82 - 259 C | 2175 | 75 | 7.5 |
| FLIP 83 - 7 C | 1725 | 175 | 7.5 |
| FLIP 83 - 12 C | 1825 | 75 | 22.5 |
| FLIP 83 - 13 C | 2050 | 125 | 5.0 |
| FLIP 83 - 15 C | 2100 | 175 | 12.5 |
| FLIP 83 - 21 C | 1750 | 50 | 10.0 |
| FLIP 83 - 22 C | 2050 | 150 | 20.5 |
| FLIP 83 - 28 C | 2525 | 125 | 25.0 |
| FLIP 83 - 31 C | 1700 | 125 | 10.[illegible] |
| FLIP 83 - 46 C | 2125 | 100 | 12.5 |
| FLIP 83 - 47 C | 2000 | 175 | 5.0 |
| FLIP 83 - 48 C | 1725 | 150 | 5.0 |
| FLIP 83 - 60 C | 2450 | 50 | |

| | | | |
|---|---|---|---|
| Local | 2150 | 225 | 27.5 |
| Local | 2375 | 175 | 27.5 |
| Local | 2475 | 300 | 17.5 |
| Local | 2450 | 150 | 52.5 |
| Local | 2775 | 225 | 77.5 |
| Local | 3150 | 225 | 70.0 |
| Local | 2575 | 200 | 20.0 |
| Local | 2475 | 200 | 15.0 |
| Local | 2675 | 175 | 10.0 |
| Local | 2625 | 250 | 15.0 |
| Local | 2450 | 300 | 20.0 |
| Local | 2150 | 250 | 15.0 |
| Local | 2500 | 125 | 12.5 |
| Local | 2250 | 100 | 15.0 |
| Local | 2400 | 125 | 12.5 |
| Local | 1675 | 175 | 12.5 |
| Local | 1900 | 250 | 10.0 |
| Local | 1300 | 50 | 10.0 |
| Local | 1300 | 350 | 15.0 |
| Local | 950 | 250 | 12.5 |
| Local | 675 | 250 | 5.0 |

Tableau 14 C : Lecture de l'ascochyta (AR) et du wilt dans le CIABN-A

Table 14 C : Ascochyta ratings (AR) and wilt incidence in the CIABN-A at Beja

| Lignée/Line | Wilt incidence % | AR |
|---|---|---|
| ILC 72 | 100 | 3.25 |
| ILC 182 | 100 | 3.00 |
| ILC 200 | 100 | 2.50 |
| ILC 202 | 90 | 3.00 |
| ILC 215 | 100 | 4.50 |
| ILC 482 | 100 | 5.75 |
| ILC 3279 | 100 | 2.75 |
| ILC 3856 | 100 | 2.75 |
| ILC 3868 | 100 | 4.00 |
| ILC 3870 | 100 | 2.00 |
| ILC 4421 | 100 | 3.25 |
| FLIP 81 - 70 | 100 | 5.25 |
| FLIP 81 - 293 | 100 | 6.75 |
| FLIP 82 - 1 C | 100 | 2.75 |
| FLIP 82 - 52 C | 100 | 3.25 |
| FLIP 82 - 64 C | 100 | 6.00 |
| FLIP 82 - 74 C | 60 | 7.25 |
| FLIP 82 - 93 C | 100 | 5.75 |
| FLIP 82 - 104 C | 100 | 2.25 |
| FLIP 82 - 127 C | 100 | 5.75 |
| FLIP 82 - 128 C | 100 | 8.00 |
| FLIP 82 - 130 C | 100 | 2.75 |
| FLIP 82 - 144 C | 100 | 1.25 |
| FLIP 82 - 150 C | 100 | 1.50 |
| FLIP 82 - 191 C | 100 | 6.50 |
| FLIP 82 - 243 C | 100 | 4.00 |
| FLIP 82 - 258 C | 100 | 5.50 |
| FLIP 82 - 259 C | 100 | 5.00 |
| FLIP 83 - 7 C | 100 | 7.00 |
| FLIP 83 - 12 C | 100 | 3.25 |
| FLIP 83 - 13 C | 75 | 3.25 |
| FLIP 83 - 15 C | 100 | 5.25 |
| FLIP 83 - 21 C | 100 | 3.75 |
| FLIP 83 - 22 C | 100 | 2.50 |
| FLIP 83 - 28 C | 100 | 1.25 |
| FLIP 83 - 31 C | 100 | 5.25 |
| FLIP 83 - 46 C | 65 | 4.50 |
| FLIP 83 - 47 C | 100 | 2.50 |
| FLIP 83 - 48 C | 100 | 5.75 |
| FLIP 83 - 60 C | 13 | 2.25 |
| Local | 100 | 8.75 |

Tableau 15 C : Lecture de l'Ascochyta (AR) et du wilt% dans le CIABN-3

Table 15 C : Ascochyta Ratings (AR) and wilt Incidence % in the CIABN-3 at Beja in 1985-86.

| Lignée/Line | Wilt incidence% | AR(1) |
|---|---|---|
| ILC 72 | 100 | 3.5 |
| ILC 182 | 100 | 4.0 |
| ILC 200 | 100 | 2.25 |
| ILC 202 | 100 | 4.25 |
| ILC 215 | 100 | 7.5 |
| ILC 482 | 100 | 7.0 |
| ILC 3279 | 100 | 5.0 |
| ILC 3856 | 100 | 3.0 |
| ILC 3868 | 100 | 3.0 |
| ILC 3870 | 100 | 2.75 |
| ILC 4421 | 100 | 4.25 |
| FLIP 81 - 70 | 100 | 5.0 |
| FLIP 81 - 293 | 100 | 5.0 |
| FLIP 82 - 1 C | 100 | 4.75 |
| FLIP 82 - 52 C | 100 | 7.0 |
| FLIP 82 - 64 C | 100 | 9.0 |
| FLIP 82 - 74 C | 100 | 5.5 |
| FLIP 82 - 93 C | 80 | 3.5 |
| FLIP 82 - 104 C | 100 | 2.5 |
| FLIP 82 - 127 C | 100 | 6.5 |
| FLIP 82 - 128 C | 100 | 6.0 |
| FLIP 82 - 130 C | 100 | 3.75 |
| FLIP 82 - 144 C | 100 | 1.5 |
| FLIP 82 - 150 C | 100 | 5.5 |
| FLIP 82 - 191 C | 60 | 4.25 |
| FLIP 82 - 243 C | 100 | 7.0 |
| FLIP 82 - 258 C | 100 | 5.5 |
| FLIP 82 - 259 C | 100 | 6.0 |
| FLIP 83 - 7 C | 100 | 3.75 |
| FLIP 83 - 12 C | 100 | 5.0 |
| FLIP 83 - 13 C | 100 | 3.5 |
| FLIP 83 - 15 C | 100 | 4.0 |
| FLIP 83 - 21 C | 100 | 3.5 |
| FLIP 83 - 22 C | 100 | 6.75 |
| FLIP 83 - 28 C | 100 | 2.25 |
| FLIP 83 - 31 C | 100 | 7.5 |
| FLIP 83 - 46 C | 100 | 3.5 |
| FLIP 83 - 47 C | 100 | 3.0 |
| FLIP 83 - 48 C | 100 | 2.5 |
| FLIP 83 - 60 C | 100 | 3.75 |

| | | | |
|---|---|---|---|
| ILC | 3932 | 100 | 1.0 |
| ILC | 5035 | 100 | 5.5 |
| ILC | 5127 | 100 | 2.25 |
| ILC | 5566 | 100 | 3.75 |
| ILC | 6304 | 100 | 7.25 |
| ILC | 6306 | 100 | 5.5 |
| ILC | 6373 | 100 | 1.5 |
| ILC | 6945 | 100 | 3.0 |
| Pch | 70 | 100 | 3.25 |
| Pch | 124 | 100 | 2.5 |
| ILC | 263 | 100 | 3.5 |
| Local | | 100 | 7.7 |

(1) Ascochyta rating-1 to 9 scale

Tableau 16 C : Pépinière de selection pour la résistance à la larve mineuse

Table 16 C : Seed yield of lines in the CILMN at four locations

| Lignée/Line | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | OM | BS | K |
| ILC 5 | 850 | 1375 | 1800 | 250 |
| ILC 316 | 600 | 3200 | 1700 | 125 |
| ILC 333 | 175 | 2950 | 1900 | 250 |
| ILC 334 | 250 | 2525 | 1800 | 100 |
| ILC 402 | 100 | 2675 | 1500 | 125 |
| ILC 655 | 475 | 775 | 1800 | M |
| ILC 663 | 225 | 2105 | 1500 | 200 |
| ILC 666 | 150 | 3400 | 2400 | 300 |
| ILC 668 | 300 | 2950 | 2000 | 100 |
| ILC 726 | 63 | 3025 | 1600 | 200 |
| ILC 730 | 100 | 1050 | 1500 | 200 |
| ILC 745 | 475 | 3475 | 1900 | 50 |
| ILC 824 | 125 | 1825 | 1600 | 100 |
| ILC 936 | 2425 | 2550 | 2300 | 225 |
| ILC 1000 | 600 | 2550 | 1200 | M |
| ILC 1003 | 375 | 3625 | 1700 | 100 |
| ILC 1008 | 400 | 2300 | 2300 | M |
| ILC 1048 | 200 | 2400 | 1900 | 100 |
| ILC 1169 | 75 | 1850 | 1500 | 200 |
| ILC 1216 | 525 | 3125 | 1600 | 200 |
| ILC 1776 | 150 | 2200 | 1200 | 250 |
| ILC 2226 | 575 | 2800 | 1800 | 200 |
| ILC 2436 | 875 | 2175 | 900 | 300 |
| ILC 2961 | 888 | 3325 | 1900 | 150 |
| ILC 3805 | 675 | 1575 | 900 | 125 |
| ILC 3397 | 650 | 2975 | 1300 | 200 |
| ILC 3397 | 825 | 2975 | 1900 | 200 |
| ILC 3397 | 1575 | 2925 | 2000 | 350 |
| ILC 3397 | 1025 | 2525 | 1800 | 250 |
| ILC 3397 | 1550 | 2700 | 1400 | 250 |
| ILC 3397 | 613 | 3200 | 2400 | 250 |
| ILC 3397 | 1400 | 3325 | 2200 | 200 |
| ILC 3397 | 1350 | 3300 | 2500 | 200 |
| ILC 3397 | 1250 | 2350 | 1800 | 400 |
| ILC 3397 | 650 | 2825 | 2400 | 250 |
| ILC 3397 | 550 | 2850 | 2400 | 200 |
| ILC 3397 | 1175 | 1850 | 1900 | 150 |
| ILC 3397 | 600 | 1575 | 2600 | 150 |
| ILC 3397 | 825 | 1475 | 1900 | 150 |

Tableau 17 C : Essai avancé de rendement de pois chiche de printemps No. 1

Table 17 C : Seed yield of lines in the AYT-Sp1 at five locations

| Lignée/Line | Rendement/Yield | | | | |
|---|---|---|---|---|---|
| | B | OM | K | RR | BS |
| PL-Se-Bej. 81 - 6 | 1394 | 1375 | 171 | 144 | 800 |
| PL-Se-Bej. 81 - 11 | 1675 | 1578 | 168 | 256 | 1000 |
| PL-Se-Bej. 81 - 34 | 1619 | 2125 | 183 | 244 | 1018 |
| PL-Se-Bej. 81 - 36 | 1350 | 1578 | 175 | 262 | 906 |
| PL-Se-Bej. 81 - 37 | 1450 | 1453 | 206 | 169 | 981 |
| PL-Se-Bej. 81 - 40 | 1462 | 1562 | 218 | 194 | 862 |
| PL-Se-Bej. 81 - 41 | 1266 | 1468 | 154 | 225 | 833 |
| PL-Se-Bej. 81 - 46 | 1494 | 1312 | 200 | 231 | 1062 |
| PL-Se-Bej. 81 - 48 | 1500 | 1921 | 231 | 219 | 987 |
| PL-Se-Bej. 81 - 87 | 1013 | 1984 | 96 | 275 | 962 |
| PL-Se-Bej. 81 - 103 | 1325 | 1531 | 118 | 137 | 968 |
| PL-Se-Bej. 81 - 107 | 1458 | 1515 | 216 | 217 | 1083 |
| PL-Se-Bej. 81 - 119 | 1738 | 1781 | 203 | 283 | 856 |
| PL-Se-Bej. 81 - 120 | 1675 | 1593 | 175 | 256 | 931 |
| PL-Se-Bej. 81 - 122 | 1306 | 1421 | 70 | 244 | 893 |
| PL-Se-Bej. 81 - 111 | 1606 | 1781 | 140 | 206 | 1112 |
| FLIP 81 00 4 | 687 | 1734 | 166 | 317 | 993 |
| ILC 3279 | 675 | 1406 | 43 | 319 | M |
| ILC 136 | 1275 | 1421 | 78 | 262 | 812 |
| ILC 165 | 1316 | 1796 | 162 | 262 | 925 |
| ILC 451 | 1608 | 1796 | 184 | 312 | 931 |
| ILC 2587 | 1094 | 1203 | 134 | 331 | 862 |
| ILC 482 | 612 | 1750 | 81 | 337 | 887 |
| Local P | 1075 | 1337 | 137 | 350 | 900 |
| Local N.P | 1325 | 1387 | 91 | 175 | 843 |
| SE ± | 266.1 | 362.5 | NA | 100.0 | 130.3 |
| CV % | 20.1 | 22.2 | NA | 40.2 | 13.9 |

Tableau 18 C : Essai avancé de rendement de pois chiche de printemps No. 2

Table 18 C : Seed yield of lines in the AYT-Sp.2 at four locations

| Lignée/Line | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | OM | K | RR |
| ILC 76 | 1093 | 625 | 121 | 200 |
| ILC 83 | 1056 | 1290 | 134 | 325 |
| ILC 116 | 1131 | 1019 | 216 | 318 |
| ILC 132 | 1006 | 906 | 262 | 343 |
| ILC 134 | 850 | 412 | 200 | 312 |
| ILC 135 | 968 | 550 | 158 | 293 |
| FLIP 82 - 85 | 1012 | 884 | 95 | 456 |
| FLIP 81 - 131 | 987 | 1118 | 280 | 331 |
| FLIP 81 - 149 | 956 | 1287 | 200 | 293 |
| FLIP 81 - 156 | 681 | 871 | 125 | 318 |
| FLIP 81 - 180 | 918 | 890 | 150 | 250 |
| FLIP 81 - 181 | 1025 | 781 | 133 | 437 |
| FLIP 81 - 187 | 937 | 1425 | 200 | 268 |
| FLIP 81 - 391 | 943 | 1402 | 200 | 212 |
| 28 II Fretissa | 1081 | 884 | M | 412 |
| ILC 484 | 768 | 1250 | 237 | 318 |
| F 81 - 004 | 450 | 1659 | 81 | 200 |
| ILC 3279 | 537 | 731 | M | 287 |
| ILC 136 | 1081 | 759 | 175 | 306 |
| ILC 165 | 1306 | 1081 | 175 | 301 |
| ILC 451 | 1081 | 1265 | 175 | 318 |
| ILC 2587 | 900 | 903 | 104 | 375 |
| ILC 482 | 568 | 1256 | 150 | 737 |
| Local P | 1000 | 987 | 125 | 350 |
| Local N.P | 1062 | 1218 | 125 | 300 |
| SE ± | 206.2 | 467.0 | NA | 135.0 |
| CV % | 21.9 | 45.8 | NA | 41.0 |

Tableau 19 C : Essai avancé de rendement de pois chiche de printemps No. 3
Table 19 C : Seed yield of lines in the AYT-Sp3 at four locations

| Lignée/Line | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | OM | K | RR |
| ILC 263 | 1438 | 1918 | 150 | 125 |
| ILC 254 | 1288 | 1503 | 96 | 468 |
| ILC 3396 | 1225 | 1418 | 153 | 300 |
| ILC 3749 | 781 | 1578 | 100 | 675 |
| ILC 35 | 763 | 1359 | 75 | 437 |
| ILC 496 | 1244 | 1287 | 179 | 600 |
| FLIP 81 - 158 | 1338 | 1432 | 137 | 312 |
| FTA - 82 - 5 | 1250 | 1903 | 120 | 431 |
| FTA - 82 - 9 | 1369 | 1671 | 137 | 668 |
| FTA - 82 - 13 | 981 | 1403 | 112 | 556 |
| FTA - 82 - 21 | 1250 | 1728 | 181 | 581 |
| FTA - 82 - 23 | 1394 | 1881 | 145 | 468 |
| FTA - 82 - 29 | 1563 | 1862 | 200 | 637 |
| Local | 1356 | 1665 | 231 | 856 |
| 28 II Fretissa | 963 | 1418 | 112 | 368 |
| ILC 484 | 1300 | 1668 | 203 | 950 |
| F 81 004 | 656 | 1471 | 162 | 593 |
| ILC 3279 | 566 | 1259 | 100 | 531 |
| ILC 136 | 800 | 1303 | 137 | 643 |
| ILC 165 | 1000 | 1400 | 175 | 637 |
| ILC 451 | 1259 | 1385 | 206 | 687 |
| ILC 2587 | 868 | 1465 | 175 | 512 |
| ILC 482 | 756 | 1421 | 112 | 657 |
| Local P | 819 | 1231 | M | 518 |
| Local N.P | 1075 | 1659 | 225 | 400 |
| SE ± | 395.0 | 405.0 | NA | 230.0 |
| CV % | 36.1 | 26.4 | NA | 42.4 |

