FABIS

Faba Bean Information Service

NEWSLETTER
No. 19
December 1987

INTERNATIONAL CENTER FOR AGRICULTURAL RESEARCH IN THE DRY AREAS

(ICARDA)

ICARDA and CGIAR

The overall objective of the International Center for Agricultural Research in the Dry Areas (ICARDA) is to increase agricultural productivity and food availability in both rural and urban areas, thus improving the economic and social well-being of people in developing countries, particularly in North Africa and West Asia. The center focuses mainly on winter rainfall areas with 200-600 mm annual precipitation. When appropriate, research also covers environments with monsoon rainfall or irrigation.

ICARDA is a world center for the improvement of barley, lentil, and faba bean, and a regional center for improving wheat, chickpea, farming systems, livestock, and pasture and forage crops. The training of agricultural researchèrs from developing countries and the communication of research results are an important part of ICARDA's activities.

ICARDA is a non-profit research center established in 1977 by the Consultative Group on International Agricultural Research (CGIAR). The CGIAR, an informal association of donors including governments, organizations, and private foundations, supports agricultural research worldwide to improve food production in developing countries, through a network of 13 international research institutions, including ICARDA. The network covers crop and livestock systems that supply three-quarters of the food of the developing world.

FABIS

FABIS Newsletter is produced three times a year at ICARDA with the financial support of the International Development Research Center (IDRC), Ottawa, Canada. FABIS, the newsletter of the Faba Bean Information Service, is a forum for communicating faba bean research results. Short research articles provide rapid information exchange, and comprehensive reviews are invited regularly on specific areas of faba bean research. The newsletter also includes announcements. The Faba Bean Information Service provides information on faba bean research free of charge through a question and answer service, photocopies, and searches of a faba bean document collection.

DEADLINE: Contributions must reach FABIS for No. 20 by 28 February, for No. 21 by 30 June 1988 and for No. 22 by 30 October 1988.

SUBSCRIPTIONS: FABIS Newsletter is available free to faba bean researchers under an IDRC grant. To subscribe, write: FABIS/Documentation Unit/ICARDA/P.O. Box 5466/Aleppo, Syria.

FABIS Coordinating Committee:
CANADA: Dr. C. Bernier, Department of Plant Science, University of Manitoba, Winnipeg, Manitoba R3T 2N2.
EGYPT: Dr. A. Nassib, Field Crops Institute, Agricultural Research Center, Giza 12619.
JAPAN: Dr. K. Kogure, Faculty of Agriculture, Kagawa University, 2393 Ikenobe, Miki-tyo, Kagawa-Ken.
SUDAN: Dr. F. A. Salih, Agricultural Research Corporation, Shambat Research Station, P.O.Box 30, Khartoum North.
SYRIA: Dr. M. C. Saxena, Food Legume Improvement Program, ICARDA, P.O.Box 5466, Aleppo.
BRAZIL: Dr. H. Aidar, National Center for Research on Rice and Beans, BR-153, km 4-Goiania/Anapolis, Caixa Postal 179, 74.000-Goiania, Goias.
FRANCE: Dr. J. Picard, 4 Rue du 8 Mai, 36.100 Neuvy-Pailloux.
ITALY: Prof. C de Pace, Istituto di Biologia Agraria, Universita della Tuscia, Viterbo.
SPAIN: Dr. J. I. Cubero, Escuela Technica Superior de Ingenieros Agronomos, Departmento di Genetica, Apartado 3048, Cordoba.
U.K.: Dr. D. A. Bond, Plant Breeding Institute, Maris Lane, Trumpington, Cambridge CB2 2LQ.

FABIS Production Team:
Dr. Mohan C. Saxena/Technical Editor, ICARDA
Dr. M. El Habib Ibrahim/Associate Technical Editor
Mr. Nihad Maliha/Editor
Mrs. Malika Abdelali Martini/Assistant
Dr. Walid Sarraj and Mr. Khaled Al-Jebaili/Arabic abstracts

COVER PHOTO: Productive faba bean with determinate growth habit.

ISSN 0255 6448

FABIS

Faba Bean Information Service

NEWSLETTER 19 December 1987

CONTENTS

SHORT COMMUNICATIONS

بحوث مختصرة

Breeding and Genetics

التربية والوراثة

Introduction of a New Faba Bean Recommended for the Caspian Regions (Gorgan and Mazandaran)

B. Sadri
Food Legume Research Department,
Seed and Plant Improvement Institute,
Ministry of Agriculture and Rural Development,
Karadj,
IRAN

Abstract

In Iran, the line ILB 1269 (New Mammoth) was identified for release, from an international trial provided by the International Center for Agricultural Research in the Dry Areas (ICARDA). The new line, which was named Barkat, is recommended for the Caspian region. In three years of testing Barkat outyielded the local check by an average of 128% and in one year by 230% in dry seed and green pod, respectively. This line also proved to be moderately resistant to foliar diseases, i.e. chocolate spot, rust, and alternaria leaf spot.

Introduction

In Iran, faba bean (*Vicia faba* L.) is one of the important pulses. The crop is usually grown in the Caspian region, where it is mainly consumed as green pods and to a lesser extent as dry seeds. Hence farmers tend to pay more attention to green pod yield as dictated by consumer preferences.

As little improvement was done in the past, the production per unit area was still low. Therefore, research was directed towards the identification of new high yielding cultivars adapted to the region. The present work was undertaken to study the performance of some of the faba bean advanced lines received from ICARDA during 1982. The aim was to identify and select lines which yield higher than the local cultivars. The work lasted for four years and data were collected on yields of dry seeds (three years of testing) and green pods (one year of testing).

Materials and Methods

In the 1982/83 growing season one of ICARDA's Faba Bean International Yield Trials was planted at Gorgan Research Station. The trial consisted of 12 entries replicated four times in a randomized complete block design. Dry seed yield was evaluated. During data gathering the line ILB 1269 (New Mammoth) was noted to have very long pods.

During 1983/84, 1984/85 and 1985/86 growing seasons. ILB 1269 was tested against five local varieties. Each season the six test entries were replicated four times in a randomized complete block design. In the first three growing seasons (1983-85) the test entries were evaluated for their yields of dry seed. In the 1985/86 season only the yields of green pods were recorded.

In all experiments selection was made under isolated conditions, and was based on the adaptation to environmental conditions, which results in varieties with high yields of dry seeds and green pods.

Results and Discussion

The line ILB 1269 (New Mammoth), which yielded 5.9 t/ha of dry seeds in the 1982/83 season, had the highest yield among all entries in the ICARDA international trial and it also significantly outyielded the local check (Table 1).

In the 1983/84 and 1984/85 seasons the new line, yielded 6.1 t/ha of dry seeds, which was higher than all the other entries, and significantly outyielded the check. Also, in the 1985/86 season the new variety had the highest yield of green pods (16.2 t/ha). The check green pod yield was 7.0 t/ha, thus the new variety was 230% higher than the check. The length of green pods, the number of seeds per pod, and the green yield were twice that of the local check (Table 2).

Table 1. Summary of results: yield trial experiments on the faba bean variety (ILB 1269) Barkat in Gorgan from 1982/83 to 1985/86.[a]

	1982/83	1983/84	1984/85	1985/86
Yield (t/ha)				
Barkat	5.91	6.12	6.10	16.98
Local check	4.1	5.15	5.02	7.03
Yield increase over check (%)	44	19	22	142

[a] All results are significantly different at the 1% level of probability.

The new variety, which proved to be moderately resistant to chocolate spot, rust, and alternaria leaf spot, was less affected by the diseases as infection occurred late in the season. In contrast, the local check was infected by the diseases early in the season (at the podding stage) thus resulting in decreased yields and poor marketing value of green pods.

Conclusions

In comparison with the local check, the variety ILB 1269 (New Mammoth) had significantly higher yields of dry seeds and green pods, better marketing value, and an acceptable level of disease resistance. Therefore, it was released and named Barkat.

We recommended this variety for Gorgan and Mazandaran, which have similar climatological conditions.

Table 2. Important agronomic characters and disease reaction of the new variety Barkat as compared with the local check.

	Agronomic character				Disease reaction[a]		
	Green pod yield/m^2 (g)	Number of pods/m^2	Number of seeds/pod	Pod length (cm)	Rust	Alternaria leaf spot	Chocolate spot
Barkat	1600	445	7	20-25	MR	MR	MR
Local check	700	390	3	8-10	HS	S	HS

[a] MR = moderately resistant; S = susceptible; HS = highly susceptible.

ادخال سلالة جديدة من الفول يوصى بزراعتها
في منطقة قزوين (جوركان ومازانداران)

ملخص

في ايران تم تحديد السلالة (New Mammoth)
ILB 1269 لاعتمادها وذلك من خلال تجربة دولية كان قد
زودنا بها المركز الدولي للبحوث الزراعية في المناطق الجافة
(ايكاردا) . ويوصى بزراعة السلالة الجديدة ــ التي اطلق
عليها اسم بركات ــ في منطقة قزوين . وخلال ثلاث سنوات
من الاختبار تفوقت السلالة بركات على الشاهد المحلي
بمتوسط قدره 128 % في غلة الحبوب الجافة وبنسبة
230 % ولسنة واحدة في غلة القرون الخضراء . كما
أثبتت هذه السلالة انها متوسطة المقاومة للامراض التي
تصيب الاوراق مثل التبقع البني والصدأ وتبقع الاوراق
الالترناري .

Physiology and Microbiology

الفيزيولوجيا والأحياء الدقيقة

The Emergence of Faba Bean as Related to Soil Temperature in the Field

Helena Labuda
Institute of Horticultural Production, Agricultural University in Lublin, Leszczynskiego 58, 20-069 Lublin, POLAND.

Abstract

Soil temperatures at which seven cultivars of faba bean (*Vicia faba* L. var *major*) emerge were studied. The sum of temperatures at 5 cm deep from sowing till emergence was 222°C on average. The time from sowing till emergence, in days, depended on the mean temperature of soil (x), according to the equation Y = a/x. The value of "a" was determined to be 229.4. The time from germination till emergence varied from 8 to 3 days at 9°C and 22°C, respectively.

Introduction

Soil moisture and temperature determine the time it takes plants to emerge (Labuda 1978; Glinski and Labuda 1979).

The effect of temperature on the germination of vegetable seeds was studied more than 50 years ago by Kotowski (1926, 1927) who hypothesized that differences in the rates of germination are related to biochemical processes and therefore also depend on the chemical composition of seeds.

Bierhuizen and Wagenvoort (1974) determined the sums of the temperatures needed for germination of a number of vegetables as well as the minimum temperatures at which the species could germinate, and indicated practical applications of the parameters.

In 1981, Labuda found systematic differences in emergence of faba bean related to the time of sowing and showed that temperature of the soil was the major determinant because soil moisture was not a limiting factor in the studies. As a follow-up to the previous work, this study was undertaken to determine the sum of temperatures necessary for the emergence of faba bean and to establish the relation between emergence and the mean temperature of soil in the field.

Materials and Methods

The experiment was carried out at Lublin, Poland, 51°14' N, 22° 38' E, at an altitude of 215 m, on a brown soil developed from loess. It included seven cultivars of faba bean (*Vicia faba* L. var *major* Harz.). Five cultivars were introduced every year from the UK -- Aquadulce Claudia, Bunyard's Early Exhibition, Giant Four Seeded Green Windsor, Giant Four Seeded White Windsor, and Masterpiece Green Longpod -- and the other two were cultivars grown in Poland: Windsor Bialy and Hangdown Bialy.

Seeds were sown by hand, 5 cm deep, on three dates: the first, early sowing, on 27 April, the second, middle early sowing, on 10 May, and the third, late sowing, on 24 May. All the cultivars were sown on plots 5 m long and 1.2 m wide. Rows were 40 cm apart, and spacing within rows was 20 cm: 75 seeds (3 rows of 25 seeds) were sown in each plot of 6 m^2 surface area. The experiment lasted 4 years (from 1977 to 1980) and included three dates of sowing, seven cultivars, and four replications.

Soil temperature at a depth of 5 cm, was measured three times daily at 0700, 1300, and 1900 h, and was averaged. This value was regarded as the mean diurnal temperature and was used for the calculation of sums of temperatures from sowing till emergence. Emergence was assessed every morning, and it was recorded full emergence when 70 plants in a plot were observed. Daily observations included also the moisture of soil, whose suction force varied from 10 to 40 kPa.

Results and Discussion

The mean sums of temperatures and the mean time from sowing till emergence of faba bean varied significantly among years (Table 1) and dates of sowing (Table 2).

Table 1. Average of the sum of temperatures and mean time to emergence from sowing of faba bean, 1977-80.[a]

Year	Sum of temperatures (°C)	Mean time to emergence (days)
1977	196.4a	14.8a
1978	224.8b	17.8b
1979	253.6c	14.9a
1980	213.9ab	17.7b

[a] Means followed by different letter(s) are significantly different at $P < 0.05$.

Table 2. Average of sum of temperatures and mean time to emergence from sowing of faba bean in relation to sowing time.[a]

Sowing time	Sum of temperatures (°C)	Mean time to emergence (days)
Early	225.5ac	20.2c
Middle early	237.9bc	16.4b
Late	203.1a	12.2a

[a] Numbers followed by different letter(s) are significantly different at $P < 0.05$.

The cultivars under study had similar temperature requirements for emergence (range of 211.3 to 232.5°C), but the cv Bunyard's Early Exhibition required the highest sum of temperatures, Hangdown Bialy and Windsor Bialy the lowest (Table 3).

The sum of temperatures from sowing till emergence was, on average, 222°C. Plotting the mean time from sowing till emergence against the mean temperature (x) of the soil (only the means of nonidentical points of the relationship were included) produced a curve close to an equiaxial hyperbola ($y = a/x$), and within the range of values obtained from the experiment "a" was 229.4.

The data of Bierhuizen and Wagenvoort (1974) were used as a basis for the plotting of the calculated relationship between the temperature and the germination of *V. faba* to identify the form of the relationship. For a range of 6 - 22°C, germination should occur within 6 - 26 days (Fig. 1). I found that plotting the date of germination against temperature also produced a hyperbola, where, on average, "a" was 153.0. The equations obtained were used as a basis for the calculation of the difference between the

Table 3. Differences in sums of temperatures and mean time to emergence from sowing for seven cultivars of faba bean.[a]

Cultivar	Sum of temperatures (°C)	Mean time to emergence (days)
Aquadulce Claudia	223.9a	16.5a
Bunyard's Early Exhibition	232.5a	17.1a
Giant Four Seeded Green Windsor	227.4a	16.7a
Giant Four Seeded White Windsor	226.8a	15.6a
Masterpiece Green Longpod	221.5a	16.2a
Windsor Bialy	211.8a	15.3a
Hangdown Bialy	211.3a	15.6a

[a] Numbers followed by different letter(s) are significantly different at $P < 0.05$.

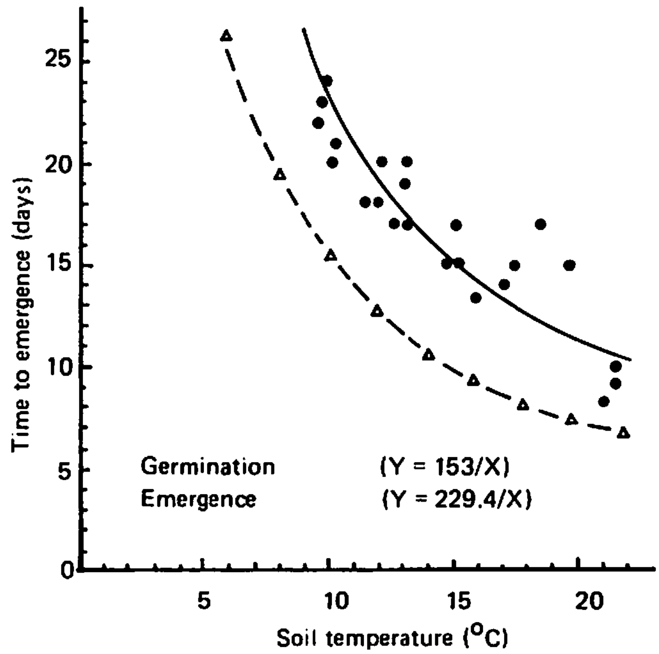

Fig. 1. Time to germination and emergence (from sowing) of faba bean related to soil temperature in the field. Sum of temperatures and minimum temperature (T min) to germination were 148°C and 0.4°C, respectively. Time to germination (in days) was calculated as $t = S/(T - T\ min)$.

germination and the emergence of faba bean. In the experiment carried out, the difference was "a" = 76.4. It was possible to determine the difference between germination and emergence, for a range of mean temperatures of soil in the field from 9°C to 22°C. The time from germination to emergence varied from 8 to 3 days, corresponding to the temperature of the soil.

References

Bierhuizen, J.F. and Wagenvoort, W.A. 1974. Some aspects of seed germination in vegetables. I:

Determination and application of heat sums and minimum temperature for germination. Scientia Horticulturae 2: 213-219.

Glinski, J. and Labuda, S. 1979. Oxygen diffusion rate and redox potential as indices of the oxygenation of flax and bean roots during emergence. Polish Journal of Soil Science 12: 75-80.

Kotowski, F. 1926. Temperature relations in germination of vegetable seed. Proceedings of the American Society for Horticultural Science 23: 176-184.

Kotowski, F. 1927. Temperature relations in germination of vegetable seeds. Roczniki Nauk Rolniczych i Lesnych 17: 397-405. (in Polish).

Labuda, H. 1981. Growth, development and green seed yield of faba bean (*Vicia faba* L. var *major Harz.*). Ph.D. thesis. Agricultural University in Lublin, Poland. (in Polish).

Labuda, S. 1978. Soil oxygen diffusion rate and soil redox potential as indices of the roots' oxygenation during emergence. Ph.D. thesis. Agricultural University in Lublin, Poland. (in Polish).

ظهور بادرات الفول وعلاقة ذلك بدرجة حرارة التربة في الحقل

ملخص

تمت دراسة درجات حرارة التربة التي ظهرت عندها بادرات سبعة أصناف من الفول (Vicia faba L. var major) ، وكان مجموع درجات الحرارة على عمق 5 سم من التربة منذ الزراعة وحتى ظهور البادرات هو 222 مئوية بالمتوسط . أما الفترة (بالايام) بين الزراعة وحتى ظهور البادرات فقد توقفت على متوسط درجة حرارة التربة وفق المعادلة التالية Y = a/x . وقد حددت قيمة a بأنها 229.4 ، وتباينت الفترة من الانبات وحتى ظهور البادرات ما بين 8 الى 3 أيام على حرارة 9 و22 مئوية على التوالي .

Study of the Action of Three Rhizobial Strains and their Combination on Vicia faba L.

R.S. Shukla, C.B. Singh, D. Khare and G.K. Koutu
Department of Plant Breeding and Genetics,
J.N. Agricultural University, Jabalpur, M.P.,
INDIA

Abstract

The rhizobia isolated from faba bean, soybean, and chickpea were tested, alone and in combination for their symbiosis with faba bean (host). Measurements of nodules and yield indicated that rhizobia isolates from faba bean were most effective in symbiosis with faba bean. Plants grown in soil inoculated with mixtures that included rhizobia isolates from faba bean with those from chickpea or soybean performed better than other combinations (i.e., faba bean + chickpea + soybean; and chickpea + soybean).

Introduction

Legumes are important in crop rotation because of their ability to fix nitrogen. Among legumes faba bean (*Vicia faba* L.) has been observed to fix a maximal amount of nitrogen/ha (Nutman 1976), but this ability depends on the availability of *Rhizobium* spp. that can colonize the legume. Tang *et al.* (1982) detected no symbiotic response when four legume genera were inoculated with rhizobia isolated from other genera; seven in this experiment. The objective of our work, therefore, was to determine the effect on *V. faba* of inoculation with rhizobial strains isolated from *V. faba* L., *Cicer arietinum* L., and *Glycine max* L. Merr..

Materials and Methods

The experiment was conducted in a greenhouse. Rhizobial strains were isolated from faba bean (93-23), soybean (S9) and chickpea (H-45) and were multiplied. We prepared combinations of the rhizobial strains by mixing equal numbers of cells from the different cultures: faba bean + soybean, faba bean + chickpea, soybean + chickpea, and faba bean + soybean + chickpea.

Leonard jars were filled with sterilized (121°C,5 h) nitrogen-free sand. Then in each jar four sterilized (rectified sprit 5 min followed by 5-6 washings with sterilized water) and presoaked seeds (18 h in distilled water) of faba bean cultivars JV-24 and JV-67 were planted. After germination of the seeds, the soil was inoculated with the Rhizobium culture (by injecting broth into the sand with a syringe). Each treatment was replicated four times. The plants were watered with sterilized Jansen's nutrient solution (Jansen 1942).

After 45 days, observations on the number of nodules/plant, dry weight of nodules/plant, dry weight of roots and shoots/plant and total biological yield

Table 1. Mean performance of rhizobial strains in combination with variety JV-24 and JV-67 of *Vicia faba* L.