Tableau 20 C : Essai avancé de rendement de pois chiche de printemps No.4
Table 20 C : Seed yield of lines in the AYT-Sp4 at one location

| Lignée/Line | Rendement/Yield |
|---|---|
| | B |
| FTA - 85 - 1 | 1700 |
| FTA - 85 - 2 | 1850 |
| FTA - 85 - 10 | 1525 |
| FTA - 85 - 11 | 1625 |
| FTA - 85 - 15 | 1575 |
| FTA - 85 - 17 | 1750 |
| FTA - 85 - 18 | 1675 |
| FTA - 85 - 22 | 1875 |
| FTA - 85 - 23 | 1675 |
| PL - Se - Bej. 81 - 10 | 1775 |
| PL - Se - Bej. 81 - 22 | 1800 |
| PL - Se - Bej. 81 - 25 | 1750 |
| PL - Se - Bej. 81 - 26 | 1600 |
| PL - Se - Bej. 81 - 75 | 1925 |
| PL - Se - Bej. 81 - 92 | 1775 |
| PL - Se - Bej. 81 - 95 | 2025 |
| ILC 482 | 1525 |
| ILC 3279 | 1475 |
| ILC 263 | 1750 |
| ILC 136 | 1375 |
| ILC 165 | 1725 |
| ILC 451 | 1850 |
| ILC 2587 | 1850 |
| Local P | 1475 |
| Local N.P | 1450 |
| SE ± | NA |
| CV % | NA |

Tableau 21 C : Essai avancé de rendement de pois chiche de printemps gros calibre (CIYT-L)

Table 21 C : Seed yield of lines in the IYT-L at four locations

| Lignée/Line | Rendement/Yield | | | |
|---|---|---|---|---|
| | B | OM | K | RR |
| ILC 35 | 875 | 1312 | 87 | 120 |
| ILC 76 | 550 | 966 | 81 | 197 |
| ILC 83 | 1119 | 1541 | 62 | 212 |
| ILC 116 | 1269 | 925 | 87 | 167 |
| ILC 132 | 819 | 1345 | M | 232 |
| ILC 134 | 1163 | 562 | 91 | 227 |
| ILC 135 | 1338 | 853 | 93 | 245 |
| ILC 136 | 1013 | 1120 | 100 | 181 |
| ILC 165 | 875 | 167 | 137 | 135 |
| ILC 171 | 888 | 1200 | 93 | 137 |
| ILC 254 | 1025 | 887 | 93 | 230 |
| ILC 263 | 1200 | 1407 | 118 | 165 |
| ILC 451 | 1219 | 1062 | 75 | 200 |
| ILC 464 | 913 | 1307 | 56 | 145 |
| ILC 496 | 942 | 1187 | 173 | 297 |
| ILC 613 | 919 | 1328 | 75 | 280 |
| ILC 620 | 1050 | 1112 | 118 | 262 |
| ILC 629 | 1056 | 1866 | 50 | 267 |
| ILC 2587 | 1413 | 945 | 100 | 197 |
| ILC 3749 | 381 | 1141 | 37 | 182 |
| FLIP - 81 - 180 C | 1250 | 1537 | 106 | 247 |
| ILC 482 | 450 | 1895 | 75 | 172 |
| ILC 1929 | 944 | 1482 | 137 | 157 |
| Local | 788 | 1175 | 100 | 132 |
| Local | 856 | 703 | M | 250 |
| Local | 650 | 1262 | M | 107 |
| SE ± | 311.2 | 358.7 | NA | 97.5 |
| CV % | 32.8 | 29.3 | NA | 49.4 |

Tableau 22 C : Essai avancé de rendement de pois chiche hiver/ printemps No. 1

Table 22 C : Seed yield of lines in AYT-Sp/W1 at two locations

| Lignée/Line | Rendement/Yield | |
|---|---|---|
| | B | OM |
| FLIP 81 - 068 | 975 | 1171 |
| FLIP 81 - 71 | 1081 | 2031 |
| FLIP 81 - 75 | 941 | 1596 |
| FLIP 82 - 25 C | 812 | 1256 |
| FLIP 82 - 26 C | 850 | 1334 |
| FLIP 82 - 73 C | 862 | 1703 |
| FLIP 82 - 87 C | 1041 | 2090 |
| FLIP 82 - 91 C | 900 | 2103 |
| FLIP 82 - 96 C | 825 | 1981 |
| FLIP 82 - 101 C | 843 | 1800 |
| FLIP 82 - 127 C | 1287 | 1862 |
| FLIP 82 - 161 C | 1100 | 1734 |
| FLIP 82 - 228 C | 950 | 1950 |
| FLIP 82 - 254 C | 758 | 2890 |
| FLIP 82 - 12 C | 575 | 1696 |
| FLIP 82 - 48 C | 950 | 1945 |
| 82 TH 77 | 656 | 1865 |
| FLIP 82 - 180 | 508 | 2075 |
| FLIP 82 - 121 | 750 | 1690 |
| FLIP 82 - 312 | 566 | 1956 |
| FLIP 82 - 45 | 1075 | 1934 |
| ILC 482 | 975 | 1981 |
| ILC 3279 | 415 | 1553 |
| Local | 956 | 1856 |
| Local | 843 | 1903 |
| SE ± | 212.4 | 365 |
| CV % | 25.2 | 20.5 |

Tableau 23 C : Essai avancé de rendement de pois chiche hiver/ printemps No. 2

Table 23 C : Seed yield of lines in the AYT-Sp/W2 at two locations

| Lignée/Line | Rendement/Yield | |
|---|---|---|
| | B | OM |
| FLIP 82 - 1 C | 1037 | 1718 |
| FLIP 82 - 71 C | 712 | 1831 |
| FLIP 82 - 64 C | 737 | 1006 |
| FLIP 82 - 117 C | 625 | 1393 |
| FLIP 82 - 169 C | 650 | 1818 |
| FLIP 82 - 208 C | 675 | 1950 |
| FLIP 82 - 40 C | 925 | 1625 |
| FLIP 81 - 269 C | 862 | 1612 |
| 83 TH 114 | 662 | 1481 |
| 83 TH 136 | 862 | 1612 |
| ILC 482 | 725 | 1962 |
| ILC 482 | 562 | 1918 |
| ILC 3279 | 350 | 1350 |
| ILC 3279 | 575 | 1768 |
| Local | 825 | 1593 |
| SE ± | 182.4 | 426.2 |
| CV % | 25.3 | 26.5 |

Tableau 24 C: Incidence du wilt sur pois chiche (pépinières ICRISAT-ICPRWN) WSP-Béjà

Table 24 C: Wilt incidence on chickpea lines in the ICRISAT-Nursery (ICRRWN) at the WSP of Béjà

| Lignée/Line | No. total de plantes Total number of plants | Stand | Wilt incidence % Incidence du wilt % |
|---|---|---|---|
| ICC 184 | 57 | 5 | 0 |
| 594 | 45 | 5 | 0 |
| 871 | 51 | 5 | 2 |
| 1314 | 43 | 5 | 0 |
| 1405 | 55 | 5 | 4 |
| 1435 | 53 | 5 | 2 |
| 1437 | 45 | 5 | 0 |
| 1441 | 41 | 5 | 2 |
| 1870 | 44 | 4 | 2 |
| 2243 | 50 | 5 | 2 |
| 2246 | 44 | 5 | 0 |
| 2484 | 45 | 5 | 0 |
| 2595 | 53 | 5 | 0 |
| 2831 | 40 | 4 | 0 |
| 3075 | 46 | 5 | 0 |
| 3208 | 49 | 5 | 0 |
| 3274 | 37 | 5 | 0 |
| 3328 | 55 | 5 | 2 |
| 3538 | 47 | 5 | 0 |
| 4928 | 18 | 5 | 44 |
| 4934 | 46 | 5 | 0 |
| 4973 | 39 | 4 | 100 |
| 5003 | 39 | 5 | 0 |
| 9035 | 44 | 5 | 0 |
| 11320 | 55 | 5 | 0 |
| 11322 | 35 | 5 | 0 |
| 11323 | 41 | 5 | 0 |
| 11324 | 33 | 5 | 3 |
| 12252 | 43 | 5 | 0 |
| ICCL 82001 | 39 | 5 | 0 |
| 82104 | 41 | 5 | 6 |
| 83009 | 38 | 5 | 9 |
| 83136 | 26 | 2 | 0 |
| 83142 | 35 | 4 | 3 |
| 85101 | 23 | 2 | 3 |
| 85102 | 45 | 5 | 0 |
| 85103 | 28 | 3 | 0 |
| 85104 | 46 | 4 | 0 |
| 85105 | 47 | 5 | 0 |
| 85106 | 45 | 5 | 0 |
| 85107 | 35 | 3 | 0 |
| 85108 | 38 | 4 | 0 |

| | | | |
|---|---|---|---|
| ICCL 85109 | 34 | 5 | 0 |
| 85111 | 36 | 5 | 0 |
| 85112 | 50 | 5 | 0 |
| 85113 | 41 | 5 | 0 |
| 85114 | 44 | 5 | 0 |
| 85115 | 16 | 2 | 5 |
| 85116 | 61 | 5 | 0 |
| 85117 | 45 | 5 | 0 |
| ICC 4951 | 45 | 4,76 | 2,84 |
| Local | 29 | - | 99,57 |

## 5. LENTIL IMPROVEMENT (H. Halila)

### 5.1. Introduction

In 1972 lentil area in Tunisia was around 7000 hectares(ha) but has now declined to 914 ha and this represents less than 1% of the total legume area in 1985. This decline in lentil growing is due to the lack of high yielding cultivars and equally, if not more importantly, to harvest problems involving high labour costs and grain shattering. To make the crop more attractive to farmers the objectives must be to select heavier and stable yielding lines combined with better harvest characteristics or increased height and reduced shattering. As will be seen heavier yielding lines have been identified but taller material is still difficult to obtain although few semi-tall lines were observed in the ICARDA material. Yield results, however, seem to indicate a negative correlation between height and good yielding character.

Intensive work on local cultivars this season and previous years showed that none of the local cultivars tested outyielded significantly the one from Oueslatia and until further data are obtained the Oueslatia cultivar will continue to be used as the check in all trials.

Apart from an attack of Scelerotinia spp. on trials at Beja and a light attack of rust (Uromyces spp.) on the trials at Kef, observed in 1983 no serious pests or diseases

have been observed on the crop. This is thought to be probably due to the fact that lentil cultivation is still very limited. This crop report provides a summary of the complete results from all trials and nurseries contained in tables 1 to 15 prefixed by the letter L. As indicated earlier the program has decided to release two lentil varieties. The yield performance of these varieties compared to the local Oueslatia over the last three years is given in table 12.

## 5.2. Yield trials and Nurseries

Seed yield results are available from testing 200 advanced breeding lines, 20 F4/F5 populations, and 22 F3 populations in 13 replicated yield trials at two or three locations, and 252 preliminary breeding lines in four non-replicated screening nurseries at two or four locations, a summary of the yield data is given in table 13.

Although a number of advanced lines, F4/F5 populations, and F3 populations outyielded the local check at the locations, only one line in the small seeded international yield trial, two lines in the advanced yield trial 2, and one in the preliminary yield trial 2 did so significantly at Beja and/or O. Meliz stations (Table 14). Unfortunately none of these lines showed good mechanical harvest characteristics in that none were particularly erect and all

Tableau 12 : Rendements moyens en kg/ha des variétés de lentille proposées à l'inscription.

Table 12 : Seed yield of two lentil lines and of the local Oueslatia over the last three years at Beja, Kef and Oued Meliz.

| Line/Lignee | 1983/84 | | 1984/85 | | | 1985/86 | | Moyenne/Mean | |
|---|---|---|---|---|---|---|---|---|---|
| | B | K | B | K | OM | B | OM | Sy(1) | / Local |
| ILL 4606(2) | 1937 | 858 | 2183 | 1958 | 1475 | 2038 | 1846 | 1756 | 108 |
| ILL 4400(3) | 2000 | 1167 | 2300 | 1225 | 1500 | 1717 | 1844 | 1679 | 104 |
| Local Oueslatia | 1350 | 929 | 1918 | 1815 | 1591 | 1744 | 1991 | 1619 | 100 |

(1) Sy: Seed yield/Rendement - kg/ha

(2) ILL 4606 = Nablus

(3) ILL 4400 = Syrian local large

Table 13 : Summary of seed yield results of lentil lines and populations tested in replicated trials (YT) and screening nurseries (SN) in 1985/86 at Beja (B), Kef (K), Oued Meliz (OM) and Mateur(M).

| Trial designation (1) | | Number of lines/populations | | | | | | | | | Coefficients of variation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Tested | Exceeding the local check at | | | | Significantly exceeding the local check at (2) | | | | | | | |
| | | | B | K | OM | M | B | K | OM | M | B | K | OM | M |
| International | YT-L | 23 | 7 | 14 | 3 | - | 0 | 9 | 0 | - | 9.0 | 23.9 | 36.5 | - |
| | YT-S | 23 | 5 | 17 | 3 | - | 0 | 11 | 1 | - | 14.2 | 22.2 | 20.8 | - |
| | YT-$F_3$ | 23 | 3 | 5 | - | - | 0 | NS | - | - | 18.0 | 33.0 | - | - |
| Advanced | YT-$L_1$ | 22 | 6 | 6 | 1 | - | NS | 3 | 0 | - | 16.2 | 23.1 | 22.9 | - |
| | YT-$L_2$ | 22 | 7 | 11 | 3 | - | 0 | 8 | 0 | - | 16.4 | 18.8 | 28.3 | - |
| | YT-$L_3$ | 22 | 7 | 13 | 1 | - | 2 | 8 | 0 | - | 20.8 | 16.6 | 20.0 | - |
| | YT-L/$F_4$-$F_5$ | 22 | 11 | 9 | 6 | - | 0 | 6 | NS | - | 21.1 | 22.7 | 37.5 | - |
| Preliminary | YT-$L_1$ | 22 | 17 | 10 | - | - | 0 | NS | - | - | 17.1 | 23.5 | - | - |
| | YT-$L_2$ | 22 | 11 | 4 | - | - | 1 | 3 | - | - | 16.4 | 21.9 | - | - |
| | YT-$L_3$ | 22 | 5 | 2 | - | - | 0 | 1 | - | - | 17.9 | 26.3 | - | - |
| | YT-$L_4$ | 22 | 7 | 15 | - | - | 0 | 10 | - | - | 18.2 | 24.3 | - | - |
| International | SN-L | 51 | 7 | 12 | 1 | - | - | - | - | - | | | | |
| | SN-TE | 64 | 5 | 17 | 6 | 10 | - | - | - | - | | | | |
| | SN-S | 65 | 7 | 16 | 4 | 8 | - | - | - | - | | | | |
| | SN-E | 72 | 4 | 8 | 3 | - | - | - | - | - | | | | |

(1) L = Large, S = Small, E = Early, T = Tall. (2) NS = 'F' test of treatments not significant ($P > 0.05$)
Screening nurseries(SN) not analysed statistically

Tableau 14 : Rendements moyens des lignées de lentille dépassant significativement le local Oueslatia.

Table 14 : Seed yield of superior yielding lentil lines in two trials at Beja, O. Meliz and Kef in 1985/86

| Trial | Line | B | OM | K | Mean |
|---|---|---|---|---|---|
| IYT-S | ILL 5728 - FLIP 84-58L | 1794 | 2268 (1) | 433 | 1498 |
| | Local Oueslatia | 2316 | 2168 | 445 | 1643 |
| | SE ± | 288.4 | 361.2 | 107.5 | |
| | CV % | 14.2 | 20.8 | 22.2 | |
| AYT-3 | FLIP 84- 56 L | 2237 | 2068 | 665 | 1656 |
| | FLIP 84-114 L | 2156 | 2240 | 669 | 1688 |
| | Local Oueslatia | 1634 | 2406 | 597 | 1545 |
| | SE ± | 360.9 | 403.7 | 102.5 | |
| | CV % | 20.0 | 20.0 | 16.6 | |
| PYT-2 | ILL 5716 - FLIP 84-45L | 2250 | - | 512 | 1381 |
| | Local Oueslatia | 1673 | - | 618 | 1145 |
| | SE ± | 277.3 | | 121.2 | |
| | CV % | 16.4 | | 21.9 | |

(1) Underlined values significantly ($P \leqslant 0.05$) outyielded the check.

tended to lodge to a certain degree. It was disappointing that of the above lines only two advanced lines from the AYT 2 significantly outyielded the check last season, and that none of the lines in the AYT 1 and 2 showed a significant yield increase over the check although many of them has done so in the previous season. This may partly reflects the genotype x environment interaction factors.