Rhizobial strain	Faba bean cultivar	Number of nodules/ plant	Dry Wt. nodules/ plant (g)	Dry Wt. of shoot/ plant (g)	Dry Wt. of root/ plant (g)	Biological yield/ plant (g)
Uninoculated control	JV-24			0.27	0.20	0.48
	JV-67			0.24	0.22	0.44
Faba bean	JV-24	110.83	0.04	0.66	0.31	1.02
	JV-67	96.50	0.04	0.58	0.26	0.88
Chickpea	JV-24	29.66	0.02	0.32	0.22	0.55
	JV-67	34.00	0.03	0.37	0.27	0.67
Soybean	JV-24	22.16	0.03	0.30	0.19	0.50
	JV-67	22.50	0.03	0.55	0.34	0.64
Faba bean + chickpea	JV-24	78.33	0.04	0.63	0.31	1.00
	JV-67	65.83	0.03	0.50	0.28	0.80
Faba bean + soybean	JV-24	65.66	0.02	0.45	0.22	0.67
	JV-67	53.83	0.03	0.36	0.20	0.58
Chickpea + soybean	JV-24	41.33	0.05	0.55	0.28	0.58
	JV-67	36.16	0.05	0.32	0.20	0.53
Faba bean + chickpea + soybean	JV-24	58.33	0.03	0.42	0.20	0.70
	JV-67	53.00	0.02	0.40	0.26	0.67
SE ±	JV-24	0.380	0.010	0.155	0.020	0.008
	JV-67	0.170	0.005	0.105	0.005	0.003

were recorded. The efficiency of the treatments was compared by the mean performance.

Results and Discussion

Both varieties of faba bean performed best when inoculated with pure faba bean *Rhizobium* (Table 1). Although the strains from chickpea and soybean and their combinations were able to colonize the legume, the crop growth was poor. The faba bean *Rhizobium* when combined with strains from chickpea or soybean performed better than other combinations. The mixture of the three strains of rhizobia performed poorly due to interaction at the time of nodule initiation.

References

Jansen, H.L. 1942. Nitrogen Fixation in Leguminous Plants. Proceedings of the Linnean Society of New South Wales 67: 98-108.

Nutman, P.S. 1976. IBP field experiments on nitrogen fixation by nodulated legumes. Pages 211-237 *in* Symbiotic Nitrogen Fixation in Plants (Nutman, P.S., ed.). Cambridge University Press, Cambridge, England.

Tang, M., Tamayo, E.V. and Marquez, B. 1982. Study of the action of seven rhizobium strains on four leguminous species. From Resumenes Analiticos sobro Pasto's Tropicales, 5(3).

دراسة تأثير سلالات من البكتيريا العقدية (الريزوبيا) وخلائطها على الفول Vicia faba L.

ملخص

جرى اختبار ثلاث سلالات من البكتيريا العقدية كل على حدة أو مع بعضها في خلطات كانت قد عزلت من ثلاثة محاصيل هي الفول ، وفول الصويا ، والحمص وذلك لتحديد قدرتها التعايشية أو التكافلية مع الفول (النبات المضيف) . وقد دلت نتائج دراسة العقد البكتيرية والغلة الى ان عزلات البكتيريا العقدية الماخوذة من الفول كانت اكثر فاعلية في التعايش مع الفول . ان النباتات المزروعة في تربة ملقحة بخلطات بكتيريا عقدية مكونة من عزلات ماخوذة من نبات الفول مع أخرى مأخوذة من الحمص أو فول الصويا قد أظهرت كفاءة أعلى من تلك المزروعة مع خلطات بكتيريا عقدية أخرى (أي فول + حمص + فول صويا ، أو حمص + فول صويا) .

Agronomy and Mechanization

المعاملات الزراعية والمكننة

Response of Faba Bean to Sowing Date at New Halfa, Sudan

Ahmed Mohamed Gorashi
New Halfa Research Station,
P.O. Box 17, New Halfa,
SUDAN

Abstract

Field trials were conducted to find the optimal sowing date for faba bean at New Halfa, Sudan. Seeds of three cultivars of faba bean BM9/3, BF2/2, and H72 were sown at 15-day intervals (from 1 October to 15 November for two seasons) in a randomized complete block design with four replications. The crops planted between 15 October and 1 November performed best, and the cultivars BF2/2 and H72 outyielded BM9/3, and appeared to be better adapted to conditions at New Halfa. Among the yield components seed weight/plant was most affected by sowing date.

Introduction

Faba bean is an important food crop in the Sudan. Traditionally, it is grown in the Northern region of Sudan. To reduce imports of faba bean, the government introduced the crop to new areas such as the agricultural schemes in the Gezira, Rahad, and New Halfa.

Faba bean is well suited to the New Halfa Scheme (lat. 15° 19'N and long. 38° 41'E), where wheat is mainly grown as a winter crop. Faba bean can be cropped with wheat in the same rotation because it has a similar growth cycle. Also, being a leguminous crop, it improves soil fertility. However, the varieties currently being grown in the scheme suffer from heat stress, and, consequently both area and production of the crop have declined (Hassan 1984). This study was undertaken to find the optimum sowing date and the varieties best adapted at new Halfa.

Materials and Methods

At New Halfa Research Station during winter seasons 1981/82 and 1982/83. seeds of three faba bean cvs BM9/3, BF2/2, and H72 were planted at 15 -day intervals between 1 Oct and 15 Nov in a randomized complete block design with four replications.

The plants were spaced 20 cm apart on both sides of 60-cm ridges, the seed rate being about 119 kg/ha (2 seeds/hole). The plot size was 3 m X 6 m, of which 1.8 m X 4 m was harvested for yield. The crop was irrigated every 10-14 days, sprayed with insecticides, and kept weed-free.

Seed yield was measured in both years, whereas some other yield components were studied in 1982/83.

Results

In both seasons, the different sowing dates produced a highly significant effect ($P < 0.01$) on seed yield, with highest yields obtained from crops planted 15 Oct (Tables 1 and 2). Sowing of the crop in 1 Oct 1981/82 and 15 Nov 1982/83 resulted in lowest yields.

Table 1. Seed yield of three cultivars of faba bean sown on four dates at New Halfa, Sudan, during 1981/82 season.

	Mean seed yield (kg/ha)
Sowing date	
1 Oct	762
15 Oct	1476
1 Nov	1428
15 Nov	1142
SE +	95
Cultivar	
BM9/3	1047
BF2/2	1309
H72	1238
SE +	95

Table 2. Response of faba bean to sowing date at New Halfa, Sudan, 1982/83.

	Seed yield (kg/ha)	Pods/plant	Seed weight/ plant (g)	Branches/ plant	Plant height (cm)
Sowing date					
1 Oct	1761	30	24	7	81
15 Oct	1833	31	27	7	87
1 Nov	1809	31	25	6	51
15 Nov	1380	25	17	6	86
SE ±	100	1.7	1.7	0.4	2.1
Cultivar					
BM9/3	1618	-	-	-	89
BF2/2	1714	-	-	-	82
H72	1714	-	-	-	88
SE ±	48	-	-	-	1.8

The effect of sowing date was also significant for all yield components. It was highly significant ($P < 0.01$) only for seed weight/plant, and significant ($P < 0.05$) for the other components.

In both seasons, the varieties BF2/2 and H72 produced higher seed yields than BM9/3, but the difference was not significant. In 1982/83 the three cultivars differed significantly ($P < 0.05$) in plant height (Table 2).

Discussion

The sowing dates proved important in determining seed yields at New Halfa where the winter season is shorter and warmer than in the area where faba bean has traditionally been grown. Planting on 15 Oct and on 1 Nov allowed flowering to occur during the coolest month (January). Earlier and later sowing dates produced lower yields. These results agree with the findings by other investigators at Hudeiba (Hiepko and Kaufmann 1965; Baghdadi and Khalifa 1968; Abu Salih 1979; Ageeb 1981; Hassan 1984), and at Rahad (Mohamed 1986).

The cultivars BF2/2 and H72 outyielded BM9/3 and seem to be more adapted to the New Halfa scheme. All three cultivars produced medium-sized seeds. More work is needed to further illucidate the effect of sowing date on yield and yield components.

Acknowledgements

I would like to express my appreciation to the director general of the Agricultural Research Corporation of Sudan for allowing me to publish this paper and Dr. Farouk Ahmed Salih, faba bean breeder, for his encouragement.

References

Abu Salih, H.S. 1979. Broad bean mosaic virus BBMV. Pages 10-13 in Hudeiba Research Station Annual Report 1971/72. Agricultural Research Corporation, Wad Medani, Sudan.

Ageeb, O.A.A. 1981. Fieldbeans. Pages 10-12 *in* Hudeiba Research Station Annual Report 1976/77. Agricultural Research Corporation, Wad Medani, Sudan.

Baghdadi, A.M. and Khalifa, O. 1968. Control of powdery mildew attacking Ful Masri *Vicia faba*. Pages 30-32 *in* Hudeiba Research Station Annual Report 1967/68. Agricultural Research Corporation, Wad Medani, Sudan.

Hassan, M.S. 1984. Introduction of broad beans (*Vicia faba*) into the central clay plains of the Sudan. Acta Horticulturea 143: 205-212.

Hiepko, G.H. and Kaufmann, H. 1965. Ful Masri sowing date, spacing and nitrogen experiment. Pages 49-54 *in* Hudeiba Research Station Annual Report 1964/65. Agricultural Research Corporation, Wad Medani, Sudan.

Mohamed M.B. 1986. Responses of faba beans to sowing date at El Rahad, Sudan. FABIS Newsletter 14: 19-22.

استجابة الفول لموعد الزراعة في حلفا الجديدة بالسودان

ملخص

اجريت تجارب حقلية لتحديد الموعد المثالي لزراعة الفول في حلفا الجديدة بالسودان . وقد زرعت بذور ثلاثة أصناف من الفول هي BM 9/3، BF 2/2 و H 72 بفواصل زمنية مدتها 15 يوما (من 1 تشرين الاول/اكتوبر وحتى 15 تشرين الثاني/نوفمبر وعلى موسمين) وفق تصميم القطاعات العشوائية الكاملة بأربعة مكررات . وقد كانت كفاءة المحاصيل التي زرعت بين15 تشرين الاول/اكتوبر و 1 تشرين الثاني/نوفمبر هي الافضل ، كما تفوق الصنفان BF 2/2 و H 72 على الصنف BM 9/3 ، وظهر انهما متأقلمان بشكل أفضل تحت الظروف السائدة في حلفا الجديدة . ومن بين مكونات الغلة كان وزن البذور/نبات هو الاكثر تأثرا بموعد الزراعة .

Pest and Disease

الآفات والأمراض

Electrophoretic Separation: An Alternative Simple Procedure for the Purification of Broad Bean Mottle and Alfalfa Mosaic Viruses

K.M. Makkouk[1], L. Katul[2] and A. Rizkallah[2]
1. ICARDA, P.O. Box 5466, Aleppo, Syria.
2. Lebanese National Council for Scientific Research and Faculty of Agricultural and Food Sciences, American University of Beirut, Beirut, LEBANON.

Abstract

A procedure to purify broad bean mottle virus (BBMV) and alfalfa mosaic virus (AMV) using agarose-acrylamide gel electrophoresis was developed. Infected tissue was extracted in 0.2 M phosphate buffer, pH 7.2 containing 0.01 M EDTA and 1% sodium sulfite. The extract was clarified by low speed centrifugation (10,000 rpm, 20 min) and the virus was then precipitated by 6% polyethylene glycol + 2% sodium chloride and centrifugation at 12,000 rpm for 20 min. The partially purified virus preparation was electrophoresed in 0.5% agarose + 2% acrylamide gel for 4 h at 250 V. BBMV preparation produced one dense band and AMV produced two dense and two faint bands with no corresponding bands in the healthy extracts. When rabbits were injected with the gels containing the virus-specific bands of BBMV and AMV, the quality of the antiserum produced was good for the detection of the two viruses by ELISA.

Introduction

Electrophoresis is a simple technique for the separation of macromolecules including viruses (Van Regenmortel 1964). Bean yellow mosaic virus was recently purified by this method and a BYMV antiserum was produced (Makkouk *et al.* 1988). Such a procedure does not require the use of an ultracentrifuge, an expensive instrument to buy and maintain. The availability of an equally efficient procedure other than ultracentrifugation for the purification of BYMV, encouraged us to apply it for the purification of two other viruses of faba bean, broad bean mottle and alfalfa mosaic viruses.

Materials and Methods

Virus purification

Plants of *Vicia faba* L. (cv Syrian Local) and *Nicotiana glutinosa* were mechanically inoculated with isolates of BBMV (from faba bean, SV 48-86) and AMV (from chickpea SC 10-86), respectively. The two virus isolates were identified earlier in our laboratory from infected plants in Syria. Both viruses were purified by using the same procedure: 10 g of infected tissue were extracted in 30 ml of 0.2 M phosphate buffer, pH 7.2 containing 0.01 M EDTA and 1% sodium sulfite. The extract was clarified by centrifugation at 10 000 rpm for 20 min and the virus was precipitated from the supernatant by the addition of 6% polyethylene glycol + 2% sodium chloride and centrifugation at 12 000 rpm for 20 min. The pellets were suspended in 3 ml of 0.2 M phosphate buffer, pH 7.2. Healthy tissue of faba bean and *N. glutinosa* were processed in parallel. Electrophoresis of the partially purified BBMV and AMV was carried out on 0.5% agarose + 2% acrylamide gels following the procedure reported for BYMV (Makkouk *et al.* 1988).

Antiserum production and serology

Areas in the unstained gels which corresponded to the virus bands in the stained gels were removed, homogenized and emulsified (1:1) with Freund's complete adjuvant for the first injection and with incomplete adjuvant for subsequent injections. Four intramuscular injections were given to each rabbit at weekly intervals. A booster injection was given to the rabbit immunized with BBMV three weeks after the fourth injection.

Immunoglobulins (IgG) were fractionated from the antisera using the caprylic acid method of Steinbuch and Audran (1969). The reactivity of the isolated IgG was evaluated by ELISA (Clark and Adams 1977).

Results and Discussion

The electrophoresis of the partially purified BBMV and AMV in 2% acrylamide plus 0.5% agarose produced specific bands in the gel with no corresponding bands in the healthy samples (Fig. 1). BBMV produced one virus-specific dense band, whereas AMV produced 2 dense and two faint virus-specific bands. The wide BBMV band however, seemed to be the result of two bands close to each other, but whose high concentration in the gel made it difficult to appear as two separate bands. When assayed by ELISA, the BBMV and AMV bands gave a strong reaction with a BBMV antiserum prepared earlier in our laboratory, and with an AMV antiserum provided by Dr. D.Z. Maat, IPO, Wageningen, The Netherlands, respectively. Consequently, the virus-specific bands for each virus were pooled and used for antiserum production.

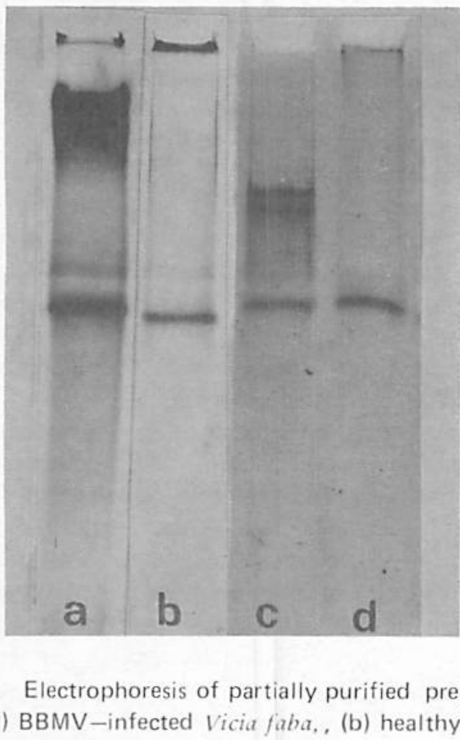

Fig. 1. Electrophoresis of partially purified preparations from (a) BBMV–infected *Vicia faba*., (b) healthy *V. faba*, (c) AMV–infected *Nicotiana glutinosa*, and (d) healthy *N. glutinosa* plants in 2% polyacrylamide + 0.5% agarose gels using a tris–glycine buffer, pH 8.3. Electrophoresis was carried out at 250 V and 18 mA/ slab, for 4 h. Migration was towards the anode.

Table 1. ELISA values[a] obtained from testing virus-infected and healthy tissues using IgG from the different bleedings of AMV and BBMV antisera obtained by injecting rabbits with virus bands from agarose-acrylamide gels after electrophoretic separation.

	BBMV[b]		AMV[c]	
Bleeding	Infected *V. faba*	Healthy *V. faba*	Infected *N. glutinosa*	Healthy *N. glutinosa*
1	0.448	0.017	0.341	0.000
2	0.473	0.018	0.309	0.000
3	0.491	0.017	NT[d]	NT
4	0.505	0.000	NT	NT
5	0.492	0.013	NT	NT

a Enzyme conjugate dilution used was 1:1000. Absorbance was read at 405 nm.

b Plates were coated with 1 μg/ml IgG and substrate incubation time was 45 min.

c Plates were coated with 10 μg/ml IgG and substrate incubation time was 2 h.

d Not tested.

When the fractionated IgG from the different bleedings of the BBMV and AMV antisera were used for coating the plates and testing BBMV -and AMV-infected tissue, high ELISA values were obtained with virus-infected extracts and very low values with healthy extracts (Table 1).

BBMV and AMV are known to reach high concentrations in infected tissue and high virus yields from purification are reported for both viruses (Jaspars and Bos 1980; Lane 1979). For this reason it was possible to obtain from 10 g of infected tissue enough purified virus of BBMV and AMV to inject the rabbits and produce antisera of good quality for diagnostic purposes.

Acknowledgement

This research was supported by a grant from the Directorate General for International Cooperation (DGIS) of the Netherlands, Minister for Development Cooperation.

References

Clark, M.F. and Adams, A.N. 1977. Characteristics of the microplate method of enzyme-linked immunosorbent assay for the detection of plant viruses. Journal of General Virology 34: 475-483.

Jaspars, E.M.J. and Bos, L. 1980. Alfalfa mosaic virus. CMI/AAB Descriptions of Plant Viruses 229, 7pp.

Lane, L.C. 1979. Bromovirus group. CMI/AAB Descriptions of Plant Viruses 215, 4 pp.

Makkouk, K.M., Katul, L. and Rizkallah, A. 1988. A simple procedure for the purification and antiserum production of bean yellow mosaic virus. Journal of Phytopathology (In press).

Steinbuch, M. and Audran, R. 1969. The isolation of IgG from mammalian sera with the aid of caprylic acid. Annals of Biochemistry and Biophysics 134: 279-284.

Van Regenmortel, M.H.V. 1964. Purification of plant viruses by zone electrophoresis. Virology 23: 495-502.

الفصل بالهجرة الكهربائية : طريقة بسيطة وبديلة لتنقية فيروسي تبرقش الفول وموزاييك الفصة

ملخص

تم استخدام طريقة جديدة لتنقية فيروس تبرقش الفول (BBMV) وفيروس موزاييك الفصة (AMV) باستخدام الهجرة الكهربائية داخل وسط مكون من الاجاروز والاكريلاميد تم استخلاص النسج المصابة في محلول فوسفاتي منظم 0.2 M ودرجة حموضة (pH) 7.2 تحتوى على 0.01 M EDTA و 1 %من كبريتات الصوديوم . وبعد تنقية جزئية للمستخلص باستعمال القوة الطاردة المركزية على سرعة بطيئة (10.000 دورة بالدقيقة) ولمدة 20 دقيقة تم ترسيب الفيروس باضافة 6 % من بولي أثيلين جليكول + 2 % كلوريد الصوديوم ثم جمع بواسطة الطرد المركزى بسرعة 12.000 دورة بالدقيقة ولمدة 20 دقيقة . خضع المستحضر الفيروسي المنقى جزئيا بعد ذلك للهجرة الكهربائية في هلام مكون من0.5% أجاروز + 2 % اكريلاميد لمدة 4 ساعات على 250 V . وقد اعطى فيروس تبرقش الفول شريطا كثيفا في حين اعطى فيروس موزاييك الفصة شريطين كثيفين وآخرين باهتين مع عدم وجود اشرطة مماثلة في المستخلصات السليمة . وعندما حقنت الارانب بالهلام الحاوى على الاشرطة الخاصة بفيروسي BBMV و AMV كانت نوعية المصل المضاد المنتج جيدة للكشف عن الفيروسين بطريقة الايزا ELISA.

Control of Orobanche spp. with Scepter Herbicide

J. Sauerborn, M.C. Saxena, H. Masri and K.H. Linke
ICARDA, P.O. Box 5466, Aleppo, SYRIA.

Abstract

Scepter (imazaquin) was tested as a new herbicide for controlling *Orobanche* spp. in faba bean crop. Two applications of Scepter at 10 g a.i./ha each, once at the tubercle stage and the second time at the bud stage of the underground development of *Orobanche* plant, gave almost complete control of the parasite (mostly *Orobanche crenata*). The treatment also resulted in some increase in the yield of faba bean over untreated check. Rates higher than 20 g a.i./ha of Scepter decreased faba bean yield.