Although Kef station was not considered in the discussion, due to the severe drought observed in the area, results from Kef site show that while other crops such as Faba bean and Chickpea have completely failed, lentil gave a relatively good performance. This shows that lentils, which are grown mostly in wet areas, could possibly be extended to much dryer zones. The research program of next year will take into consideration this aspect and special trials will be developped for Kef based on this year results.

Tableau 1 L : Essai avancé de rendement de lentille No. 1

Table 1 L : Seed yield of lines in the AYT - L1 at three locations

| Lignée/Line | Selection | Rendement/Yield | | |
|---|---|---|---|---|
| | | B | OM | K |
| ILL 8 | 78 S 26002 | 1869 | 1518 | 781 |
| ILL 26 | 78 S 26032 | 1638 | 1584 | 587 |
| ILL 346 | - | 1481 | 1139 | 606 |
| ILL 707 | | 1584 | 1568 | 425 |
| ILL 842 | Lebanon | 1663 | 1543 | 650 |
| ILL 857 | Algeria | 1733 | 1446 | 612 |
| ILL 975 | Chile | 1544 | 1328 | 668 |
| ILL 1939 | Morocco | 1788 | 1350 | 656 |
| ILL 4606 | Nablus | 2038 | 1846 | 881 |
| ILL 5562 | 76 TA 66005 | 2100 | 1662 | 643 |
| ILL 5584 | 78 S 26004 | 1808 | 1212 | 716 |
| ILL 5585 | 78 S 26009 | 1694 | 1246 | 866 |
| ILL 5588 | 78 S 26013 | 1775 | 1318 | 525 |
| ILL 5590 | 78 S 26018 | 1791 | 806 | 575 |
| ILL 5700 | FLIP 84 - 29 L | 1783 | 1284 | 662 |
| ILL 5732 | FLIP 84 - 62 L | 1483 | 1615 | 456 |
| ILL 5746 | FLIP 84 - 76 L | 1916 | 1340 | 556 |
| ILL 5753 | FLIP 84 - 83 L | 1581 | 1212 | 556 |
| FLIP 84 - 1 L | | 1325 | 1378 | 562 |
| 76 TA 143 | | 1691 | 1643 | 718 |
| ILL 28 | | 1666 | 1559 | 612 |
| ILL 4400 | | 1916 | 1521 | 743 |
| Local Oueslatia | | 1844 | 1787 | 640 |
| Local Oueslatia | | 1833 | 1306 | 762 |
| Local Oueslatia | | 1658 | 2178 | 718 |
| SE ± | | 281.3 | 336.2 | 70.1 |
| CV % | | 16.2 | 22.9 | 23.1 |

Tableau 2 L : Essai avancé de rendement de lentille No. 2

Table 2 L : Seed yield of lines in the AYT - L2 at three locations

| Lignée/Line | Rendement/Yield | | |
|---|---|---|---|
| | B | OM | K |
| 75 TA 23 | 2218 | 490 | 600 |
| 76 TA 2 | 1743 | 1965 | 718 |
| 76 TA 9 | 2137 | 1618 | 506 |
| 76 TA 10 | 1987 | 1221 | 519 |
| 76 TA 38 | 2008 | 1937 | 625 |
| 76 TA 169 | 2218 | 1690 | 612 |
| 76 TA 169 | 1512 | 1725 | 581 |
| 76 TA 182 | 1868 | 2081 | 607 |
| FLIP 84 - 44 L | 782 | 2012 | 700 |
| FLIP 84 - 48 L | 1950 | 1915 | 658 |
| FLIP 84 - 51 L | 1912 | 2062 | 725 |
| FLIP 84 - 58 L | 16[illegible]3 | 2415 | 681 |
| FLIP 84 - 68 L | 2318 | 1950 | 650 |
| FLIP 84 - 78 L | 2081 | 2134 | 475 |
| FLIP 84 - 84 L | 2343 | 2290 | 700 |
| FLIP 84 - 89 L | 1831 | 1546 | 669 |
| FLIP 84 - 100 L | 2187 | 2175 | 550 |
| FLIP 84 - 103 L | 2068 | 2268 | 775 |
| FLIP 84 - 125 L | 887 | 1462 | 475 |
| FLIP 84 - 129 L | 2108 | 1881 | 575 |
| ILL 28 | 2168 | 1959 | 550 |
| ILL 4400 | 1950 | 1962 | 469 |
| Local Oueslatia | 2093 | 1878 | 600 |
| Local Oueslatia | 2131 | 2234 | 641 |
| Local Oueslatia | 2091 | 2390 | 569 |
| SE ± | 316.7 | 543.7 | 112.5 |
| CV % | 16.4 | 28.3 | 18.8 |

Tableau 3 L : Essai avancé de rendement de lentille No. 3

Table 3 L : Seed yield of lines in the AYT - L3 at three locations

| Lignée/Line | Rendement/Yield | | |
|---|---|---|---|
| | B | OM | K |
| ILL 358 | 1368 | 1812 | 475 |
| ILL 1866 | 1291 | 1653 | 619 |
| ILL 2149 | 1627 | 1625 | 562 |
| ILL 2532 | 1862 | 1684 | 575 |
| ILL 4062 | 2016 | 2396 | 506 |
| FLIP 84 - 43 L | 1712 | 2050 | 712 |
| FLIP 84 - 50 L | 1662 | 2015 | 656 |
| FLIP 84 - 56 L | 2237 | 2068 | 665 |
| FLIP 84 - 75 L | 1400 | 1950 | 832 |
| FLIP 84 - 92 L | 1856 | 2150 | 755 |
| FLIP 84 - 108 L | 1791 | 1918 | 657 |
| FLIP 84 - 112 L | 2037 | 2125 | 594 |
| FLIP 84 - 114 L | 2156 | 2240 | 669 |
| FLIP 84 - 116 L | 1768 | 2184 | 712 |
| FLIP 84 - 117 L | 1862 | 1400 | 675 |
| FLIP 84 - 121 L | 1787 | 1621 | 531 |
| FLIP 84 - 123 L | 1400 | 1871 | 862 |
| FLIP 84 - 128 L | 2012 | 2143 | 618 |
| FLIP 84 - 131 L | 1833 | 1643 | 400 |
| FLIP 84 - 135 L | 1400 | 2093 | 637 |
| ILL 28 | 1806 | 2668 | 469 |
| ILL 4400 | 1493 | 1978 | 519 |
| Local Oueslatia | 1725 | 2640 | 615 |
| Local Oueslatia | 1637 | 2534 | 600 |
| Local Oueslatia | 1541 | 2046 | 575 |
| SE ± | 360.9 | 403.7 | 102.5 |
| CV % | 20.8 | 20.0 | 16.6 |

Tableau 4 L : Essai avancé de rendement de lentille No. 4

Table 4 L : Seed yield of lines in the AYT - L4 at three locations

| Lignée/Line | Rendement/Yield | | |
|---|---|---|---|
| | B | OM | K |
| 82 S 33 | 1331 | 415 | 381 |
| 82 S 40 | 1450 | 1581 | 506 |
| 82 S 49 | 1283 | 2053 | 481 |
| 82 S 55 | 1575 | 1762 | 612 |
| 82 S 89 | 1218 | 1881 | 600 |
| 82 S 168 | 387 | 728 | 407 |
| 82 S 61 | 1287 | 1678 | 475 |
| 82 S 177 | 1158 | 1568 | 431 |
| 82 S 186 | 1450 | 1890 | 675 |
| 82 S 243 | 1606 | 1562 | 519 |
| 82 S 220 | 1025 | 1437 | 594 |
| 82 S 57 | 1518 | 1540 | 562 |
| 82 S 349 | 1068 | 1371 | 383 |
| 82 S 245 | 1108 | 1246 | 419 |
| 82 S 230 | 1558 | 1371 | 675 |
| 83 S 2 | 1643 | 1403 | 575 |
| 83 S 163 | 1031 | 1384 | 531 |
| 83 S 311 | 1618 | 1690 | 531 |
| 83 S 321 | 1306 | 1571 | 419 |
| 83 S 15 | 1637 | 1512 | 612 |
| ILL 28 | 1587 | 1459 | 512 |
| ILL 4400 | 1512 | 1915 | 562 |
| Local Oueslatia | 1437 | 1696 | 550 |
| Local Oueslatia | 1318 | 1831 | 506 |
| Local Oueslatia | 1225 | 1496 | 531 |
| SE ± | 281.9 | 561.0 | 115.0 |
| CV % | 21.1 | 37.5 | 22.7 |

Tableau 5 L : Essai préliminaire de rendement de lentille No. 1

Table 5 L : Seed yield of lines in the PYT - L1 at two locations

| Lignée/Line | Selection | Rendement/Yield | |
|---|---|---|---|
| | | B | K |
| ILL 5667 | 80 Ter 52428 | 1341 | 375 |
| ILL 5671 | 81 S 3832 C | 1156 | 575 |
| ILL 5751 | FLIP 84 - 81 L | 1550 | 450 |
| ILL 5752 | FLIP 84 - 82 L | 1687 | 500 |
| ILL 5754 | FLIP 84 - 84 L | 836 | 631 |
| ILL 5755 | FLIP 84 - 85 L | 1250 | 287 |
| ILL 5756 | FLIP 84 - 86 L | 1584 | 525 |
| ILL 5760 | FLIP 84 - 90 L | 1556 | 487 |
| ILL 5763 | FLIP 84 - 93 L | 1443 | 419 |
| ILL 5766 | FLIP 84 - 96 L | 1608 | 494 |
| ILL 5769 | FLIP 84 - 99 L | 1537 | 475 |
| ILL 5770 | FLIP 84 - 100 L | 1758 | 537 |
| ILL 5772 | FLIP 84 - 102 L | 1668 | 508 |
| ILL 5773 | FLIP 84 - 103 L | 1756 | 583 |
| ILL 5776 | FLIP 84 - 106 L | 1900 | 600 |
| ILL 5814 | FLIP 84 - 144 L | 1568 | 544 |
| ILL 5816 | FLIP 84 - 147 L | 1556 | 525 |
| ILL 5821 | FLIP 84 - 152 L | 1612 | 475 |
| ILL 5839 | FLIP 85 - 1 L | 1600 | 516 |
| ILL 5840 | FLIP 85 - 2 L | 1641 | 400 |
| ILL 28 | 74 TA 19 | 1737 | 562 |
| ILL 4400 | | 1600 | 506 |
| Local Oueslatia | | 1441 | 550 |
| Local Oueslatia | | 1587 | 446 |
| Local Oueslatia | | 1375 | 512 |
| SE ± | | 262.3 | 115.0 |
| CV % | | 17.1 | 23.5 |

Tableau 6 L : Essai préliminaire de rendement de lentille No. 2

Table 6 L : Seed yield of lines in the PYT - L2 at two locations

| Lignée/Line | Selection | Rendement/Yield | |
|---|---|---|---|
| | | B | K |
| ILL 5841 | FLIP 85 - 3 L | 1400 | 475 |
| ILL 5699 | FLIP 84 - 27 L | 1500 | 690 |
| ILL 5713 | FLIP 84 - 42 L | 1725 | 431 |
| ILL 5714 | FLIP 84 - 43 L | 1316 | 690 |
| ILL 5716 | FLIP 84 - 45 L | 2250 | 512 |
| ILL 5720 | FLIP 84 - 49 L | 1537 | 569 |
| ILL 5722 | FLIP 84 - 51 L | 1881 | 675 |
| ILL 5724 | FLIP 84 - 54 L | 1900 | 575 |
| ILL 5729 | FLIP 84 - 59 L | 1681 | 444 |
| ILL 5759 | FLIP 84 - 89 L | 1700 | 506 |
| ILL 5774 | FLIP 84 - 104 L | 1587 | 482 |
| ILL 5828 | FLIP 84 - 159 L | 1593 | 557 |
| ILL 5832 | FLIP 84 - 163 L | 1781 | 602 |
| ILL 5833 | FLIP 84 - 164 L | 1818 | 665 |
| ILL 5854 | FLIP 85 - 16 L | 1781 | 550 |
| ILL 5859 | FLIP 85 - 21 L | 1383 | 525 |
| ILL 5860 | FLIP 85 - 22 L | 1525 | 525 |
| ILL 5863 | FLIP 85 - 25 L | 1643 | 587 |
| ILL 5866 | FLIP 85 - 28 L | 1783 | 525 |
| ILL 5871 | FLIP 85 - 33 L | 1631 | 425 |
| ILL 28 | 74 TA 19 | 1973 | 575 |
| ILL 4400 | | 1958 | 475 |
| Local Oueslatia | | 1513 | 556 |
| Local Oueslatia | | 1881 | 637 |
| Local Oueslatia | | 1625 | 662 |
| SE ± | | 277.3 | 120.0 |
| CV % | | 16.4 | 21.9 |

Tableau 7 L : Essai préliminaire de rendement de lentille No. 3

Table 7 L : Seed yield of lines in the PYT - L3 at two locations

| Lignée/Line | Selection | Rendement/Yield | |
|---|---|---|---|
| | | B | K |
| ILL 358 | - | 1166 | 544 |
| ILL 2149 | - | 1588 | 531 |
| ILL 2590 | LWS 3 | 1129 | 475 |
| ILL 3516 | L 9 41 | 1563 | 437 |
| ILL 5700 | FLIP 84 - 29 L | 1442 | 558 |
| ILL 5726 | FLIP 84 - 56 L | 1600 | 512 |
| ILL 5728 | FLIP 84 - 58 L | 1741 | 637 |
| ILL 5748 | FLIP 84 - 78 L | 1600 | 640 |
| ILL 5778 | FLIP 84 - 108 L | 1525 | 437 |
| ILL 5779 | FLIP 84 - 109 L | 1100 | 219 |
| ILL 5723 | FLIP 84 - 113 L | 1438 | 369 |
| ILL 5784 | FLIP 84 - 114 L | 1316 | 469 |
| ILL 5788 | FLIP 84 - 118 L | 1231 | 494 |
| ILL 5791 | FLIP 84 - 121 L | 1475 | 425 |
| ILL 5803 | FLIP 84 - 133 L | 1544 | 300 |
| ILL 5806 | FLIP 84 - 136 L | 1858 | 537 |
| ILL 5880 | FLIP 85 - 42 L | 1881 | 582 |
| ILL 5874 | FLIP 85 - 36 L | 1706 | 219 |
| ILL 5881 | FLIP 85 - 43 L | 1508 | 475 |
| ILL 5882 | FLIP 85 - 44 L | 1550 | 525 |
| ILL 28 | 74 TA 19 | 1638 | 369 |
| ILL 4400 | | 1488 | 412 |
| Local Oueslatia | | 1750 | 507 |
| Local Oueslatia | | 1588 | 425 |
| Local Oueslatia | | 1444 | 737 |
| SE ± | | 270.9 | 100.0 |
| CV % | | 17.9 | 26.3 |

Tableau 8 L : Essai préliminaire de rendement de lentille No. 4

Table 8 L : Seed yield of lines in the PYT - L4 at two locations

| Lignée/Line | Selection | Rendement/Yield | |
|---|---|---|---|
| | | B | K |
| ILL 1939 | - | 1883 | 381 |
| ILL 4711 | Chilean | 836 | 194 |
| ILL 5582 | 78 S 26002 | 1587 | 358 |
| ILL 5604 | 78 S 26052 | 1731 | 325 |
| ILL 5669 | 81 S 31368 | 1375 | 342 |
| ILL 5698 | FLIP 84 - 26 L | 1487 | 358 |
| ILL 5714 | FLIP 84 - 43 L | 2016 | 494 |
| ILL 5718 | FLIP 84 - 47 L | 1737 | 391 |
| ILL 5737 | FLIP 84 - 67 L | 1762 | 525 |
| ILL 5745 | FLIP 84 - 75 L | 1643 | 450 |
| ILL 5753 | FLIP 84 - 83 L | 1483 | 456 |
| ILL 5786 | FLIP 84 - 116 L | 1681 | 425 |
| ILL 5799 | FLIP 84 - 129 L | 1612 | 415 |
| ILL 5800 | FLIP 84 - 130 L | 1356 | 469 |
| ILL 5805 | FLIP 84 - 135 L | 1775 | 469 |
| ILL 5875 | FLIP 85 - 37 L | 1406 | 262 |
| ILL 5876 | FLIP 85 - 38 L | 1550 | 383 |
| ILL 5877 | FLIP 85 - 39 L | 1691 | 444 |
| ILL 5878 | FLIP 85 - 40 L | 1331 | 250 |
| ILL 5879 | FLIP 85 - 41 L | 1512 | 290 |
| ILL 28 | 74 TA 19 | 1518 | 287 |
| ILL 4400 | | 1543 | 267 |
| Local Oueslatia | | 1812 | 362 |
| Local Oueslatia | | 1475 | 300 |
| Local Oueslatia | | 1725 | 17 |
| SE ± | | 288.4 | 90.0 |
| CV % | | 18.2 | 24.3 |