Introduction

Faba bean production in many countries of the West Asia and North Africa region is hampered seriously by the parasitic weed broomrape (*Orobanche crenata* Forsk. and *O. aegyptiaca* Pers.). Attempts to control the parasite by using agronomic methods and herbicides have not been fully satisfactory (Jacobson 1986; Sauerborn and Saxena 1986). Glyphosate is by far the most commonly tested herbicide but its effectiveness has been variable (Jacobson and Levy 1986). Hence there is a need to test new herbicides. At the International Center for Agricultural Research in the Dry Areas (ICARDA) such studies have been underway at its main research station, Tel Hadya, in northern Syria. In a set of such studies, Scepter, a herbicide of imidazolinone family with common name imazaquin, was evaluated. This herbicide has been recommended for use in soybean and some other leguminous crops (Anonymous 1986, Sims *et al.* 1987). It proved very effective on tobacco (Hagood and Komm 1987) but when used at a rate of 100 g a.i./ha in faba bean it showed crop damage (Roberts and Bond 1984). This herbicide is usually applied either as a pre- or post- emergence spray at low rates and it controls mainly broadleaved weeds. It is phloem and xylem mobile and tends to accumulate in the growing parts of a plant. Because of this behavior it was thought worthwhile to test this chemical for controlling *Orobanche* in faba bean fields.

Materials and Methods

Experiments were carried out at the Tel Hadya farm of ICARDA in northern Syria, during the 1985/86 and 1986/87 seasons, on fields naturally infested with mainly *Orobanche crenata* (ICARDA 1986). Faba bean cultivar Syrian Local Large was used. The crop was grown rainfed. The seasonal total precipitation was 316 mm and 340 mm during the 1985/86 and 1986/87 seasons, respectively.

Plot size was 15 m^2. Scepter was sprayed as an aqueous solution with a knapsack sprayer at a volume of 400 l/ha. Different rates and times of application as given in Tables 1 and 2 were tested. Treatments were replicated 4 times in a randomized block design and data on *Orobanche* infestation and crop yield were collected and statistically analyzed.

Results and Discussion

In the first evaluation, in the 1985/86 season, 40 and 80 g a.i. Scepter/ha gave very promising *Orobanche* control (Table 1). However, these rates caused crop stunting and the yield was, therefore, reduced when compared to the unsprayed check. In this study, the total amount of herbicide applied ranged from 40 to 160 g a.i. Scepter/ha, but higher rates caused greater reduction in yield.

In the 1985/86 season, the tested rates of Scepter, which provided good control of *Orobanche*, had a high phytotoxic effect on the crop. Therefore, it was thought worthwhile to try lower doses of the herbicide for various postemergence applications in 1986/87. In addition, a preemergence application of 80 g a.i. Scepter/ha was included as a new treatment. Table 1 shows that the best *Orobanche* control occurred when 10 g a.i./ha of the herbicide was applied twice--once at the tubercle stage of the underground development of *Orobanche* and the second time when the *Orobanche* reached the bud stage (a stage when *Orobanche* shoot differentiation can be seen for the first time). The seed yield of faba bean showed slight improvement over

Table 1. Evaluation of Scepter to control *Orobanche* spp. in faba bean during the 1985/86 and 1986/87 seasons at Tel Hadya, northern Syria.

Rate and time of herbicide application (g a.i./ha)	*Orobanche* shoots/m^2	Crop seed yield (t/ha)	*Orobanche* dry weight as % of total biomass yield
1985/86			
Control (no herbicide)	21	1.08	3.81
40 g at tubercle (T) stage[1]	0	0.84	0.00
40g at T+40 g at bud (B) stage[1]	0	0.53	0.00
80 g at T	1	0.39	0.45
80 g at T+80 g at B	0	0.14	0.00
LSD (5%)	3.8	0.32	
1986/87			
Control (no herbicide)	40	2.32	2.20
80 g as preemergence [2]	2	1.72	0.20
20 g as postemergence (Pt)[3]	48	1.99	2.40
20 g as Pt+10 g at T	1	2.23	0.02
5 g at T	11	2.47	1.05
5 g at T+7.5 g at B	4	2.41	0.20
10 g at T	3	2.44	0.10
10 g at T+10 g at B	1	2.50	0.01
LSD (5%)	36.4	0.56	

1 (T) = Tubercle stage of underground development of Orobanche; (B) = Bud stage of underground development of Orobanche.
2 Preemergence = Before the emergence of faba bean.
3 Postemergence (Pt) = When faba bean plants were about 10 cm high.

Table 2. Effect of different rates and time of application of Scepter on the number of *Orobanche* shoot per m^2 and the yield of faba bean at Tel Hadya, 1986/87 season.

Rate of Scepter application (g a.i./ha)	Time of Scepter application			
	At start of flowering		At 100% flowering	
	Orobanche shoots/m^2	Seed yield (g/plant)	*Orobanche* shoots/m^2	Seed yield (g/plant)
Control (no herbicide)	5.7	26	16.4	22
10	0.0	25	0.0	31
20	0.0	29	0.0	25
40	0.0	18	0.0	24
60	0.0	18	0.0	20
80	0.0	7	0.0	21
LSD (5%)	3.6	8.0	1.9	9.0

the check although this was statistically ($P < 0.05$) nonsignificant. Very early applications (preemergence or early postemergence), as recommended for use of this herbicide in soybean (Anonymous 1986), failed to be effective in increasing yield. Postemergence application of 20 g a.i. Scepter/ha (when faba bean was 10 cm tall) did not control *Orobanche*. However, when this application was combined with an additional application of 10 g a.i./ha of the herbicide at the tubercle stage of *Orobanche* development, the control of *Orobanche* was significantly improved. Single application of 5 g a.i. of Scepter/ha at tubercle stage gave only partial control of *Orobanche*.

The timing of application of herbicide based on the stage of development of underground *Orobanche* entails practical difficulty because one has to dig up the root system of the crop to examine the *Orobanche* attachments. Hence, an additional trial was conducted during the 1986/87 season where the timing of herbicide application was based on crop phenology. Scepter was applied at different rates either at the start of flowering (mid March) or at 100% flowering (i.e. at end of March when each plant had at least one fully open flower). The results are shown in Table 2. *Orobanche* was completely controlled in all the plots that received Scepter whereas in check plots *Orobanche* shoots emerged. With an application rate of more than 20 g a.i. of Scepter/ha the crop yield tended to decrease. Therefore, this rate can be considered as a threshold for a postemergence application. It is also evident from the data in Table 2 that the crop was able to tolerate the herbicide better when it was applied at 100% flowering than at the beginning of flowering. Field studies at ICARDA (Hezewijk *et al.* 1987) have shown that the start of flowering in faba bean generally coincides with the stage of *Orobanche* development when most of the *Orobanche* attachments to faba bean roots are at the tubercle stage whereas at the 100% flowering they would have reached the bud and crownroot stages. Thus one could time the application of Scepter based on the crop phenology to reach the parasite at its most vulnerable stage.

The results of these studies clearly show the high potential of Scepter in controlling *Orobanche crenata*. There is, however, a need to further refine the information on the time and rate of application to reduce the crop phytotoxicity so that potential gains in yield from the control of the parasite could be actually realised. Perhaps a lower dosage, in split applications, at the appropriate stage of *Orobanche* and faba bean development would ensure this. Phytotoxicity to the crop may also be reduced by the use of a product formulation without surfactant. Investigations in this regard will be continued in the 1987/88 season at ICARDA.

References

Anonymous. 1986. Scepter herbicide. Product information. American Cyanamid Company, Wyne, N.J., USA, 8 pp.

Hagood, E.S., Jr. and Komm, D.A. 1987. Effect of rate and timing of imazaquin applications on the growth and yield of flue-cured tobacco. Tobacco International 189: 27-30.

Hezewijk, M.J. van, Pieterse, A.H., Saxena, M.C. and ter Borg, S.J. 1987. Relationship between sowing date and *Orobanche* (broomrape) development on faba bean (*Vicia faba* L.) and lentil (*Lens culinaris* Medikus) in Syria. Pages 377-390 *in* Parasitic Flowering Plants (Weber, H. Chr. and Forstreuter, W., eds.). Marburg, Federal Republic of Germany.

International Center for Agricultural Research in the Dry Areas (ICARDA). 1986. Pages 204-206 *in* Food Legume Improvement Program Annual Report for 1986.

Jacobson, R. 1986. Broomrape avoidance and control: agronomic problems and available methods. Pages 18-24 *in* Proceedings of a Workshop on Biology and Control of *Orobanche* (ter Borg, S.J., ed.). LH/VPO, Wageningen, The Netherlands.

Jacobson, R. and Levy, D. 1986. Glyphosate for *Orobanche* control in various crops; problems and promises. Pages 172-175 *in* Proceedings of a Workshop on Biology and Control of *Orobanche* (ter Borg, S.J., ed.). LH/VPO, Wageningen, The Netherlands.

Roberts, H.A. and Bond, W. 1984. Evaluation of AC 252, 214 for weed control in drilled vegetable crops. Annals of Applied Biology 104 (Supplement 5): 80-81.

Sauerborn, J. and Saxena, M.C. 1986. A review on agronomy in relation to *Orobanche* problems in faba bean (*Vicia faba* L.). Pages 160-165 *in* Proceedings of a Workshop on Biology and Control of *Orobanche*. (ter Borg, S.J., ed.), LH/VPO, Wageningen, The Netherlands.

Sims, G.R., Wehtje, G., McGuire, J.A. and Patterson, M.P. 1987. Weed control in peanuts (*Arachis hypogaea*) with imazaquin. Weed Science 35: 683-685.

مكافحة الهالوك Orobanche spp. بمبيد الاعشاب Scepter

ملخص

تم اختبار مبيد الاعشاب الجديد Scepter (imazaquin) لمكافحة الهالوك Orobanche spp. في محصول الفول . وقد أدى رش Secpter مرتين بمعدل 10 غ مادة فعالة/هـ في كل رشة ــ الاولى في طور اتصال الهالوك بالنبات العائل والثانية في طور البرعمة bud stage للجزء السفلي المتطور لنبات الهالوك ــ الى تحقيق مكافحة كاملة تقريبا للنبات الطفيلي (ومعظمه الهالوك المفرض Orobanche crenata) . كما نجم عن هذه المعاملة حدوث بعض الزيادة في غلة الفول مقارنة بالصنف الشاهد غير المعامل . أما المعدلات التي تزيد عن 20 غ/هـ من Scepter فقد ادت الى تناقص غلة الفول .

Estimation of Orobanche Seeds in Soil

S. Kachelriess
ICARDA, P.O. Box 5466, Aleppo, SYRIA.

Abstract

A simple method to determine the number of seeds of *Orobanche* spp. in soil is to centrifuge a sample of soil in a suspension of $MgSO_4$ to which a small amount of Kaoline is added and then to pour the supernatant through a 500 μm sieve over a 53 μm sieve. The seeds that accumulated on the 53 μm sieve can be counted easily if transferred to a graduated petridish and examined under a binocular microscope (16 X magnification).

Introduction

It is known that the distribution of *Orobanche* spp. seeds in soil is uneven. Therefore, in field experiments, variation in infestation levels is expected. To study the differences in infestation between plots, we need to assess the effectiveness of the control measures used (Ashworth 1976). Several investigators have attempted to deal with the variability by determining the numbers of seeds in soil samples (Krishna - Murty and Chandwani 1975; Ashworth 1976; Eplee 1976; Mueller 1980; Visser and Wentzel 1980; Bozan *et al.* 1981; Benz *et al.* 1984). The efficacy of different methods was tested in the present study, the aim being to adopt the most accurate method for field studies at ICARDA.

Materials and Methods

A technique for automatic sampling of soil has been developed in the USA (R.E. Eplee, personal communication, 1987), but in this investigation, soil samples up to 15-cm depth were taken manually with an auger. Five and four subsamples from 20-m^2 and 18-m^2 plots, respectively, were each mixed to form a single bulk sample.

The soil samples were taken from the experimental station of ICARDA at Tel Hadya. The soil is classified as Terra Rossa, with infestation by *Orobanche* ranging from 0 to more than 100 seeds/100 g of soil (Table 1. Sauerborn and Masri 1986, unpublished). Samples were taken also from a pot experiment in which faba bean (*Vicia faba* L.) was a host for *Orobanche* at different levels of infestation. The soil in the pot experiment was a mixture of Tel Hadya soil and river sand (3:1).

After being sieved coarsely (5 mm), the samples were air-dried and stored in open nylon bags. They were carefully mixed, as required for the determination of number of *Orobanche* seeds in infested soil. (Mueller 1980; Visser and Wentzel 1980).

The soil samples were divided into two equal portions (100 g each) and were centrifuged in 1000-ml tubes with 450-475 ml solution of $MgSO_4$ (specific gravity 1.16 g/ml) and Kaoline (two teaspoons). The Kaoline was to facilitate decanting of the solution after centrifugation. The mixture was processed for 2 min with a Vibromixer until all particles were in suspension. Centrifuge tubes were adjusted to the same weight and then centrifuged for 5 min at 2300 rpm.

The centrifuged suspension was decanted on a 500μm sieve mounted over 53μ m sieve. The residues on the 500μ m sieve were particles larger than *Orobanche* seeds and were discarded. Residues from the 53 m sieve were washed on microfiber filter papers that were placed in half open petridishes, air-dried, and stored.

The dried residues were placed on a 15-cm diameter petridish with graduations; they were distributed evenly by hand, and the petridish was tapped on the underside so that particles did not lie on one another. Whole seeds were counted under a binocular microscope at 16 X magnification. Seed coats or damaged seeds were not counted.

Table 1. Infestation of five Tel Hadya fields with *Orobanche* spp. seeds (Sauerborn and Masri 1986, unpublished).

Field	*Orobanche* spp. seeds (seeds/100 ml soil)		
	West	->	East
A9	1	1	0
A16	0	1	2
A25	21	31	36
B7	113	77	17
C14	16	31	26

Results and Discussion

The results obtained from this study show that the distribution of *Orobanche* seeds in Tel Hadya experimental station is variable. The plots varied from 3 to 74 seeds/100 g of soil (Table 2). The variability in distribution of seeds among the plots was evident even in small areas. The variation probably explains the large differences in numbers of emerged *Orobanche* spp. shoots per unit area and per host plant within the replications. The problem of determining the appropriate size and number of samples has been discussed by Barralis *et al.* (1986). In future, either more subsamples should be taken (Fenner 1985) or subsamples should be examined separately so that counted seeds in soil may correlate with *Orobanche* plants per unit area. Nevertheless dormancy of *Orobanche* seeds will still be a source for variability.

The seeds recovered from soil samples of the pot experiment were 54.6% of the total (this percentage is much lower than expected). Therefore, the method was checked with artificially infested Tel Hadya soil. Recovery rate in the check was always more than 90%, suggesting that seeds from the pot experiment had been trapped with rapidly settling sand particles during centrifugation (Ashworth 1976) or that some seeds disappeared because of germination or natural mortality. The recovery rate in pot experiments might be improved by removal of sand particles by wet sieving of soil before centrifugation.

Acknowledgements

I want to thank ICARDA for making this work possible, especially Dr. M.C. Saxena (for his advice and support), and Dr. J. Sauerborn and Mr. H. Masri (for their technical help).

Table 2. Distribution of infestation levels of plots (18 m^2) with *Orobanche* spp. seeds in soil in a field experiment (Faba Bean Sowing Date Trial 1986/87).

Replicate	*Orobanche* spp. (seeds/100 g soil) Date of sowing				
	Oct 22	Nov 5	Nov 20	Dec 4	Dec 21
1	13.5	7.0	74.0	9.5	8.5
2	9.5	6.5	10.5	3.5	16.5
3	20.5	16.5	4.5	35.5	7.5
4	15.5	4.0	4.0	32.5	20.0

References

Ashworth, V.J. 1976. Quantitative detection of seed of branched broomrape in California tomato soil. Plant Disease Reporter 60: 380-383.

Barralis, G., Chadoeuf, R. and Gouet, J-P. 1986. Essai de determination de la taille de l'echantillon pour l'etude du potentiel semencier d'un sol. Weed Research 26: 291-297.

Benz, W., Koch, W. and Moosmann, A. 1984. Ein Extraktionsverfahren zur Bestimmung des Unkrautsamenpotentials in Boden. Zeitschrift fuer Pflanzenkrankheiten und Pflanzenschutz, Sonderheft 10: 109-114.

Bozan, J.I.R., Leon, R.G., Chaviano, P.F. and Gongora, J.V. 1981. Determinacion del potencial de semillas de *Orobanche* en los suelos. Centro Agricola, Enero - Abril 1981: 61-65.

Eplee, R.E. 1976. Determination of *Striga* seeds in soil. USDA Witchweed Laboratory, PO Box 269, Whiteville, North Carolina, USA.

Fenner, M. 1985. Seed ecology. Chapmann and Hall. New York, USA.

Krishna-Murty, G.V.G. and Chandwani, G.H. 1975. Method for isolation of germinated and ungerminated *Orobanche* seeds from soil. Indian Phytopathology 27: 447-448.

Mueller, J. 1980. Ein verbessertes Extraktionsverfahren fuer *Heterodera schachtii*. Nachrichtenblatt des Deutschen Pflanzenschutzdienstes 32: 21-24.

Visser, J.H. and Wentzel, L.F. 1980. Quantitative estimation of *Alectra* and *Striga* seed in soil. Weed Research 20: 77-81.

تقدير بذور الهالوك Orobanche في التربة

ملخص

هناك طريقة بسيطة لتحديد عدد بذور الهالوك Orobanche spp. في التربة تتمثل بوضع عينة من التربة في معلق من $MgSO_4$ مضاف اليه مقدار ضئيل من الكاولين ، وبعد الطرد بالقوة الطاردة المركزية تصب المادة الطافية عبر منخل 500 µm موضوع على منخل 53 µm . ان البذور المتراكمة على منخل 53 µm يمكن عدها بسهولة اذا ما نقلت على اطباق بترى مدرجة وفحصت تحت مجهر ثنائي العينية (بتكبير × 16) .

Seed Quality and Nutrition

جودة البذور والتغذية

Effect of Seed Coat and Cotyledons on the Texture of Cooked Faba Bean (Medammis)

A.M. El-Tabey Shehata, H.M. Zeinah and M.M. Youssef
Department of Food Science and Technology, College of Agriculture, University of Alexandria, Alexandria, EGYPT.

Abstract

The effect of seed coat on the hydration capacity of dry seeds and on the hydration and texture of cooked ones was studied on six freshly harvested faba bean samples [3 hard-to-cook (H) and 3 soft-to-cook (S)]. The seed coat had a slight effect on the hydration capacity of dry seeds (7 to 14% for S samples, and 11 to 17% for H samples). In S samples, although the seed coat constituted only 13-14% of the seed weight, it was reflected in 64-65% of the texture of cooked seeds indicating the significance of its chemical nature rather than its permeability. The cotyledon has almost as much effect as the seed coat on the texture of H samples.

Introduction

Variation in cooking time of legume seeds has been known for a long time, and has been attributed to genetical and environmental factors, particularly to climatic conditions and available nutrients (P,K) in soil (Halstead and Gfeller 1964; Bourne 1967; Wassimi *et al.* 1978; Shehata *et al.* 1987).

Shehata *et al.* (1985) reported a highly significant correlation between the percentage of seed coat and hydration coefficient of dry faba bean seeds with the texture and hydration coefficient of cooked ones. The texture of cooked legumes was found to be affected mainly by the water absorption capacity of seeds (Sefa-Dedeh *et al.* 1979), and by the chemical composition of the cell wall of cotyledons (Mattson *et al.* 1950). Morris *et al.* (1950) found that water absorption capacity is mainly attributed to permeability of seed coat (i.e. hard shell) and sometimes to the decorticated seeds (sclerema).

It was suggested that the interrelationship between pectic substances, phytin and divalent cations in the cotyledon affects the texture of cooked beans (Mattson *et al.* 1950; Muller 1967; Shehata *et al.* 1983). This study aims to evaluate the role of both seed coat and decorticated seeds (i.e., cotyledons) on the texture of cooked faba beans (soft-to-cook and hard-to-cook samples).

Materials and Methods

Several samples of freshly harvested faba bean seeds (Crops of 1985 and 1986) were tested for their texture after cooking, and six samples from each crop (3 soft-to-cook and 3 hard-to-cook) were selected accordingly.

Percentages of seed coat and hydration coefficient (HC) of whole and decorticated dry seeds were determined. Hydration coefficient and texture of cooked beans were measured before and after decorticating (i.e., decorticating was done after cooking). Faba bean seeds were cooked by autoclaving at 115.5°C for 2 h. Texture was measured as maximum shear force using Ottawa Texture Measuring System (Shehata *et al.* 1985). All tests were done in triplicates.