Tableau 9 L : Essai de rendement de lentille - gros calibre (LIYT-L)

Table 9 L : Seed yield of lines in the IYT-L at three locations

| Lignée/Line | Selection | Rendement/Yield | | |
|---|---|---|---|---|
| | | B | OM | K |
| ILL 20 | - | 2208 | 2105 | 325 |
| ILL 707 | - | 2191 | 1872 | 492 |
| ILL 842 | - | 2200 | 1977 | 325 |
| ILL 857 | - | 2083 | 1561 | 637 |
| ILL 4400 | Local large | 2225 | 2000 | 400 |
| ILL 4605 | Precoz | 1400 | 900 | 525 |
| ILL 4606 | Nablus | 2316 | 1738 | 542 |
| ILL 5527 | 74 TA 276 | 1991 | 1463 | 650 |
| ILL 5582 | 78 S 26002 | 2375 | 2300 | 582 |
| ILL 5590 | 78 S 26018 | 2308 | 650 | 550 |
| ILL 5668 | 81 S 30935 | 2525 | 1977 | 575 |
| ILL 5672 | 81 S 38342 | 2225 | 2055 | 282 |
| ILL 5743 | FLIP 84 - 73 L | 2016 | 1950 | 392 |
| ILL 5745 | FLIP 84 - 75 L | 2116 | 2227 | 642 |
| ILL 5746 | FLIP 84 - 76 L | 2183 | 1633 | 482 |
| ILL 5747 | FLIP 84 - 77 L | 1925 | 1888 | 650 |
| ILL 5748 | FLIP 84 - 78 L | 2266 | 1655 | 437 |
| ILL 5750 | FLIP 84 - 80 L | 2187 | 1255 | 712 |
| ILL 5722 | FLIP 84 - 82 L | 2158 | 1527 | 550 |
| ILL 5753 | FLIP 84 - 83 L | 2166 | 1588 | 632 |
| ILL 5769 | FLIP 84 - 99 L | 2200 | 2238 | 475 |
| ILL 5770 | FLIP 84 - 100 L | 2300 | 1905 | 407 |
| ILL 5772 | FLIP 84 - 102 L | 2266 | 2122 | 482 |
| Local Oueslatia | | 2325 | 2044 | 417 |
| Local Oueslatia | | 2341 | 2350 | 437 |
| Local Oueslatia | | 1983 | M | 587 |
| SE ± | | 197.3 | 478.7 | 122.5 |
| CV % | | 9.0 | 36.5 | 23.9 |

Tableau 10 L : Essai de rendement de lentille - petit calibre (LIYT-S)

Table 10 L : Seed yield of lines in the IYT - S at three locations

| Lignée/Line | Selection | Rendement/Yield | | |
|---|---|---|---|---|
| | | B | OM | K |
| ILL 975 | - | 1794 | 1746 | 519 |
| ILL 1868 | - | 1531 | 1706 | 419 |
| ILL 1939 | - | 2575 | 2246 | 487 |
| ILL 2194 | - | 2200 | 1759 | 537 |
| ILL 4401 | Local small | 1394 | 1250 | 456 |
| ILL 5562 | 76 TA 66005 | 2313 | 1803 | 641 |
| ILL 5584 | 78 S 26004 | 2316 | 2003 | 537 |
| ILL 5676 | FLIP 84 - 3 L | 1663 | 1325 | 487 |
| ILL 5677 | FLIP 84 - 4 L | 1375 | 1209 | 381 |
| ILL 5684 | FLIP 84 - 11 L | 1856 | 1512 | 500 |
| ILL 5687 | FLIP 84 - 14 L | 1563 | 1378 | 445 |
| ILL 5690 | FLIP 84 - 17 L | 1519 | 1556 | 406 |
| ILL 5698 | FLIP 84 - 26 L | 2050 | 1759 | 575 |
| ILL 5699 | FLIP 84 - 27 L | 2413 | 2065 | 569 |
| ILL 5700 | FLIP 84 - 29 L | 2400 | 1628 | 487 |
| ILL 5715 | FLIP 84 - 44 L | 2366 | 2062 | 483 |
| ILL 5720 | FLIP 84 - 49 L | 2200 | 1700 | 469 |
| ILL 5728 | FLIP 84 - 58 L | 1794 | 2268 | 433 |
| ILL 5729 | FLIP 84 - 59 L | 2469 | 2125 | 562 |
| ILL 5730 | FLIP 84 - 60 L | 2038 | 2028 | 500 |
| ILL 5731 | FLIP 84 - 61 L | 1863 | 1243 | 544 |
| ILL 5732 | FLIP 84 - 62 L | 2191 | 1831 | 458 |
| ILL 5737 | FLIP 84 - 67 L | 1769 | 1140 | 315 |
| Local Oueslatia | | 2369 | 1834 | 400 |
| Local Oueslatia | | 2481 | 2553 | 537 |
| Local Oueslatia | | 2106 | 1815 | 400 |
| SE ± | | 288.4 | 361.2 | 107.5 |
| CV % | | 14.2 | 20.8 | 22.2 |

Tableau 11 L : Essai de rendement de population F3 de lentille

Table 11 L : Seed yield of F3 population in the IF3 T at two locations

| Populations | Rendement/Yield | |
|---|---|---|
| | B | K |
| X 84 S 6 | 1750 | 362 |
| X 84 S 9 | 1062 | 275 |
| X 84 S 33 | 1925 | 387 |
| X 84 S 40 | 1363 | 425 |
| X 84 S 44 | 1512 | 375 |
| X 84 S 45 | 1462 | 262 |
| X 84 S 46 | 1862 | 262 |
| X 84 S 47 | 2075 | 537 |
| X 84 S 48 | 1512 | 462 |
| X 84 S 76 | 1525 | 425 |
| X 84 S 88 | 1662 | 400 |
| X 84 S 90 | 1900 | 550 |
| X 84 S 101 | 1562 | 527 |
| X 84 S 126 | 1725 | 350 |
| X 84 S 165 | 1162 | 437 |
| X 84 S 178 | 1500 | 500 |
| X 84 S 182 | 1150 | 650 |
| X 84 S 232 | 787 | 412 |
| X 84 S 260 | 1062 | 475 |
| X 84 S 324 | 1050 | 300 |
| X 84 S 327 | 737 | 300 |
| X 84 S 352 | 1712 | 450 |
| Syrian local | 1812 | 325 |
| Local Oueslatia | 1587 | 550 |
| Local Oueslatia | 2050 | 500 |
| Local Oueslatia | 1925 | 437 |
| SE ± | 273.0 | 140.0 |
| CV % | 18.0 | 33.0 |

Tableau 12 L : Pépinière de sélection de lentille à petit calibre (LISN-S)

Table 12 L : Seed yield of lines in the LISN-S at four locations

| Lignée/Line | Selection | Rendement/Yield | | | |
|---|---|---|---|---|---|
| | | B | OM | K | M |
| ILL 241 | | 1250 | 1700 | 500 | 1750 |
| ILL 5479 | Trebisovska | 850 | 550 | 150 | 1350 |
| ILL 5480 | Lenka | 1200 | 1300 | 250 | 1000 |
| ILL 5714 | FLIP 84 - 43L | 1550 | 2300 | 750 | 3450 |
| ILL 5717 | FLIP 84 - 46L | 1250 | 1500 | 650 | 950 |
| ILL 5725 | FLIP 84 - 55L | 1900 | 300 | 600 | 1350 |
| ILL 5758 | FLIP 84 - 88L | 1850 | 1600 | 550 | 2600 |
| ILL 5775 | FLIP 84 - 105L | 1900 | 1450 | 650 | 950 |
| ILL 5827 | FLIP 84 - 158L | 2300 | 2000 | 500 | 850 |
| ILL 5828 | FLIP 84 - 159L | 1000 | 1700 | 600 | 2575 |
| ILL 5829 | FLIP 84 - 160L | 850 | 2300 | 400 | 1300 |
| ILL 5830 | FLIP 84 - 161L | 950 | 1950 | 450 | 1950 |
| ILL 5832 | FLIP 84 - 163L | 1800 | 2200 | 650 | 1600 |
| ILL 5833 | FLIP 84 - 164L | 1550 | 2300 | 550 | 3150 |
| ILL 5834 | FLIP 84 - 165L | 1800 | 1700 | 400 | 650 |
| ILL 5835 | FLIP 84 - 166L | 1400 | 1700 | 650 | 1800 |
| ILL 5836 | FLIP 84 - 167L | 2150 | 2100 | 500 | 2200 |
| ILL 5837 | FLIP 84 - 168L | 1050 | 2050 | 800 | 1300 |
| ILL 5838 | FLIP 84 - 169L | 600 | 1400 | 450 | 1600 |
| ILL 5847 | FLIP 84 - 9L | 250 | 1000 | 500 | 1000 |
| ILL 5849 | FLIP 84 - 11L | 260 | 1850 | 500 | 1550 |
| ILL 5850 | FLIP 84 - 12L | 1200 | 1200 | 600 | 2000 |
| ILL 5851 | FLIP 84 - 13L | 750 | 1650 | M | 1200 |
| ILL 5852 | FLIP 84 - 14L | 400 | 1350 | 250 | 500 |
| ILL 5853 | FLIP 84 - 15L | 1250 | 1650 | 500 | 650 |
| ILL 5854 | FLIP 84 - 16L | 1350 | 2700 | 450 | 1600 |
| ILL 5855 | FLIP 84 - 17L | 2700 | 1750 | 700 | 1425 |
| ILL 5856 | FLIP 84 - 18L | 750 | 1300 | 400 | 1650 |
| ILL 5857 | FLIP 84 - 19L | 1150 | 1550 | 400 | 1150 |
| ILL 5858 | FLIP 84 - 20L | 2050 | 1400 | M | 1550 |
| ILL 5859 | FLIP 84 - 21L | 1500 | 1350 | 300 | 1675 |
| ILL 5860 | FLIP 84 - 22L | 900 | 2300 | 400 | 2550 |
| ILL 5861 | FLIP 85 - 23L | M | 1100 | 500 | 1000 |
| ILL 5862 | FLIP 85 - 24L | 2400 | 1850 | 550 | 1250 |
| ILL 5863 | FLIP 85 - 25L | 900 | 1950 | 650 | 900 |
| ILL 5864 | FLIP 85 - 26L | 900 | 1050 | 550 | 1325 |
| ILL 5865 | FLIP 85 - 27L | 2000 | 2300 | 700 | 1500 |
| ILL 5866 | FLIP 85 - 28L | 1600 | 1500 | 750 | 2000 |
| ILL 5867 | FLIP 85 - 29L | 1400 | 1800 | 450 | 1100 |
| ILL 5869 | FLIP 85 - 31L | 1450 | 1700 | M | 1650 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ILL 5870 | FLIP 85 - | 32L | 650 | 1500 | 350 | 1250 |
| ILL 5871 | FLIP 85 - | 33L | 1450 | 1750 | 500 | 2800 |
| ILL 6012 | FLIP 86 - | 26L | 1300 | 1900 | 450 | 1150 |
| ILL 6014 | FLIP 86 - | 28L | 2200 | 1550 | 400 | 1925 |
| ILL 6015 | FLIP 86 - | 29L | 2950 | 2350 | 800 | 2750 |
| ILL 6017 | FLIP 86 - | 31L | 1150 | 2550 | 600 | 1250 |
| ILL 6018 | FLIP 86 - | 32L | 1100 | 2400 | 550 | 2750 |
| ILL 6029 | FLIP 86 - | 43L | 1150 | 1700 | 500 | 1000 |
| ILL 6030 | FLIP 86 - | 44L | 1300 | 1450 | 400 | 800 |
| ILL 6031 | FLIP 86 - | 45L | 1450 | 600 | 650 | 650 |
| ILL 6047 | FLIP 86 - | 61L | 1850 | 1700 | 850 | 1050 |
| ILL 6048 | FLIP 86 - | 62L | 1800 | 1400 | 450 | 1850 |
| ILL 6049 | FLIP 86 - | 63L | 350 | 1650 | 650 | 1750 |
| ILL 6050 | FLIP 86 - | 64L | 500 | 1700 | 650 | 1250 |
| ILL 6051 | FLIP 86 - | 65L | 750 | 1850 | 350 | 2050 |
| Check genotypes | | | | | | |
| ILL 4401 | | | 250 | 1750 | 450 | 1250 |
| ILL 4401 | | | 750 | 1900 | 750 | 1300 |
| ILL 4401 | | | 1650 | 1500 | 550 | 1450 |
| ILL 4401 | | | 800 | 1700 | 400 | 1700 |
| ILL 4401 | | | 1700 | 350 | 650 | 2100 |
| ILL 5588 | 78 S | 26013 | 1700 | 2450 | 350 | 2700 |
| ILL 5588 | 78 S | 26013 | 1550 | 2550 | 750 | 1550 |
| ILL 5588 | 78 S | 26013 | 2500 | 2300 | 550 | 2700 |
| ILL 5588 | 78 S | 26013 | 2550 | 1700 | 450 | 2750 |
| ILL 5588 | 78 S | 26013 | 1600 | 1650 | 450 | 1600 |
| Local Oueslatia | | | 1000 | 2600 | 350 | 1050 |
| Local Oueslatia | | | 2050 | 1800 | 700 | 2100 |
| Local Oueslatia | | | 2500 | 2400 | 600 | 3000 |
| Local Oueslatia | | | 2400 | 2150 | 400 | 2750 |
| Local Oueslatia | | | 1650 | 2250 | 600 | 1075 |

Tableau 13 L : Pépinière de selection de lentille à gros calibre (LISN-L)

Table 13 L : Seed yield of lines in the LISN-L at three locations

| Lignée/Line | Selection | Rendement/Yield | | |
|---|---|---|---|---|
| | | B | OM | K |
| ILL 5426 | UJL 176 | 800 | 2400 | 600 |
| ILL 5481 | OKUL 1 | 750 | 650 | M |
| ILL 5593 | 78 S 26024 | 800 | 2300 | 600 |
| ILL 5571 | 81 S 38326 | 1600 | 2450 | 500 |
| ILL 5722 | FLIP 84 - 51L | 1300 | 2600 | 550 |
| ILL 5741 | FLIP 84 - 71L | 1150 | 2700 | 500 |
| ILL 5744 | FLIP 84 - 74L | 1800 | 2300 | 600 |
| ILL 5751 | FLIP 84 - 81L | 2350 | 2350 | 450 |
| ILL 5754 | FLIP 84 - 84L | 1600 | 1950 | 800 |
| ILL 5761 | FLIP 84 - 91L | 1150 | 2000 | 700 |
| ILL 5762 | FLIP 84 - 92L | 1300 | 1700 | 450 |
| ILL 5814 | FLIP 84 - 144L | 2100 | 2450 | 350 |
| ILL 5815 | FLIP 84 - 145L | 1250 | 2250 | 500 |
| ILL 5816 | FLIP 84 - 147L | 1050 | 1800 | 750 |
| ILL 5817 | FLIP 84 - 148L | 1250 | 2050 | M |
| ILL 5818 | FLIP 84 - 149L | 1350 | 2150 | 650 |
| ILL 5821 | FLIP 84 - 152L | 2000 | 2400 | 550 |
| ILL 5824 | FLIP 84 - 155L | 1100 | 2100 | 650 |
| ILL 5825 | FLIP 84 - 156L | 1550 | 2250 | 550 |
| ILL 5839 | FLIP 85 - 1L | 2300 | 1650 | 650 |
| ILL 5840 | FLIP 85 - 2L | 1550 | 1650 | 650 |
| ILL 5841 | FLIP 85 - 3L | 1200 | 2500 | 650 |
| ILL 5842 | FLIP 85 - 4L | 1450 | 2050 | 550 |
| ILL 5987 | FLIP 86 - 1L | 1800 | 1900 | 750 |
| ILL 5988 | FLIP 86 - 2L | 2050 | 2100 | 400 |
| ILL 5989 | FLIP 86 - 3L | 2200 | 2050 | 950 |
| ILL 5990 | FLIP 86 - 4L | 1700 | 2000 | 750 |
| ILL 5991 | FLIP 86 - 5L | 1400 | 1850 | 800 |
| ILL 5992 | FLIP 86 - 6L | 2000 | 2350 | 600 |
| ILL 5993 | FLIP 86 - 7L | 2700 | 2000 | 550 |
| ILL 5994 | FLIP 86 - 8L | 2050 | 2300 | 750 |
| ILL 5995 | FLIP 86 - 9L | 1700 | 2000 | 950 |
| ILL 5996 | FLIP 86 - 10L | 1550 | 1500 | 850 |
| ILL 5997 | FLIP 86 - 11L | 2100 | 2200 | 750 |
| ILL 5998 | FLIP 86 - 12L | 1300 | 1500 | 700 |
| ILL 5999 | FLIP 86 - 13L | 2800 | 2000 | 450 |
| ILL 6000 | FLIP 86 - 14L | 1400 | 1600 | 500 |
| ILL 6001 | FLIP 86 - 15L | 950 | 140 | 450 |
| ILL 6002 | FLIP 86 - 16L | 1850 | 2200 | 500 |
| ILL 6003 | FLIP 86 - 17L | 1850 | 1250 | 500 |

| | | | | |
|---|---|---|---|---|
| ILL 6004 | FLIP 86 - 18L | 750 | 1250 | 500 |
| ILL 6005 | FLIP 86 - 10L | 700 | 1600 | 500 |
| ILL 6006 | FLIP 86 - 20L | 1750 | 2150 | 450 |
| ILL 6007 | FLIP 86 - 21L | 1500 | 1450 | 500 |
| ILL 6008 | FLIP 86 - 22L | 1200 | 2550 | 500 |
| Check genotypes | | | | |
| ILL 4400 | | 1800 | 2600 | 650 |
| ILL 4400 | | 1900 | 2200 | 500 |
| ILL 4400 | | 1800 | 2100 | M |
| ILL 4605 | Precoz | 1950 | 1400 | 400 |
| ILL 4605 | Precoz | 1300 | 1000 | 350 |
| ILL 4605 | Precoz | 700 | 1050 | 600 |
| Local Oueslatia | | 2050 | 2750 | 600 |
| Local Oueslatia | | 1800 | 2750 | 700 |
| Local Oueslatia | | 2400 | 2300 | 650 |

Tableau 14 L : Pépinière d'observation de lentille (LISN-E)

Table 14 L : Seed yield of lines in the LISN-E at three locations

| Lignée/Line | Selection | Rendement/Yield | | |
|---|---|---|---|---|
| | | B | OM | K |
| ILL 241 | - | 2300 | 2400 | 500 |
| ILL 358 | - | 1550 | 1250 | 400 |
| ILL 784 | - | 1550 | 950 | 300 |
| ILL 1712 | EL 42 | 200 | 600 | 300 |
| ILL 1983 | L 528 (75) | 150 | 1250 | 300 |
| ILL 2022 | L 1057 | 350 | 50 | M |
| ILL 2069 | L 1327 | 600 | 2350 | 950 |
| ILL 2149 | - | 2550 | 1000 | 250 |
| ILL 2500 | Pant L 538 | 150 | 750 | 250 |
| ILL 2501 | Pant L 408 | 650 | 1050 | 850 |
| ILL 2575 | Pant L 639 | 300 | 700 | 300 |
| ILL 2580 | L 1278 | 100 | 1150 | 250 |
| ILL 2581 | L 1282 | 200 | 1100 | 350 |
| ILL 2582 | L L 1 | 400 | 275 | M |
| ILL 3493 | 877 | 750 | 1150 | 200 |
| ILL 3516 | L G 41 | 1800 | 2250 | 550 |
| ILL 3517 | L G 46 | 400 | 1400 | 300 |
| ILL 3601 | - | 450 | 950 | 300 |
| ILL 3614 | L L 57 | 3350 | 1250 | M |
| ILL 4377 | - | 500 | 2000 | M |
| ILL 4403 | 162 | 200 | 800 | 250 |
| ILL 5248 | UJL 81 - 173 | 2800 | 1800 | 750 |
| ILL 5255 | UJL 81 - 36 | 2000 | 2800 | 750 |
| ILL 5486 | Fam 370 | 800 | 1200 | 450 |
| ILL 5673 | 81538084 | 1100 | 300 | 500 |
| ILL 5699 | FLIP 84 - 27L | 1600 | 1650 | 600 |
| ILL 5709 | FLIP 84 - 38L | 1300 | 2100 | 500 |
| ILL 5748 | FLIP 84 - 78L | 2100 | 1900 | 500 |
| ILL 5782 | FLIP 84 - 112L | 2550 | 2200 | 400 |
| ILL 5803 | FLIP 85 - 133L | 1800 | 1400 | 650 |
| ILL 5844 | FLIP 85 - 6L | 1800 | 2800 | 650 |
| ILL 5991 | FLIP 86 - 5L | 1900 | 2700 | 900 |
| ILL 6000 | FLIP 86 - 14L | 200 | 1500 | 650 |
| ILL 6003 | FLIP 86 - 17L | 900 | 600 | 200 |
| ILL 6007 | FLIP 86 - 21L | 1250 | 1500 | M |
| ILL 6022 | FLIP 86 - 36L | 2250 | 2000 | 500 |
| ILL 6023 | FLIP 86 - 37L | 1700 | 600 | 200 |
| ILL 6024 | FLIP 86 - 38L | 1950 | 50 | 250 |
| ILL 6025 | FLIP 86 - 39L | 1800 | 1250 | 300 |

| | | | | |
|---|---|---|---|---|
| ILL 6026 | FLIP 86 - 40L | 1050 | 2000 | 250 |
| ILL 6027 | FLIP 86 - 41L | M | 1000 | 600 |
| ILL 6028 | FLIP 86 - 42L | 2100 | 1850 | M |
| ILL 6029 | FLIP 86 - 43L | 1500 | 1800 | M |
| ILL 6030 | FLIP 86 - 44L | 1250 | 1700 | 1050 |
| ILL 6031 | FLIP 86 - 45L | 1500 | 1000 | 450 |
| ILL 6032 | FLIP 86 - 46L | 650 | 800 | 600 |
| ILL 6039 | FLIP 86 - 47L | 1900 | 2100 | 550 |
| ILL 6034 | FLIP 86 - 48L | 1150 | 1400 | 650 |
| ILL 6035 | FLIP 86 - 49L | 1250 | 1300 | 550 |
| ILL 6036 | FLIP 86 - 50L | 1550 | 1500 | 550 |
| ILL 6037 | FLIP 86 - 51L | 1050 | 1300 | 800 |
| ILL 6038 | FLIP 86 - 52L | 1800 | 650 | 150 |
| ILL 6039 | FLIP 86 - 53L | 1400 | 2100 | 600 |
| ILL 6040 | FLIP 86 - 54L | 750 | 2650 | 900 |
| ILL 6041 | FLIP 86 - 55L | 1600 | 1750 | 650 |
| ILL 6042 | FLIP 86 - 56L | 2400 | 2850 | 500 |
| ILL 6043 | FLIP 86 - 57L | 1050 | 2250 | 550 |
| ILL 6044 | FLIP 86 - 58L | 3050 | 2450 | 700 |
| ILL 6045 | FLIP 86 - 59L | 300 | 1050 | M |
| ILL 6046 | FLIP 86 - 60L | 2650 | 1850 | 700 |
| Check genotypes | | | | |
| ILL 4354 | | 2100 | 2350 | 200 |
| ILL 4354 | | 2350 | 3050 | 450 |
| ILL 4354 | | 2400 | 3150 | 450 |
| ILL 4354 | | 2350 | 2450 | 700 |
| ILL 4354 | | 2250 | 1550 | 300 |
| ILL 4354 | | 2900 | 400 | M |
| ILL 4605 | Precoz | 1600 | 2050 | 650 |
| ILL 4605 | Precoz | 1100 | 1050 | 550 |
| ILL 4605 | Precoz | 650 | 1350 | 500 |
| ILL 4605 | Precoz | 1150 | 1400 | 450 |
| ILL 4605 | Precoz | 1100 | 1500 | 500 |
| ILL 4605 | Precoz | 300 | 550 | 250 |
| Local Oueslatia | | 2450 | 2700 | 650 |
| Local Oueslatia | | M | M | 550 |
| Local Oueslatia | | 2350 | 2400 | 650 |
| Local Oueslatia | | 2300 | 3000 | 550 |
| Local Oueslatia | | 2250 | M | 450 |
| Local Oueslatia | | M | 1600 | 500 |

Tableau 15 L : Pépinière de sélection de lentille à port érigé (LISN-T-E)

Table 15 L : Seed yield of lines in the LISN-T-E at four locations

| Lignée/Line | | Selection | Rendement/Yield | | | |
|---|---|---|---|---|---|---|
| | | | B | OM | K | M |
| ILL | 20 | - | 2200 | 2350 | 600 | 2400 |
| ILL | 465 | - | 1200 | 1800 | 300 | 1575 |
| ILL | 468 | - | 1250 | 2200 | 200 | 1000 |
| ILL | 813 | - | 150 | 1800 | 200 | 1000 |
| ILL | 1939 | - | 1250 | 2250 | 700 | 1750 |
| ILL | 4349 | LAIRD | 1150 | 1150 | 400 | 400 |
| ILL | 4354 | | 2650 | 1660 | 200 | 1750 |
| ILL | 4605 | PRECOZ | 1050 | 750 | 350 | 1550 |
| ILL | 4711 | CHILEAN-78 | 1300 | 1100 | 450 | 550 |
| ILL | 5486 | FAM 370 | 100 | 900 | 700 | 2250 |
| ILL | 5544 | 74 TA 550 | 100 | 1800 | 650 | 1450 |
| ILL | 5582 | 78 S 26002 | 2500 | 1850 | 450 | 1600 |
| ILL | 5604 | 78 S 26052 | 1350 | 2700 | 550 | 1350 |
| ILL | 5698 | FLIP 84 26L | 2500 | 1350 | M | 2100 |
| ILL | 5699 | FLIP 84 27L | 900 | 240 | 500 | 2300 |
| ILL | 5713 | FLIP 84 42L | 2500 | 1800 | 450 | 1500 |
| ILL | 5714 | FLIP 84 43L | 1850 | 1700 | 500 | 2150 |
| ILL | 5715 | FLIP 84 44L | 1100 | 1950 | M | 1700 |
| ILL | 5719 | FLIP 84 48L | 700 | 1000 | 650 | 2800 |
| ILL | 5722 | FLIP 84 51L | 1650 | 1850 | 750 | 1175 |
| ILL | 5728 | FLIP 84 58L | 500 | 2600 | 300 | 1050 |
| ILL | 5729 | FLIP 84 59L | 2900 | 2500 | 450 | 1200 |
| ILL | 5745 | FLIP 84 75L | 1550 | 2200 | 650 | 1250 |
| ILL | 5748 | FLIP 84 78L | 1050 | 2500 | 750 | 1200 |
| ILL | 5753 | FLIP 84 83L | 950 | 1925 | 750 | 1200 |
| ILL | 5799 | FLIP 84 129L | 2000 | 1850 | 150 | 1000 |
| ILL | 5803 | FLIP 84 133L | 2300 | 1650 | 750 | 600 |
| ILL | 5804 | FLIP 84 134L | 1900 | 1300 | 500 | 650 |
| ILL | 5806 | FLIP 84 135L | 2200 | 2150 | M | 2050 |
| ILL | 5811 | FLIP 84 141L | 400 | 2050 | 400 | 325 |
| ILL | 5823 | FLIP 84 154 | 1350 | 1600 | 300 | 750 |
| ILL | 5873 | FLIP 85 35L | 450 | 2400 | 650 | 1250 |
| ILL | 5876 | FLIP 85 38L | 2300 | 2100 | 350 | 2100 |
| ILL | 5877 | FLIP 85 39L | 1850 | 1500 | 200 | 800 |
| ILL | 5878 | FLIP 85 40L | 1900 | 1650 | 350 | 1500 |
| ILL | 5879 | FLIP 86 41L | 1800 | 1850 | 500 | 1250 |
| ILL | 5988 | FLIP 86 2L | 1650 | 2550 | M | 300 |
| ILL | 5989 | FLIP 86 3L | 1850 | 2150 | 500 | 400 |
| ILL | 5990 | FLIP 86 4L | 1550 | 1300 | 500 | 1300 |
| ILL | 5998 | FLIP 86 12L | 950 | 1500 | 450 | 700 |
| ILL | 6002 | FLIP 86 16L | 1050 | 2250 | 450 | 450 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ILL 6004 | FLIP 86 | 18L | 400 | 1160 | 400 | 200 |
| ILL 6005 | FLIP 86 | 19L | 1200 | 1800 | 200 | 425 |
| ILL 6009 | FLIP 86 | 29L | 1050 | 1700 | 650 | 2100 |
| ILL 6010 | FLIP 86 | 24L | 1600 | 1700 | 650 | 1400 |
| ILL 6011 | FLIP 86 | 25L | 1950 | 1650 | 450 | 2050 |
| ILL 6012 | FLIP 86 | 26L | 200 | 1950 | 350 | 1900 |
| ILL 6013 | FLIP 86 | 27L | 700 | 2400 | M | 1500 |
| ILL 6014 | FLIP 86 | 28L | 600 | 1350 | 150 | 2350 |
| ILL 6015 | FLIP 86 | 29L | 1850 | 2200 | 650 | 1750 |
| ILL 6016 | FLIP 86 | 30L | 950 | 1900 | 400 | 1000 |
| ILL 6017 | FLIP 86 | 31L | 2050 | 1700 | 650 | 1750 |
| ILL 6018 | FLIP 86 | 32L | 1350 | 2000 | 450 | 2460 |
| ILL 6019 | FLIP 86 | 33L | 1450 | 1400 | 350 | 1800 |
| ILL 6020 | FLIP 86 | 34L | 600 | 1000 | 500 | M |
| ILL 6021 | FLIP 86 | 35L | 800 | 3300 | 600 | 1250 |
| Check genotypes | | | | | | |
| ILL 4401 | | | 800 | 1800 | 300 | 1250 |
| ILL 4401 | | | 400 | 1750 | 400 | 900 |
| ILL 4401 | | | 1400 | 1700 | 250 | 500 |
| ILL 4401 | | | 1900 | 1600 | 600 | 1950 |
| ILL 2130 | Hurani 1 | | 100 | 2650 | 600 | 1000 |
| ILL 2130 | Hurani 1 | | 125 | 1600 | 450 | 425 |
| ILL 2130 | Hurani 1 | | 1300 | 1750 | 350 | 1750 |
| ILL 2130 | Hurani 1 | | 1300 | 1500 | 400 | 550 |
| Local Oueslatia | | | 650 | 2500 | 480 | 1150 |
| Local Oueslatia | | | 2700 | 2350 | 600 | 2250 |
| Local Oueslatia | | | 2650 | 2300 | 350 | 870 |
| Local Oueslatia | | | 3600 | 2300 | 400 | 2700 |

## 6. AGRONOMIC STUDIES (H. Halila and Ben Salah for F.B)

### 6.1. Introduction

Agronomic studies were conducted for the fifth year at various locations on all the three food legumes covering the aspects of date of sowing and plant population, chemical weed control and crop/weed competition. Multi-location evaluation of winter vs. spring sowing of chickpea was also undertaken. Many stations were added this year with the collaboration of the Agromony Laboratory of INRAT and the Office des Cereales and data from these additional stations will be presented in their respective progress reports.

### 6.2. Date of Sowing and Plant Population Studies

Effect of five sowing dates at 15 days interval, starting from 16 October 1985 for faba beans and lentils, at Kef station and starting from 17 October 1985 for faba beans and lentils, and 3 March 1986 for spring chickpea at Beja station, was studied in combination with four levels of plant population (Table 15). Local cultivars (Beja and Kef local faba beans and Oueslatia lentil and Amdoun chickpea) were used for these studies. The results of these trials are presented in tables 1A and 2A. As mentioned earlier, this year's climatic conditions have largely conditionned the results in general. Due to a

Tableau 15 : Niveau de peuplement utilises et dates de semis utilisees dans les essais de dates et densites de semis

Table 15 : Details of the treatments of plant population levels (plant/m²) and dates of planting used in the DPPT at Beja and El Kef in 1985/86.

| Population levels/Peuplements | Plants/m² | | | |
|---|---|---|---|---|
| | F.B.Large Feves | F.B.Small Feveroles | Lentil Lentille | Chickpea Pois chiche |
| P1 | 12.5 | 50.00 | 115.00 | 31.20 |
| P2 | 8.30 | 25.00 | 82.50 | 20.80 |
| P3 | 6.20 | 16.60 | 54.90 | 15.60 |
| P4 | 5.00 | 12.50 | 41.20 | 12.50 |

Béjā

| | F.B., Lentils/Fèves et Lentilles | Spring Chickpeas/ Pois chiche-printemps |
|---|---|---|
| D1 | 16/10/1985 | 3/3/1986 |
| D2 | 2/11/1985 | 18/3/1986 |
| D3 | 18/11/1985 | 2/4/1986 |
| D4 | 2/12/1985 | 21/4/1986 |
| D5 | 20/12/1985 | 5/5/1986 |

Kef

| | F.B.small and large, lentil/Fèves, Féveroles et Lentille |
|---|---|
| D1 | 16/10/1985 |
| D2 | 1/11/1985 |
| D3 | 15/11/1985 |
| D4 | 1/12/1985 |
| D5 | 17/12/1985 |

dry autumn at both stations the effect of the early dates of sowing was not as pronouced as in the previous year except for the spring chickpea.