Results and Discussion

Seed coat percentage ranged from 13.4 to 15.7% and was slightly higher in hard-to-cook (H) than in soft-to-cook (S) seeds (Tables 1 and 3). On the other hand, hydration coefficient (HC) of whole and decorticated dry seeds was slightly higher in (S) than in (H) seeds. The effect of seed coat on HC was small (7 to 17%) while HC of cooked seeds was almost twice that of dry seeds. Although variations between 1985 and 1986 samples were evident, the ratio between H and S samples was very close (Table 3), except that for seed coat

Table 1. Effect of seed coat on the hydration capacity of faba bean seeds.[1]

	Sample	Seed coat (%)	Hydration coefficient (HC) Seeds soaked for 2 h: Whole	Decorticated	Cooked seeds	Seed coat[2] effect	Seed coat[3] effect (%)
	S	13.9[d]	126.5[b]	135.9[cd]	260.2[ab]	9.4	7.4
	S	13.5[e]	127.9[a]	138.9[a]	259.5[b]	11.0	8.6
1985	S	13.4[e]	127.1[ab]	136.2[cd]	262.1[a]	9.1	7.1
	H	14.2[c]	121.9[c]	135.6[a]	240.9[c]	13.7	11.2
	H	15.7[a]	121.3[c]	136.9[b]	239.8[c]	15.6	12.8
	H	15.1[b]	122.1[c]	136.4[bc]	241.2[c]	14.3	11.7
	S	14.0[e]	134.4[a]	150.9[b]	256.4[a]	16.5	12.2
	S	13.9[e]	132.9[b]	151.0[b]	252.5[c]	18.1	13.6
1986	S	14.3[d]	134.0[a]	153.0[c]	254.2[b]	19.0	14.1
	H	14.5[c]	126.9[cd]	146.5[c]	227.8[e]	19.6	15.0
	H	15.1[a]	127.5[c]	148.0[c]	230.2[d]	20.5	16.0
	H	14.8[b]	126.4[d]	148.1[c]	227.8[e]	21.7	17.1

[1] Means followed by different letter (s) (for each year) are significantly different at 1% level of probability.

[2] Seed coat effect = HC of decorticated seeds - HC of whole seeds.

[3] Percentage of seed coat effect = $\frac{\text{Seed coat effect}}{\text{HC of whole seeds}} \times 100$

effect on HC, which was much higher for 1985 than for 1986 samples. Samples of 1986 which had higher HC for dry seeds, had lower HC and texture for cooked beans than the 1985 samples. Tables 2 and 3 show that seed coat had great effect on the texture of cooked faba bean seeds, particularly in the soft-to-cook samples. The effect of seed coat on the texture of cooked beans measured as maximum shear force was about 41 out of 64 (kg/100 g) for S samples and increased to about 52.5 out of 107 (kg/100 g) for H samples. The cooked decorticated beans contributed by about 35 and 52% to the texture of S and H samples, respectively.

Seed coat which constituted 13-14% of the S samples, contributed to 64% of the texture of cooked beans indicating the significance of its chemical nature rather than its permeability. Muller (1967) and Jackson and Varriano-Marston (1981) reported that removal of seed coat before the cooking of several types of beans reduced the cooking time by 60 to 75%. Cooking decorticated faba bean reduced cooking time by about 80%, but produced an entirely different product (besara; mashed gel) from that obtained from cooking whole faba bean seeds (medammis).

The cotyledons of hard-to-cook samples contributed to about 52% of the texture of cooked beans indicating that the hard-to-cook phenomenon in faba bean is due mainly to differences in cotyledon structure and

Table 2. Effect of seed coat on the texture of cooked faba bean seeds.[1]

	Sample	Max.shear force (kg/100 g): Whole seeds	Decorticated seeds	Seed[2] coat effect	Texture of[3] decorticated seeds (%)
	S	67.7[a]	24.1[a]	43.6	35.6
	S	65.3[a]	23.6[a]	41.7	36.1
1985	S	63.4[a]	20.9[a]	42.5	32.9
	H	112.8[b]	57.4[b]	55.4	50.8
	H	116.2[b]	59.3[b]	56.9	51.0
	H	112.3[b]	58.7[b]	53.6	52.2
	S	61.8[a]	21.6[a]	40.2	34.9
	S	64.8[a]	23.8[a]	41.0	36.7
1986	S	63.9[a]	23.7[a]	40.2	37.1
	H	105.2[b]	56.0[b]	49.2	53.2
	H	107.5[b]	57.2[b]	50.3	53.2
	H	107.0[b]	56.2[b]	50.8	52.5

[1] Means followed by different letter(s) (for each year) are significantly different at 1% level of probability.

[2] Seed coat effect = Maximum shear force of whole seeds - maximum shear force of decorticated seeds.

[3] Percentage of texture of decorticated seeds = $\frac{\text{Max.shear force of decorticated seeds}}{\text{Max.shear force of whole seeds}} \times 100$

Table 3. Mean values for the properties of soft-to-cook (S) and hard-to-cook (H) faba bean samples.

Crop	Samples	Dry seed						Cooked seeds (autoclaved at 115.5 °C for 2 h			
		Seed coat (%)	Hydration coefficient (HC): Seeds soaked for 2 h, Whole	Hydration coefficient (HC): Seeds soaked for 2 h, Decorticated	Hydration coefficient (HC): Cooked seeds	Seed[1] coat effect	Seed[1] coat effect (%)	Maximum shear force (kg/100 g): Whole	Maximum shear force (kg/100 g): Decorticated	Seed coat effect[2]	Texture of decorticated seeds[2] (%)
1985	S	13.60	127.20	137.00	260.60	9.80	7.70	65.5	22.9	42.6	34.90
	H	15.00	121.80	136.30	240.60	14.50	11.90	113.8	58.5	55.3	51.30
1986	S	14.10	133.80	151.60	254.40	17.80	13.30	63.5	23.0	40.5	36.20
	H	14.80	126.90	147.50	228.60	20.60	16.20	106.6	56.5	50.1	53.00
1985	H:S[a]	1.10	0.95	0.99	0.92	1.48	1.54	1.7	2.6	1.3	1.47
1986	H:S	1.05	0.95	0.97	0.90	1.15	1.21	1.7	2.5	1.2	1.46

[1] as in Table 1; [2] as in Table 2.
[a] H:S = Ratio between hard-to-cook and soft-to-cook seeds.

composition. Although seed coat constitutes about 14% of the seed it is still responsible for about 50% of its texture when cooked as a whole bean.

References

Bourne, M.C. 1967. Size, density, and hard shell in dry bean. Food Technology 21: 335-338.

Halstead, R.L. and Gfeller, F. 1964. The cooking quality of field peas. Canadian Journal of Plant Science 44: 221-228.

Jackson, G.M. and Varriano-Marston, E. 1981. Hard-to-cook phenomenon in beans:Effects of accelerated storage on water absorption and cooking time. Journal of Food Science 46: 799-803.

Mattson, S., Akerberg, E., Erikson, E., Koutler-Anderson, E. and Vahtras, K. 1950. Factors determining the composition and cookability of peas. Acta Agriculturae Scandinavica 1: 40-61.

Morris, H.J., Olson, R.L. and Bean, R.C. 1950. Processing quality of varieties and strains of dry beans. Food Technology 4: 247-251.

Muller, F.M. 1967. Cooking quality of pulses. Journal of the Science of Food and Agriculture 18: 292-295.

Sefa-Dedeh, S., Stanley, D.W. and Voisey, P.W. 1979. Effect of storage time and conditions on the hard to cook defect in cowpeas (*Vigna unguiculata*). Journal of Food Science 44: 790-796.

Shehata, A.M. El-Tabey, Abu-Bakr, T.M., and El-Shimi, N.M. 1983. Phytate, phosphorus and calcium contents of mature seeds of *Vicia faba* L., and their relation to texture of pressure-cooked faba beans. Journal of Food Processing and Preservation 7: 185-192.

Shehata, A.M. El-Tabey, El-Ruby, M.M. and Messalam, A.S. 1985. Relationship between properties of dry and cooked faba beans (*Vicia faba* L.). Journal of Food Quality 7: 209-218.

Shehata, A.M. El-Tabey, El-Sheemy, H., Khalil, M.M., Mesallam, A.S. and El-Rouby, M. 1987. Relationship between environmental variables including soil physico-chemical properties and the cooking properties of faba beans. Alexandria Journal of Agricultural Research (In press).

Wassimi, N., Abu-Shakra, S., Tannous, R. and Hallab, A.H. 1978. Effect of mineral nutrition on cooking quality of lentils. Canadian Journal of Plant Science 58: 165-168.

تاثير غلاف البذرة والفلقتين على بنية أو قوام الفول المطبوخ (المدمس)

ملخص

جرت دراسة تأثير غلاف البذرة على قدرة اماهة أو تميه البذور الجافة hydration وعلى اماهة وقوام البذور المطبوخة لست عينات من بذور الفول المحصودة حديثا (ثلاث صعبة الطهو (H) وثلاث سهلة الطهو (S)) . وكان لغلاف البذرة تاثير طفيف على قدرة تميه البذور الجافة (من 7 الى14 %للعينات S ومن 11 الى17% للعينات H) . وفي العينات السهلة الطهو (S) وبالرغم من أن غلاف البذرة كان يشكل فقط 13 - 14 % من وزن البذور فقد انعكس بنسبة 64-65 % من قوام البذور المطبوخة مما يدل على أهمية طبيعته الكيميائية اكثر مما يدل على نفاذيته. وكان للفلقة تأثير مماثل تقريبا لتاثير غلاف البذرة على قوام العينات الصعبة الطهو .

Effect of Wilt and Root Rot Disease Complex on Some Quality Parameters of Faba Bean (Ful Masri) Seeds

E.M.A. Saeed[1], S.O. Freigoun[1], M.E. Omer[2] and S.B. Hanounik[3]

1. University of Gezira, P.O. Box 20, Wad Medani, SUDAN.

2. ARC, P.O. Box 31, Wad Medani, SUDAN.

3. ICARDA, P.O. Box 5466, Aleppo, SYRIA.

Abstract

In addition to its effect on the productivity of the crop, the wilt and root rot disease complex adversely affected the quality parameters investigated. Seeds collected from diseased plants were found to be lighter and smaller than those collected from healthy plants. They were also shriveled and contained higher percentages of hard seeds. The protein content and digestible protein were significantly reduced by the disease. Seeds from healthy plants, required significantly longer cooking time and contained higher amounts of fiber than the ones from diseased plants. The adverse effects on seed quality were more pronounced with higher disease incidence.

Introduction

In the Sudan, faba bean (*Vicia faba* L.) is mainly grown for human consumption. In the traditional areas of production (Northern region) about 17,000 ha is allotted for faba bean production Babiker (1981). Because of the increasing demand for the crop and the scarcity of land along the Nile, efforts are now being directed to expand faba bean cultivation south of Khartoum, namely in the Gezira and Rahad schemes.

The productivity of the crop is known to be adversely affected by a number of factors among which the wilt and root rot disease complex is important. The disease was found to affect nearly all grain yield attributes. Therefore, the aim of the present study was to investigate the effects of the disease complex on the seed quality of faba bean.