The relative effect of dates of sowing on all the crops is shown in table 16. Reduction was highest in faba bean large and in spring planted chickpea (c.v. Amdoun) at Beja when sowing was delayed till December and April respectively.

Conspicuous increase in yield was observed when the plant population was increased from lowest levels to the highest level. The population levels that proved optimum were 50, 12, 115 and 31 plants/m² for faba bean (small), faba bean (large), lentil and spring sown chickpeas, respectively.

## 6.3. Weed Control Studies

Yield losses due to weeds were very high again this year (Table 17). Hand weeding twice (at 45 days and 90 days after sowing) reduced the weed damage. The detailed effects are shown for faba bean, lentil and chickpeas in tables 3A to 6A. Data from the Chemical Weed Control Trials on these crops indicated that none of the herbicides tested proved very effective. Averaged over Beja and Kef locations.

Tableau 16 : Pertes de rendements occasionnées par les semis tardifs et augmentation du rendement dûe à l'utilisation des niveaux de peuplement élevés.

Table 16 : Percentage reduction due to delay in sowing and percentage increase due to increased plant populations in the yield of faba bean, lentil and chickpea at Beja and Kef during 1985/86.

| | Lentils/ Lentilles | | Faba bean small/Féveroles | | Faba bean large/Fêves | | Chickpea Spring/Pois chiche | |
|---|---|---|---|---|---|---|---|---|
| | BEJA | KEF | BEJA | KEF | BEJA | KEF | BEJA | KEF (1) |
| Date of planting / Date de semis | | | | | | | | |
| D1 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | - |
| D2 | 105 | 84 | 89 | 88 | 97 | 83 | 89 | - |
| D3 | 111 | 100 | 97 | 87 | 91 | 105 | 27 | - |
| D4 | 92 | 85 | 95 | 108 | 87 | 87 | 24 | - |
| D5 | 74 | 79 | 98 | 95 | 50 | 87 | 02 | - |
| Populations/ Peuplement | | | | | | | | |
| P1 | 120 | 150 | 174 | 339 | 164 | 193 | 136 | - |
| P2 | 90 | 121 | 115 | 173 | 129 | 139 | 131 | - |
| P3 | 100 | 106 | 106 | 133 | 105 | 123 | 111 | - |
| P4 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | - |

(1) Not harvested/non récolté

Table 17 : Percentage yield loss due to weeds, as average of Beja and Kef stations in small seeded faba beans, chickpeas and lentils during 1985/86

| Treatment | Faba bean | Chickpea | Lentil |
|---|---|---|---|
| Weed free | 0 | 0 | 0 |
| Weedy | 8.5 | 88 | 89 |
| Hand weeding, 2 times | 39 (2) | 10 | 24 (1) |

(1) Beja only
(2) Kef only

Igran (@ 3.5 kg a.i./ha) plus Kerb (@ 1.0 kg a.i./ha) as a pre-emergence application proved the most effective herbicide treatment for faba bean and chickpea while for lentil it was Maloran (@ 2.5 kg a.i./ha) plus Kerb (@ 0.5 kg a.i./ha). There is still a need for evaluating new herbicides at different rates and in different combinations for developing a satisfactory control schedule.

The crop weed competition studies at Kef (Table 7 A) and Beja (Table 8 A) showed that this year weeds did not pose any serious competition for the first eight weeks, but subsequent 10 to 12 weeks were very critical and any measure of control to ensure effective suppression of weeds in this period should result in increased yield. This also emphasizes the importance of late weeds in affecting the yield of food legumes at these locations.

In the orobanche chemical control trial, the best results were obtained with three applications of glyphosate at 0.08 kg a.i./ha starting at the beginning of flowering and twice at 15 days interval (Table 9A). For the date of sowing there is no big difference among the dates due to the lack of rain during the beginning of the growing season.

## 6.4. Comparison of Spring vs. Winter Sowing of Some Chickpea Genotypes

Four chickpea genotypes, ILC 482, ILC 3279, FLIP-81-56W and local (Amdoun) were evaluated for their performance when planted in winter (1st Dec. 1985), early spring (1st Feb. 1986) and late spring (1st Apr. 1986) at four different sites (Beja, Krib, O. Meliz and Menzel Temime)

Performance of all the genotypes at each location was affected by the date of sowing as shown in tables 10A and 11A. Average over all locations, the seed yield by winter sowing increased by a margin of 259% and by early spring sowing by a margin of 135% over late spring sowing (Tables 10A, 11A). The results of the previous seasons highlight the potential importance of winter sowing in areas where the rainfall is insufficient for growing a spring sown crop of chickpeas.

Tableau 1 A : Rendements moyens (kg/ha) pour les dates de semis

Table 1 A : Mean yield (kg/ha) of different food legumes as affected by dates of sowing in the DPPT at Beja and Kef in 1985/86.

| Date(2) | F.B.Large/ Fêves | | F.B.Small Féveroles | | Lentils/ Lentilles | | Chickpea/ Pois chiche | |
|---|---|---|---|---|---|---|---|---|
| | B | K | B | K | B | K | B | K(1) |
| D1 | 3754 | 580 | 3534 | 962 | 1099 | 371 | 1376 | - |
| D2 | 3648 | 486 | 3175 | 854 | 1162 | 313 | 1237 | - |
| D3 | 3419 | 614 | 3447 | 839 | 1225 | 373 | 371 | - |
| D4 | 3270 | 510 | 3383 | 1041 | 1014 | 318 | 330 | - |
| D5 | 1902 | 507 | 3499 | 919 | 821 | 295 | 30 | - |

Tableau 2 A: Rendements moyens (kg/ha) des niveaux de peuplements.

Table 2 A: Mean yield (kg/ha) of different food legumes as affected by the PP levels in the DPPT at Beja and Kef in 1985/86.

| Peuple-ment(2) | F.B.Large/ Fêves | | F.B.Small/ Féveroles | | Lentils/ Lentilles | | Chickpea/ Pois chiche | |
|---|---|---|---|---|---|---|---|---|
| | B | K | B | K | B | K | B | K(1) |
| P1 | 4212 | 752 | 4788 | 1678 | 1248 | 420 | 771 | - |
| P2 | 3315 | 542 | 3174 | 856 | 934 | 338 | 740 | - |
| P3 | 2706 | 477 | 2924 | 662 | 1042 | 297 | 630 | - |
| P4 | 2506 | 387 | 2744 | 495 | 1033 | 279 | 564 | - |

(1) Not harvested/Non récolté

(2) Details in table 15 /Détails au tableau No 15

Tableau 3 A : Essai de désherbage chimique sur féveroles. Rendements en kg/ha.

Table 3 A : Weed control trial on faba bean small. Seed yield in kg/ha in 1985/86.

| Treatments/ Traitements | | Beja | | Kef | |
|---|---|---|---|---|---|
| | | Rendt/Yield | % T2 | Yield/Rendt | % T2 |
| Temoin/Weedy check | T1 | 13 | 27 | 0 | 0 |
| Propre/Weed Free | T2 | 50 | 100 | 613 | 100 |
| 2 binages/Hand Weedings | T3 | 70 | 140 | 379 | 61 |
| Igran (3,0kg) | T4 | 0 | 0 | 39 | 6 |
| Igran (3,5kg) | T5 | 13 | 27 | 73 | 11 |
| Igran (3,0kg) + Kerb (1kg) | T6 | 77 | 153 | 326 | 53 |
| Igran (3,5kg) + Kerb (1kg) | T7 | 60 | 120 | 366 | 59 |
| Maloran (2,0kg)+ Kerb (1kg) | T8 | 37 | 73 | 319 | 52 |
| Maloran (2,5kg)+ Kerb (1kg) | T9 | 60 | 120 | 313 | 51 |
| Maloran (2,0kg)+ Igran (3,0kg) + Kerb (1 kg) | T10 | 166 | 33 | 182 | 29 |
| CV % | | 150.9 | | 48.0 | |
| SE ± | | 82.5 | | 94.9 | |

Tableau 4 A : Essai de désherbage chimique sur lentille. Rendements en kg/ha.

Table 4 A : Weed control trial on lentil. Seed yield in kg/ha in 1985/86.

| Treatments/ Traitements | | Beja | | Kef | |
|---|---|---|---|---|---|
| | | Yield/Rendt | %T2 | Yield/Rendt | %T2 |
| Temoin/Weedy check | T1 | 259 | 22 | 0 | 0 |
| Propre/Weed free | T2 | 1199 | 100 | 359 | 100 |
| 2 binages/Hand Weedings | T3 | 909 | 76 | 33 | 9 |
| Tribunil (2,5kg)+ Kerb (1kg) | T4 | 308 | 26 | 39 | 10 |
| Tribunil (3kg) + Kerb (1kg) | T5 | 348 | 29 | 29 | 8 |
| Gesagard (2,0kg)+ Kerb (1kg) | T6 | 463 | 59 | 39 | 10 |
| Gesagard (2,0kg)+ Kerb (1kg) | T7 | 323 | 27 | 0 | 0 |
| Maloran (2,0kg) + Kerb (1kg) | T8 | 595 | 50 | 33 | 9 |
| Maloran (2,5kg) + Kerb (1kg) | T9 | 364 | 30 | 186 | 51 |
| Maloran (2,0kg) + Tribunil (2,5kg)+ Kerb (1kg) | T10 | 356 | 30 | 119 | 33 |
| CV % | | 51.9 | | 106.0 | |
| SE ± | | 266.7 | | 67.0 | |

Tableau 5 A : Essai de désherbage chimique sur pois chiche. Rendements en kg/ha.

Table 5 A : Weed control trial on chickpea. Seed yield in kg/ha in 1985/86.

| Treatments/ Traitements | | Beja | | Kef(1) | |
|---|---|---|---|---|---|
| | | Yield/Rendt | %T2 | Yield/Rendt | %T2 |
| Temoin/Weedy check | T1 | 196 | 12 | - | - |
| Propre/Weed free | T2 | 1586 | 100 | - | - |
| 2 binages/Hand Weedings | T3 | 1423 | 90 | - | - |
| Tribunil (3,0kg) + Kerb (1kg) | T4 | 163 | 10 | - | - |
| Tribunil (3,5kg) + Kerb (1kg) | T5 | 129 | 8 | - | - |
| Igran (3,5kg) + Kerb (1kg) | T6 | 269 | 17 | - | - |
| Igran (4,0kg) + Kerb (1kg) | T7 | 573 | 36 | - | - |
| Maloran (2,5kg) + Kerb (1kg) | T8 | 526 | 33 | - | - |
| Maloran (3,0kg) + Kerb (1kg) | T9 | 416 | 26 | - | - |
| Igran (3,5kg) + Maloran (3,0kg) + Tribunil (3kg) + Kerb (1kg) | T10 | 439 | 28 | - | - |
| CV % | | 47.5 | | - | |
| SE ± | | 271.9 | | - | |

(1) Not harvested/non récolté

Tableau 6 A : Essai de désherbage chimique sur petit pois. Rendements en kg/ha.

Table 6 A : Weed control trial on Peas. Seed yield in kg/ha in 1985/86.

| Treatments/ Traitements | | Beja | | Kef | |
|---|---|---|---|---|---|
| | | Yield/Rendt | %T2 | Yield/Rendt | %T2 |
| Temoin/Weedy check | T1 | 586 | 25 | 19 | 7 |
| propre/Weed free | T2 | 2339 | 100 | 266 | 100 |
| 2 binages/Hand Weedings | T3 | 1799 | 76 | 159 | 59 |
| Tribunil (2,5kg)+ Kerb (1kg) | T4 | 753 | 32 | 39 | 14 |
| Tribunil (3,0kg)+ Kerb (1kg) | T5 | 739 | 31 | 86 | 32 |
| Gesagard (2,0kg)+ Kerb (1kg) | T6 | 1373 | 58 | 49 | 18 |
| Maloran (2,5kg)+ Kerb (1kg) | T7 | 1253 | 53 | 86 | 32 |
| Maloran (2,0Kg)+ Kerb (1kg) | T8 | 939 | 40 | 142 | 53 |
| Bladex (1,5kg) + Kerb (1kg) | T9 | 699 | 29 | 115 | 43 |
| Tribunil (2,5kg)+ Bladex (1,5kg) + Kerb (1kg) | T10 | 799 | 34 | 46 | 17 |
| CV % | | 44.1 | | 76.5 | |
| SE ± | | 498.5 | | 58.9 | |

Tableau 7 A : Essai de désherbage manuel-station de Kef. Rendements en kg/ha.

Table 7 A : Crop/weed competition trial at Kef in 1985/86. Seed yield in kg/ha.

| Treatments/ Traitements | | F.B.Small Féveroles | Lentils Lentilles | Chickpea[1] Pois-chiche | Peas P.pois |
|---|---|---|---|---|---|
| Weedy for two weeks after emergence 2 semaines après levée puis propre | T1 | 879 | 279 | - | 359 |
| Weedy for 4 weeks after emergence 4 semaines après levée puis propre | T2 | 626 | 213 | - | 319 |
| Weedy for 6 weeks after emergence 6 semaines après levée puis propre | T3 | 666 | 179 | - | 359 |
| Weedy for 8 weeks after emergence 8 semaines après levée puis propre | T4 | 593 | 226 | - | 466 |
| Weedy for 10 weeks after emergence 10 semaines après levée puis propre | T5 | 386 | 53 | - | 106 |
| Weedy for 12 weeks after emergence 12 semaines après levée puis propre | T6 | 66 | 13 | - | 13 |
| Weed free for two weeks after emergence Propre 2 semaines après levée puis abandonnee | T7 | 0 | 0 | - | 13 |
| Weed free for 4 weeks after emergence Propre 4 semaines après levée puis abandonnee | T8 | 13 | 13 | - | 0 |
| Weed free for 6 weeks after emergence Propre 6 semaines après levée puis abandonnée | T9 | 266 | 66 | - | 26 |
| Weed free for 8 weeks after emergence Propre 8 semaines après levée puis abandonnée | T10 | 153 | 66 | - | 199 |
| Weed free for 10 weeks after emergence | T11 | 599 | 213 | - | 333 |

| | | | | | |
|---|---|---|---|---|---|
| Propre 10 semaines après levée puis abandonnee Weed free for 12 weeks after emergence | T12 | 766 | 233 | - | 319 |
| Propre 12 semaines après levée puis abandonnée Weedy check/Temoin | T13 | 26 | 0 | - | 0 |
| CV % | | 45.0 | 150.9 | | 37.6 |
| SE ± | | 131.1 | 135.8 | | 53.2 |

(1) Not harvested/Non récolté

Tableau 8 A : Essai de désherbage manuel-station de Beja. Rendements en kg/ha.

Table 8 A : Crop/weed competition trial at Beja station in 1985/86. Seed yield in kg/ha.

| Treatments/ Traitements | | F.B.Small Féveroles | Lentils Lentilles | Chickpeas Pois-chiche | Peas P.pois |
|---|---|---|---|---|---|
| Weedy for two weeks after emergence 2 semaines après levée puis propre | T1 | 3389 | 1766 | 2006 | 2179 |
| Weedy for 4 weeks after emergence 4 semaines après levée puis propre | T2 | 3286 | 1393 | 2256 | 2186 |
| Weedy for 6 weeks after emergence 6 semaines après levée puis propre | T3 | 3446 | 1666 | 2293 | 2173 |
| Weedy for 8 weeks after emergence 8 semaines après levée puis propre | T4 | 3486 | 1684 | 2233 | 2046 |
| Weedy for 10 weeks after emergence 10 semaines après levée puis propre | T5 | 3239 | 1148 | 1660 | 1526 |
| Weedy for 12 weeks after emergence 12 semaines après levée puis propre | T6 | 1799 | 529 | 379 | 699 |
| Weed free for 2 weeks after emergence Propre 2 semaines après levée puis abandonnée | T7 | 2039 | 1359 | 2026 | 1799 |
| Weed free for 4 weeks after emergence Propre 4 semaines après levée puis abandonnée | T8 | 3239 | 1369 | 1333 | 2166 |
| Weed free for 6 weeks after emergence Propre 6 semaines après levée puis abandonnée | T9 | 3286 | 1246 | 1966 | 2406 |
| Weed free for 8 weeks after emergence Propre 8 semaines après levée puis abandonnée | T10 | 3453 | 1013 | 1566 | 2443 |
| Weed free for 10 weeks after emergence | T11 | 3559 | 1033 | 1899 | 2246 |

| | | | | |
|---|---|---|---|---|
| Propre 10 semaines après levée puis abandonnée Weed free for 12 weeks after emergence T12 | 3273 | 1713 | 1719 | 2473 |
| Propre 12 semaines après levée puis abandonnée Weedy check/Temoin T13 | 1219 | 519 | 946 | 1079 |
| CV % | 21.6 | 31.0 | 40.6 | 18.9 |
| SE ± | 641.0 | 394.5 | 713.5 | 371.3 |

Table 9 A : Faba bean orobanche chemical control

| Treatments | Yield percent of the check |
|---|---|
| T 1 : Control - no glyphosate | 100 |
| T 2 : At the beginning of flowering apply 0.08 kg a.i./ha once | 341 |
| T 3 : At the beginning of flowering apply 0.08 kg a.i./ha twice at 15 days interval | 433 |
| T 4 : At the beginning of flowering apply 0.08 kg a.i./ha twice at 15 days interval | 261 |
| T 5 : At 15 days after flowering began, apply glyphosate at 0.08 kg a.i./ha once | 270 |
| T 6 : Starting 15 days after flowering began, apply glyphosate at 0.08 kg/ha twice at 15 days interval | 239 |
| T 7 : Starting 15 days after flowering began, apply glyphosate at 0.08 kg a.i./ha twice at 15 days interval | 293 |
| T 8 : At the beginning of flowering, apply glyphosate at 0.12 kg a.i./ha once | 346 |
| T 9 : Starting at the beginning of flowering, apply glyphosate at 0.12kg a.o./ha twice at 15 days interval | 374 |
| T10 : Starting at the beginning of flowering, apply glyphosate at 0.12kg a.i./ha twice at 15 days interval | 266 |

Tableau 10 A: Essai de date de semis sur pois chiche (hiver/printemps). Effet dates/sites. Rendements moyens de toutes les variétés (kg/ha)

Table 10 A: Dates of sowing comparison trials in chickpea in 1985/86 at B, OM, Kr, M.T. Average yield of all varieties. Kg/ha.

| Locations/ Sites | D1 = 1/12/85 | D2 = 15/2/86 | D3 = 1/4/86 |
|---|---|---|---|
| Beja | 1836.2 | 873.1 | 531.8 |
| M. Temime | 1087.5 | 786.2 | 30.0 |
| Krib | 1122.5 | 1182.5 | 692.8 |
| O. Meliz | 2738.0 | 2012.0 | 634.8 |
| Mean/Moyenne | 1696.0 | 1213.4 | 472.3 |
| % of D3 | 359 | 235 | 100 |

Tableau 11 A Essai de date de semis sur pois chiche (hiver/printemps). Effet dates/variétés. Rendements moyens de tous les sites (kg/ha).

Table 11 A Dates of sowing comparison trials in chickpea in 1985/86 at B, OM, Kr, M.T. Average yields of all locations. Kg/ha.

| Variety/Variété | D1 = 1/12/85 | D2 = 15/2/86 | D3 = 1/4/86 | Mean/Moyenne |
|---|---|---|---|---|
| FLIP 81-56W | 1634.6 | 1260.0 | 484.4 | 1126.3 |
| ILC 482 | 1867.5 | 1182.5 | 479.3 | 1176.4 |
| ILC 3279 | 1536.8 | 1163.5 | 408.8 | 1036.3 |
| Local | 1745.2 | 1247.8 | 516.7 | 1169.9 |
| Mean/Moyenne | 1696.0 | 1213.4 | 472.3 | |

# TOUR REPORT - TUNISIA

(11-18 May, 1986)

M.P. HAWARE

## Itinerary

| | |
|---|---|
| 11-12 May | Hyderabad-Bombay-Tunis |
| 13 May | Visit to Beja (Agric. Res. Station) |
| 14 May | Visit to Farmers' fields |
| 15 May | Visit to Farmers' fields |
| 16 May | Visit to INRAT, INAT and departure to Zurich |
| 17-18 May | Zurich-Bombay-Hyderabad |

INRAT (Institut National de la Recherche Agronomique de Tunisie) and Dr. M.C. Saxena, Program Leader (FLIP) ICARDA wanted me to visit Tunisia to see chickpea wilt work and discuss with scientists about the ongoing research.

## 12 May

I reached Tunis Monday afternoon. Mr. Habib Hallila, Head, Food Legumes, INRAT received me at the airport. He briefed me about my program for next 4 days in Tunis. I visited ICARDA office and met Dr. Ahmed H. Kamel, ICARDA representative for North Africa region. Due to Ramzan the offices and markets were closed at 2.30 p.m.

## 13 May

Visited Beja, Agricultural Research Station of INRAT along with Dr. Ahmed H. Kamel and Mr. Habib Hallila.

Faba beans and chickpea are the two most important food legumes grown in Tunisia. Chickpea is grown on about 30,000 ha, but the yields are poor (500 kg/ha). Traditionally chickpea is planted in Spring (March) and harvested in June-July. Their preference is for white seed and 45-50 gm/100 seed wt. It is sown mostly in Mateur, Beja and El-Kef in North West and in south of Tunis along the sea coast. Annual rainfall in these areas is around 600 to 1000 mm, mostly in December-February.

Most of the field experiments on food legumes are conducted at Beja. The soil is black and annual rainfall is 600 mm. The day was spent in looking for chickpea diseases in winter and spring plantings. I have listed the diseases in order of their intensity at Beja Farm.

| | Winter Planting | | Spring Planting |
|---|---|---|---|
| 1 | Wilt | 1 | Wilt |
| 2 | Ascochyta blight | 2 | Root rots |
| 3 | Root rots | 3 | Stunt |
| 4 | Stunt | | |

Wilt: Wilt was almost in all the fields of chickpea planted in winter and spring. The symptoms were typical of vascular disease. Two pathogens, Fusarium oxysporum and Verticillium albo-atrum were reported to cause wilt. According to Mr. Habib, there was no difference in initial and late symptoms due to these two pathogens. In Beja soils both wilt pathogens are present and it makes the screening work difficult.

Wilt sick plot was developed by adding infected plant debris in the same field year after year. The plot is quite uniform (1 ha). All the chickpea material received from ICARDA including $F_3$ progenies was planted for screening. One replication of ICRRWN (50 test lines) along with check ICC 4951 after every 2 test rows, was also planted. Local check was planted after every 10 rows. It was highly susceptible and showed 100% wilt. ICC-4951 (JG-62) did not show any wilting and was healthy. ICC-4934 and -5003 were also resistant. However, C-104 and L-550 were highly susceptible. These reactions indicated the possibility of new race of Fusarium in Tunisia. Natural occurrance of AB (Ascochyta blight) was sporadic.

In addition, 500 germplasm lines received from ICARDA were being evaluated in wilt sick plot. ILC-3279 was tolerant to wilt. Wilt resistant selections, made from local 'Amdoun' were resistant with 45-50g/100 seed wt. Crosses for Tunisia are undertaken at Aleppo, between Ascochyta resistant lines with high yield in Tunisia and wilt resistant selections from Beja. $F_3$ progenies are simultaneously screened for wilt and Ascochyta blight resistance at Beja. There were several lines in FLIP material and local Amodoun selections which were wilt resistant. Some of these were field resistant to Ascochyta blight. ILC-480 was susceptible to wilt and Ascochyta blight in Tunisia.

Root Rots: Several dried seedlings were examined closely. The mortality was mainly due to early wilting and collar rot (Sclerotium rolfsii). Late mortality due to dry root rot was possible. Mr. Habib described the symptoms of the disease, which he told, were common at maturity when day temperatures were above 30°C.

Ascochyta blight: Due to long dry spell, Ascochyta blight did not appear. However the disease was present in AB-nursery (winter planting) where humidity was created with sprinklers. Local check was showing 5-9 rating. ILC-3279 showed 3 to 5 rating.

Orobanche: In winter chickpea orobanche was a problem. Spring planted chickpea was free from infestation.

14 May

Surveyed chickpea fields in Beja Governorate. Chickpea cultivation was mostly concentrated around Mateur and Beja. The fields were sown in spring and soils were black. Wilt was most common and destructive. Stunt was observed in some of the fields. Iron chlorosis was also observed. Salanity symptoms were observed in low

lying fields. Most of the crop was in pre-flowering stage. Plant population was less than normal and fields were free from weeds. Mr. Habib told that the fields which had wilt problem last year were sown with cereals this year by farmers. Local seeds were used.

15 May

In the south of Tunis we travelled along the coast towards Nabeul. In this part chickpea is a new introduction. Cultivation practices in terms of planting (March to April), row to row distance (50 to 150 cm) and cultivation (monocrop to garden crop: Olive) varied. Chickpea did not have any problem except very low plant population. The soils were deep-red mediterranean type.

Incidence of wilt and other diseases of chickpea in the farmers' fields in Tunisia during May 1986

| Location | Approximate area (ha) | % Disease Incidence | | | | Remarks |
|---|---|---|---|---|---|---|
| | | Wilt | Stunt | RR | AB | |
| A MATEUR-BEJA-TUNIS | | | | | | |
| Sitinsir 1 | 10 | 10 | - | - | - | |
| 2 | 5 | 60 | - | - | - | |
| 3 | 10 | 50 | - | - | - | |
| Frietissa | 10 | 50-100 | 5 | - | - | |
| Mateur 1 | 5 | 1 | 5 | - | - | |
| 2 | 15 | 50 | 1 | - | - | |
| Gucumine 1 | 10 | 20 | 2 | 1 | - | Iron chlorosis |
| 2 | 5 | 1 | - | 1 | - | Salinity |
| Beja 1 | 10 | 10 | - | 1 | - | Salinity |
| 2 | 10 | 10 | 1 | - | - | |
| B Tunis-Nabeul | | | | | | |
| Hamam Chatt | 2 | 1 | - | - | - | In olive orchard |
| Korbous-1 | 5 | - | - | 0.5 | - | Leaf miner |
| 2 | 5 | - | - | - | - | |
| 3 | 5 | - | - | - | - | Late sowing |
| Nabeul | 4 | - | - | - | - | Late sowing |

RR - Root Rot, AB - Ascochyta blight

Visit to INAT (Institut National Agronomique de Tunisie)

INAT is a teaching institute. I met Dr. M.M. Harrabi, Head of Plant Pathoicgy. Two students were working with him for their M.Sc. degree on chickpea diseases. One of his students worked on variability in *Ascochyta rabiei* and found out 4 races in Tunisia. Dr. Harrabi was hesitant to call them races because of the reactions on host were not well differentiated. Regarding chickpea wilt, he was very much sure about the role of *Verticillium* and *Fusarium* in causing wilt. He used water culture technique to screen chickpea lines against both pathogens. Fortunately, the lines which were resistant to *Fusarium* were also resistant to *Verticillium*. Local 'Amdour' was susceptible to both. Mr. Habib in cooperation with Dr. Harrabi are planning to work on inheritance of wilt resistance in chickpea. We discussed on the possible screening techniques which could be used in confirming the field resistant lines. Dr. Harrabi showed me the laboratory facilities which were adequate (except glasshouse) for pathology work. Detailed discussion was held with Mr. Habib Halila on chickpea pathology work to be carried out in future.

16 May

At the end of my trip I had a meeting with Dr. Mustapha Lasram, Director INRAT and Vice-Chairman, Board of Trustees, ICARDA. Mr. Habib and I briefed him about the disease situation in chickpea. He appreciated my visit. He was of the opinion that surveys with the help of ICRISAT scientists should be conducted in North Africa Region (Morocco, Algeria and Tunisia) to understand the disease situation in chickpea. He also wished that ICRISAT should help Tunisia in training the persons in legume pathology.

SUMMARY

1. Wilt is a major problem in spring and winter chickpea. Therefore resistance to wilt is a must in released cultivars.

2. Under favourable condition Ascochyta blight can be a problem in winter chickpea. Resistance to blight and wilt has to be incorporated in local high yielding materials.

3. Facilities have to be created to strengthen the work on disease resistance. Uniform disease nurseries and screen houses are essential.

4. There is a need for Legume Pathologist who can work on chickpea, faba beans and lentil.

5. There is a need to understand the distribution of *Fusarium* and *Verticillium* pathogens in farmers fields in Tunisia and other North African regions.

6. Identification of *Fusarium* races based on host differentials is possible and should be carried out.

7. Since *Ascochyta* and *Fusarium* are seed-borne, effective fungicidal seed treatment is essential, which may be recommended to farmers.

8. The material generated at ICARDA involving Tunisian lines may be tested in $F_3$ in Tunisia so that selections for resistance are made against local isolates. Introduction of advanced material have the problem of local adaptation.

9. ICRISAT may offer the training facilities to scientists from Tunisia.

10. Stunt can be a problem. Highly susceptible material should be discarded.

My sincere thanks to Dr. M.C. Saxena ICARDA and Dr. Y.L. Nene ICRISAT for giving me the opportunity to visit Tunisia.

Mr. Habib Halila and Dr. Ahmed H. Kamel helped me to make my visit productive.

# Report on Food Legume Seed Production

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I visited Tunisia on the request of the Leader, FLIP, ICARDA, Aleppo (Syria) from March 30, 1986 to April 2, 1986 with the following objectives:

1. To review and assess briefly the present system of seed multiplication and production for main food legumes in the country through discussion with National Staff and field visits.
2. To elaborate and submit a proposal for a sound seed multiplication program for faba bean, lentil, chickpea, pea and Phaseolus taking into account international and local regulations on the matter.

During the visits, meetings with the officials of all the 3 seed companies were held, fields, processing plants and Seed Testing Laboratory were visited to get the first hand information on the status of seed production in Tunisia.

The report is based on the field visits and discussions with the officials of seed companies. Although the stay in Tunisia was brief but the author got the feeling of the present situation of seed production in food legumes.

Actually in true sense of the term no seed production program in food legumes exists in Tunisia. However, throughout in this report in the section 'Present Status' the term Seed Production has been used loosely. In addition to review the present situation, a method of seed production including field and seed standards have been suggested for faba beans, lentil, chickpea, pea and Phaseolus.

It is hoped that the report will be found to be useful in starting a scientific and methodical seed production program of food legumes in Tunisia.

It should be emphasized that for starting the program much investment is not required. A system already exists for the production and distribution of improved varieties of cereals, therefore all the necessary infrastructure like field staff for inspection, seed processing facilities and seed testing laboratory etc. exist. With very little effort in training the existing staff the seed production program for food legumes can be initiated which I am confident will go a long way in increasing the yield. It has been proved beyond doubt that even in self pollinated cultivars use of certified seed of known quality yields significantly more than the seeds which have been saved by farmers for sowing.

## Present Status

### 1. Food Legumes in Tunisia

Food Legumes have long been important crops in Tunisia. 82,828 hectares are under cultivation in faba bean, chickpea, lentil, pea and Phaseolus. The crop wise area under cultivation are: faba bean 40,728, chickpea 32,947, lentil 857, pea 6,947 and Phaseolus 1,349 hectares (Average of 5 years: 1981 to 1985 Table 1). Faba beans are most important representing around 50% of the total area under cultivation in food legumes. But yield of these food legumes are very low. The last 14 years average being 8.3 Q/ha in faba beans, 7.9 Q/ha in chickpea, 7.4 Q/ha in lentil, 6/7 Q/ha in pea and 7.5 Q/ha in Phaseolus. One of the reasons for low yield in food legumes is perhaps the cultivation of age old cultivars as no new cultivars have been released (Anonymous, 1981-82). However, the experimental yield in faba beans (large and small), lentil and pea have been reported to be higher than that of the local checks (Anonymus, 1983/84, and Table 1). Therefore, there is a clear case of release of improved cultivars of some of the food legumes. If new improved cultivars are to be released, a systematic method of seed production and multiplication should be evolved so that identity of the new released cultivars may not be lost.

2. Method of release of new cultivars:

1. INRA has 4 major research stations for food legume breeding work as well as for conducting trials.
2. Promising lines are tested in microplots for their superiority over the local cultivars by breeder himself, under the control of INRAT, for 3 years during the normal growing seasons. The testing on larger plots may be conducted by "Office des Cereales".
3. The best line thus obtained is presented for release to the National Varietal Release Committee.
4. Amount of breeder seed which should be available with the breeder for the release of food legume cultivars is not specified but in cereals it is fixed to be 150 kg, to be given equally to the three seed companies (50 kg each) for multiplication.

3. Popularization of new cultivars:

Large scale demonstrations are conducted on farmers field by extention services of the Directorate of Agricultural Production. Open house or information days (field days) are also organised by the "Office des Cereales" during which farmers are invited to visit these demonstrations to know about the new cultivars. INRAT publishes bulletins on New Cultivars etc. for the use by extension officials. Radio and T.V. talks/announcements are also arranged about the "New Cultivars".

However, no improved cultivars have been released in food legumes.

4. Seed Production in Food Legumes:

There are 3 seed companies in Tunisia namely (i) COSEM, (ii) CCSPS and (iii) GRAFOUPAST. The first two companies are in cooperative sector. The GRAFOUPAST was established in 1977 in private sector with 67% State share primarily to produce and market forage seeds, but it also produces seeds of faba bean (small and large), pea and chickpea. Detailed discussions were held with the officials of COSEM (Mr. Abdelhamid Abdeljelil, Technical Director and Mr. Mohamed Makki Chouchane, Administrative Director) and GRAFOUPAST (Mr. Jabeur Ammar, President Directeur General).

COSEM: It is engaged in producing seeds of cereals, vegetables and food legumes. About 1000 Q of faba beans and 2,000 Q of pea seeds are produced and marketed every year. Small quantity of vetch and chickpea seeds are also produced and marketed.

Seeds of food legumes are produced without providing any isolation distance which is important to check "out-crossing" in a crop like faba beans where the extent of out crossing could be as high as 70% (cf. Hawtin and Omar, 1980). Althuogh no such studies have been conducted in Tunisia, in Syria a maximum of 15% out crossing have been observed (Hawtin and Omar, 1980). No field inspection and rouguing are done but seeds are cleaned at the processing plant. The seeds are also tested for germination in the seed testing laboratory (Laboratoire de Controle de Semences et Plantes,D.P.V. Ministere de l'Agriculture) although it is not specified on the tag which is attached with the bag. The genetic purity is not guaranteed. For marketing 50 kg of small faba beans, pea and vetch and 40 kg of large faba beans are packed in a bag.

The so called "seed" is sold at the grain price to the farmers which was about 80 dinar/Q for pea, 25 dinar/Q for small faba beans, 50 dinar/Q for large faba beans and 100 dinar/Q for chickpea in 1984-85, (1 Dinar = 0.72 US$) whereas price of cereal seeds is 1.5 times higher than the grain price which is subsidized by the Government.

GRAFOUPAST: I had the most stimulating discussion with Mr. Jabeur Ammar, President Directeur General of the company. Mr. Ammar was very optimistic and enthusiastic for evolving a systematic system for the production and distribution of seeds of improved cultivars of food legumes. Food legume seeds are produced through contract growers. It has its own processing plant where about 2,000 tons seeds of food legumes can be processed every year. The company is planning to establish a new processing plant which would have a capacity of about 10,000 tons per year out of which 4,000 tons per year would be for seeds of the food legumes only.

The cost of the food legumes seeds marketed by the company is 20-30% higher than the grain price and the company does not face much difficulty in marketing. It is in contrast to COSEM which sells the so called seeds at the price of grain. Seeds are bagged either in jute bag, multiwall paper bag or polyvinyl bag.

CCSPS: Due to the pre-occupation of the company official, it was not possible to have a meeting. But the processing plant at Beja was visited which is modern and automatic. It has a capacity of 2 tons/hour/shift (8 hour shift).

5. Seed Testing and Quality Control:

The Laboratoire de Controle de Semences et Plantes has excellent facilities, which was established with the help of the Federal Republic of Germany (ISTA News Bulletin, No. 38, October 1972, Page 1. "Seed Testing Station in Tunis - A Tunisian German Applied Project"), for testing the quality attributes of seeds including seed health. Seeds may be tested for physical purity, germination, vigour, moisture, tetrazolium and seed health. About 3,000 samples were tested in 1985 but the laboraotry has the capacity for testing about 5,000 samples per year. 30 technical persons are working in the laboratory. All the three seed companies send their sample for testing and a nominal fee is charged for the services rendered by the laboratory.

Seeds are tested as per the procedure prescribed by the International Seed Testing Association (1985). The laboratory is authorised to issue the International Seed Analysis certificate.

Synthesis of the present status:

1. No improved cultivars of food legumes have so far been released.
2. The country does not have a systematic seed production program for food legumes and yet the so called seeds are produced and marketed every year at the price of grain.
3. Genetic purity of the marketed food legume seed is neither guaranted nor any attempt is made to maintain it.

4. No legislation or law is available in the country to regulate the production and marketing of food legume seeds.
5. Neither field standard nor seed standard have been prescribed for seed production in food legumes.
6. Very good seed processing facilities are available in the country.
7. A modern seed testing laboratory with sufficient staff and good equipment is available with a capacity to test about 5,000 seed samples per year.
8. The International rules for seed testing are followed in Tunisia.

Table 1. Some vital statistics about food legumes in Tunisia.

| Crop | Area* (ha) | | Seed rate** (kg/ha) | Seed requirement/Yr. (Minimum, tons) | Yield*** | Approx.**** multiplication ratio |
|---|---|---|---|---|---|---|
| 1. Faba bean | 40728[1] | Large | 182 | 3706 | 1775 | 10 |
| | | Small | 242 | 4928 | 2275 | 9 |
| 2. Chickpea | 32947 | | 88 | 2899 | 676 | 8 |
| 3. Lentil | 857 | | 107 | 92 | 1657 | 15 |
| 4. Pea | 6947 | | 194 | 1348 | 2780 | 14 |
| 5. Phaseolus | 1349 | | 103 | 139 | 600 | 6 |
| Total | 82828 | | | 13112 tons | | |

* Average of the last 5 years (1981 to 1985).
** Based on experimental results (Source: Mr. Habib Halila).
*** Experimental yield (Source: Mr. Habib Halila).
**** Multiplication ratio = Yield divided by seed rate.

1/ Assuming 50% of the area (20364 ha) under large faba bean and 50% of the area under small faba beans.

Scientific Seed Production of improved cultivars of food legumes:

Seed production is a highly specialized job. The use of certified seeds of improved cultivars is a most effective and economical way for obtaining higher yields. Seeds of improved varieties should be:

- True to type
- high in germination and vigour
- physically pure
- free from seed borne diseases &
- chemically treated

To achieve the above quality attributes in seeds to the extent of 100% is difficult but realistic quality attributes may be obtained by evolving a systematic method for certified seed production.

Method of Seed Production:

Generation system of seed production is suggested which consists of using the "Breeders Seed" (pre-basic seed) for production of the "Foundation Seed" (basic seed), which in turn should be used to produce the "Certified Seed".

In a highly self pollinated crops like chickpea, lentil etc. where extent of out-crossing is very little foundation and certified seeds of these crops may be utilized for one more generation (beyond foundation or certified seed stage) to produce certified seeds. However, to stop further multiplication of such seeds beyond second generation the tag should carry the inscription like "Not fit for multiplication for further certification".

Requirements for seed production

1. Seeds should be produced on good soil with adequate irrigation facility or adequate rainfall. The area which is selected for seed production should be suitable for growing the crop. Field requirement which is specified for all the five food legumes crops (see later) should be met,
2. Generation system of seed productin should be followed.
3. Adequate isolation should be provided to prevent outcrossing, disease spread and mixture of varieties by accident or by mechanical means.
4. Field inspection should be done (as suggested in the standard) to check whether requirements outlined (see later) have been maintained and to suggest roguing of other varieties, diseased and weed plants etc.
5. Sufficient precaution should be taken during harvesting and threshing to avoid mixing seeds of different varieties.
6. Seeds should be processed (cleaning, size grading etc.)
7. Seeds should be analyzed for quality attributes (Germination, physical purity, seed moisture and seed health).

The above requirements of seed production may be met by adopting the procedure of certified seed production.

Seed Certification:

1. Purpose:

The purpose of seed certification should be to maintain and make available to the public, through certification, high quality seeds of food legumes so grown and distributed as to ensure genetic identity and genetic purity. Only released varieties should be eligible for certification.

2. Classes and source of seed:

A. Breeder Seed (pre-basic seed):

It should be controlled directly by the originating plant breeder of the breeding program or institution (e.g. INRAT) and which should be the source for the initial and recurring increase of foundation seed.

B. Foundation Seed (Basic Seed):

It should be the progeny of breeder seed or in case of highly self pollinated crops like chickpea be produced from foundation seed which can be clearly traced to breeder seed. Production should be supervised and approved by the certification authority. It should be so handled as to maintain specific genetic identity and purity and should be required to conform to certification standards specified for the crop being certified. The three seed companies may be responsible for the production of foundation seeds either at their own farm or through contract growers.

C. Certified Seed:

It should be the progeny of foundation seed and its production should be so handled as to maintain genetic identity and purity as per standards specified for each crop.

In case of highly self pollinated crops certified seed may be produced from certified seed for two more generations beyond foundation seed.

Certified seed may be produced through contract growers by seed companies.

Standards:

A set of standards are fixed for certified seed production which are of two types viz:

1. Field standards
2. Seed standards

Field standards are checked during field inspection during various stages of seed crop growth by qualified and trained staff and if found to meet pre-set field standards the crop is certified. The seed crop is then harvested, threshed, cleaned and delivered at the seed processing plant for further cleaning, size grading, treating with insecticides and fungicides (optional). The seed is then tested for pre-set seed standards which are normally for analytical purity, germination, seed health and moisture content, in the seed control laboratories.

Certification standard should be realistic and should be such as to attract farmers to have deep faith in the high quality of seed and to assure them of the soundness of their investment in the purchase of seed.

Seed certification standard for faba bean, pea, Phaseolus, chickpea and lentil are suggested.

Minimum Seed Certification Standard for faba bean (Vicia faba)

1. Field Requirements:

A crop of faba bean shall not be eligible for certification if planted on land in which a crop of the same kind was grown in the previous season unless the crop in the previous season was of the same variety and was certified.

2. Field Inspection (Minimum)

Three

First: Preferably 15-25 days after sowing

Second: At flowering

Third: At maturity but before harvest.

3. Field Standard

a. Isolation distance (Minimum)

A minimum isolation distance of 200 metres for foundation seed class and 100 metres for certified seed class shall be provided from fields of other varieties and fields of the same variety not conforming to varietal purity requirements for certification .

b. Off Types (Maximum permitted at flowering)

Foundation: 0.10%

Certified: 0.20%

c. Plants affected by seed borne disease maximum permitted at the final inspection: 0.5%.

4. Seed Standard

| Factor | Standard % | |
|---|---|---|
| | Foundation | Certified |
| 1. Pure seed (Minimum) | 98.0 | 98.0 |
| 2. Inert matter (Maximum) | 2.0 | 2.0 |
| 3. Other crop seed (Maximum) | 0.25 | 0.50 |
| 4. Germination including hard seed (Minimum) | 80.0 | 80.0 |
| 5. Moisture content (Maximum) | 11.0 | 11.0 |

Minimum Seed Certification Standard for Pea (*Pisum sativum*)

1. Field Requirements:

A pea crop shall not be eligible for certification if planted on land on which the same kind of crop was grown in the previous season unless the crop in the previous season was of the same variety and was certified.

2. Field Inspection (Minimum)

Three

First: Preferably 15-25 days after sowing

Second: At flowering

Third: At the pod stage

3. Field Standards:

a. Isolation distance

An isoaltion distance for 20 metres for foundation seed class and 10 metres for certified seed class shall be provided all around a seed field to separate if from fields of other varieties and fields of the same variety not conforming to varietal purity requirements for certification.

b. Off Types (Maximum permitted at the final inspection)

Foundation: 0.10%

Certified : 0.50%

c. Plants affected by seed borne disease, maximum permitted at the final inspection: 0.5%.

4. Seed Standard:

| Factor | Standard % | |
|---|---|---|
| | Foundation | Certified |
| 1. Pure seed (Minimum) | 98.0 | 98.0 |
| 2. Inert matter (Maximum) | 2.0 | 2.0 |
| 3. Other seeds (Maximum) | 0.25 | 0.50 |
| 4. Germination including hard seed (Minimum) | 80.0 | 80.0 |
| 5. Moisture content (Maximum) | 11.0 | 11.0 |

Minimum Seed Certification Standard for *Phaseolus vulgaris*

1. Field Requirements:

A crop of *Phaseolus* shall not be eligible for certification if planted on land on which the same kind of crop was grown in the previous season unless the crop in the previous season was of the same variety and was certified.

2. Field Inspection (Minimum)

Three

First: Preferably 15-25 days after sowing

Second: At flowering

Third: At maturity but before harvest

3. Field Standards:

a. Isolation (Minimum)

An isolation distance shall be provided all around a seed field to separate it from fields of other varieties and fields of the same variety not conforming to the varietal purity requirements for certification. The minimum isolation distances are as follows:

Foundation: 50 metres

Certified: 25 metres

b. Off Types

Maximum permitted (%) at the final inspection.

Foundation seed plots: 0.10%

Certified seed plots : 0.20%

c. Plants affected by seed borne disease maximum permitted at the final inspection: 0.5%.

4. Seed Standard:

| Factor | Standard % | |
|---|---|---|
| | Foundation | Certified |
| 1. Pure seed (Minimum) | 98.0 | 98.0 |
| 2. Inert matter (Maximum) | 2.0 | 2.0 |
| 3. Other seeds (Maximum) | 0.25 | 0.50 |
| 4. Germination including hard seed (Minimum) | 80.0 | 80.0 |
| 5. Moisture content (Maximum) | 11.0 | 11.0 |

Minimum Seed Certification Standard for Lentil (*Lens culinaris*) and Chickpea (*Cicer arietinum*).

1. Field Requirements:

A crop of lentil and chickpea shall not be eligible for certification if planted on land on which the same crop was grown in the previous season, unless the crop in the previous season was of the same variety and was certified.

2. Isolation distance (Minimum)

An isolation distance of at least ten and five metres should be provided all around a foundation and certified seed crop respectively to separate it from fields of other varieties and fields of the same variety not conforming to the varietal purity requirements for certification. In addition the seed crop should be adequately isolated from disease susceptible varieties.

3. Field Inspection (Minimum):

Three

First: 15-25 days after sowing

Second: At flowering

Third: At maturity but before harvest

4. Off Types:

Maximum permitted at the final inspection:

Foundation seed plots: 0.1%

Certified seed plots : 0.5%

5. Plants affected by seed borne disease, maximum permitted at the final inspection: 0.5%.

6. Seed Standard:

| Factor | Standard % | |
|---|---|---|
| | Foundation | Certified |
| 1. Pure seed (Minimum) | 98.0 | 98.0 |
| 2. Inert matter (Maximum) | 2.0 | 2.0 |
| 3. Other seeds (Maximum) | 0.25 | 0.50 |
| 4. Germination including hard seeds (Minimum) | 80.0 | 80.0 |
| 5. Moisture content (Maximum) | 11.0 | 11.0 |

If a seed lot meets the minimum certification standard (field as well as seed standard) the processed seed should be bagged. The seed bag must bear a tag and a seal.

The colour of the tag may be the same as prescribed for cerealseeds.

Tags, Labels and Seal

All certified seed when sold should have an official tag which will be supplied by the certification agency properly fixed to each container. The tag should contain the following information:

1. Crop and variety
2. Lot no. or Batch no.
3. Genetic purity (Minimum) in %
4. Germination (Minimum) in %
5. Physical purity (Minimum) in %
6. Other seed (Maximum)
7. Date of test, date of issue of the certificate and its validity.
8. Name and address of the certified seed producer
9. Name and address of the certification agency.

The container of the certified seed shall carry a seal of an appropriate material and no container carrying a certification tag shall be sold as certified seed if the tag or seal has either been tampered with or removed.

Seed Price

There was considerable discussion on pricing of food legumes seeds. The cost of production of seeds would be more than the cost of production of grain because of additional requirements of seed production. Therefore, cost of seed may be 50-100% more than that of grain price.

Seed Requirement:

In table 1 the requirement of seeds has been calculated to be about 13,112 tons per year. It may be subject to questioning because the seed rate for this calculation has been taken from the experimental data. Similarly, for calculation of the multiplication ratio, the experimental yield has been used. These calculations have been given as a guideline for planning the seed production to cover the sowing of the entire area (82,828 ha) with the quality seeds of improved variety in a phased manner.

It is not necessary to plant certified seeds of highly self pollinated food legumes crops every year. Farmers may be advised to purchase certified seed every 4 years. Therefore, planning for seed production may be done on the basis of 25% of the requirement i.e. about 3279 tons every year. For this amount of certified seed 38.58 and 351.4 tons of breeder and foundation seed respectively are required (Table 2).

Table 2. Seed requirements (Tons), calculated from Table 1. 25% of the total requirement.

| S. No. | Certified | Foundation | Certified |
|---|---|---|---|
| 1. Faba bean (large) | 927 | 92.7 | 9.27 |
| (small) | 1232 | 136.8 | 15.20 |
| 2. Chickpea | 725 | 90.6 | 11.32 |
| 3. Lentil | 23 | 1.5 | 0.10 |
| 4. Pea | 337 | 24.0 | 1.72 |
| 5. Phaseolus | 35 | 5.8 | 0.97 |
| Total | 3279 | 351.4 | 38.58 |

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