Materials and Methods

Seeds were collected from a field trial conducted for two consecutive seasons (1985/86 and 1986/87) at the University of Gezira Farm (UGF). The trial was designed to study the effects of sowing date and watering interval on the incidence of wilt and root rot disease complex on faba bean. At the time of harvest, plants were separated into three categories: healthy plants (plants with no disease symptoms), moderately infected plants (plants with disease symptoms but otherwise normal), and severely infected plants (plants that died after seed filling but before harvest). Seeds of the three plant categories were separately collected, mixed thoroughly and then subjected to different quality tests. All the tests in this experiment were replicated 10 times.

Determination of seed size

From each category, 1000 seeds were randomly selected, counted, and weighed.

Determination of hard seed percentage

Hundred seeds of each category were randomly collected, soaked in 100 ml distilled water for 24 h for calculating the hard seed percentage.

Determination of cooking time

A sample of 25 g of air-dry seeds was boiled to softness under reflux in tap water (99.5°C). Labconco model 30001 crude fiber digestion apparatus was used for reflux in 600 ml Berzelius beakers. After 20 min, a sample of five seeds was removed from the beaker and pressed by fingers to determine their softness, this was repeated every 2 min until 90% of the seeds became soft.

Determination of protein content

A seed sample of 20 g representing each category was ground in a U-D Cyclone sample mill (U-D Corporation, Fort Collins, Co.) fitted with 1.0 mm screen. Protein was determined with a Neotic (model FQA51A) analyzer (Pacific Scientific Inc.). Percentage protein, on dry weight basis, was determined. This was further verified by analyzing one sample (0.5 g) from each category using macro-kjeldhal procedure, and by accordingly adjusting the readings.

Determination of digestibility and neutral detergent fiber (NDF)

Both traits were determined according to the methods described by Williams *et al.* (1986).

Results

Seed weight

The 1000-seed weight was significantly affected by the disease complex. Seed size and weight were greater in seeds collected from healthy plants (Fig. 1a) than those from moderately or severely infected plants (Fig. 1b and c). These differences were more pronounced in the second season (Tables 1 and 2).

Hard seed percentage

In both seasons, the hard seed percentage varied among the three plant categories. However, in the 1986/87 season moderately and severely infected plants contained a significantly higher number of hard seeds than those of the healthy plants (Table 2).

Cooking time

Cooking time differed significantly among the three seed categories; seeds collected from healthy plants required longer cooking time than the other two categories. The results for the two seasons were similar and repeated sampling consistently gave the same results.

Protein content and digestibility

Percentages of crude and digestible protein were adversely affected by the disease and hence were highest in seeds from healthy plants (Tables 1 and 2).

Neutral detergent fiber

This trait (percent of fiber in the cell wall of seeds) was found to vary significantly ($P < 0.05$) only in the second season (Table 2). Seeds of healthy and moderately infected plants contained significantly higher amounts of fiber in their cell wall than those collected from the severely infected faba bean plants.

Discussion

The results of this investigation revealed that wilt and root rot disease complex greatly affected the

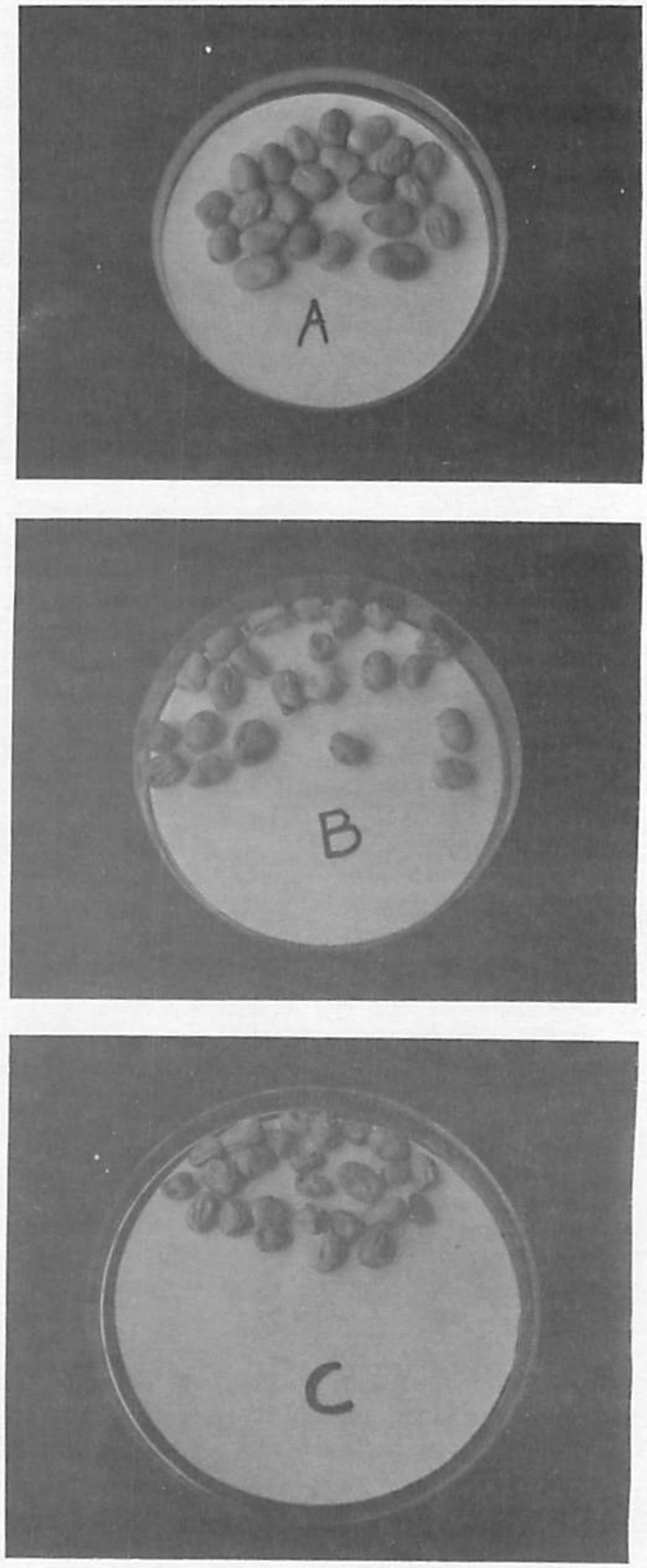

Fig. 1. Seeds collected from faba bean healthy plants (A), moderately infected plants (B), and severely infected plants (C).

Table 1. Effect of wilt and root rot disease complex on faba bean seed quality parameters during the 1985/86 season.[a]

Seed[b] category	1000-seed weight (g)	Hard seed (%)	Cooking time (min)	Crude protein (%)	Digestibility (%)	Neutral detergent fiber (%)
1	345.0a	2.85a	161.14a	27.42a	48.71a	54.11a
2	289.0b	5.14a	147.90b	27.34a	47.82a	53.09a
3	286.0b	4.28a	135.00c	26.00b	46.26a	52.20a

a Means followed by different letter(s) within each column are significantly different ($P < 0.05$).

b 1, 2, 3, indicate seeds collected from healthy plants, moderately, and severely infected plants, respectively.

Table 2. Effect of wilt and root rot disease complex on some faba bean seed quality parameters during the 1986/87 season.[a]

Seed[b] category	1000-seed weight (g)	Hard seed (%)	Cooking time (min)	Crude protein (%)	Digestibility (%)	Neutral detergent fiber (%)
1	331.4a	16.1c	161.4a	25.86a	49.60a	54.8a
2	304.6b	27.7a	149.0b	25.10b	49.49a	53.8a
3	279.0c	27.3b	137.2c	24.10c	48.52b	53.3b

a Means followed by different letter(s) within each column are significantly different ($P < 0.05$).

b 1, 2, 3, indicate seeds collected from healthy plants, moderately, and severely infected plants, respectively.

quality parameters under study. The seed size and weight were significantly reduced with increased disease severity. This could be attributed to the adverse effect of the disease on the uptake of both nutrients and water and on the photosynthetic process. This is in full agreement with the findings of Freigoun (1980), El-Zarari *et al.* (1980), and Hussein (1983). Although seed size is a highly heritable character in lentil and to a lesser extent in chickpea, it was found to be affected by other factors in faba bean e.g., the seed position in the pod. Furthermore, seed size was found to be affected to a greater extent by location and environmental conditions (Williams *et al.* 1986). In the Sudan, large-seeded types of faba bean are generally preferred by consumers hence they fetch higher prices than the small seeded types. Therefore, the adverse effect of the disease complex on seed size and weight is of economic significance.

Our results also revealed that seeds from diseased plants do not imbibe water as readily as those from healthy plants. This was reflected in the higher incidence of hard seeds among seeds collected from diseased plants. The occurrence of hard seed in faba bean is an undesirable trait, because it reduces both cooking quality and seed germinability. The hard seed quality is attributed to the impermeability of the seed coat or to the physical resistance of embryo expansion (Salih 1982). In addition to the genetic make-up of faba bean varieties, a number of other factors have been found to affect the level of hard seed incidence, including husbandry practices such as sowing date, plant population, fertilizers, watering regimes, and time of harvest (Salih 1982). However, most of these factors were also found to affect the disease complex. High temperature and water stress are the most important predisposing factors for both the disease and hard seed occurrences. Shortening of the growing season, which could sometimes be a result of a severe infection, has also been found to increase the amount of hard seeds in the cultivar Hudeiba 72 (Salih, 1982).

The longer cooking time observed in seeds collected from healthy plants could be attributed to their larger seed size and heavier seed weight. In legumes, correlation studies between seed size and cooking time have shown that the larger the seed size the longer it takes to cook, both within and between species (Erskine *et al.* 1985; Williams *et al.* 1986). However, cooking time of air-dry seeds is nowadays greatly reduced by the common practice of over-night soaking of faba bean seeds.

An important outcome of the present study is the knowledge obtained about the adverse effect of the disease on the nutritional value of the crop. The results have shown that both the crude and digestible proteins were significantly reduced in seeds collected from diseased plants. This is in agreement with Freigoun (1976). Because faba bean is an important dish in the Sudanese diet, efforts should be directed to maintain or improve the protein content of this crop. This could be achieved through improving cultural practices, controlling the disease, and selecting genotypes with high protein content.

The reduction in protein digestibility of seeds collected from diseased plants could be because of the increased concentrations of trypsin inhibitors, tannins, or formation of lignified proteins. This needs to be verified by further investigations.

The effect of the disease on the percentage of neutral detergent fiber was negligible. However, faba bean seeds have a high level of crude fiber which detracts from its use as animal feed. The fiber is mainly concentrated in the seed coat, which contains 89% of the seed crude fiber (Cerning *et al.* 1975).

Differences observed in some quality parameters in the two seasons could be caused by the higher disease incidence which occurred in the second season.

Acknowledgements

The authors are grateful to IFAD/ICARDA Nile Valley Project and University of Gezira for providing the opportunity to carry out this work. The help of the FLIP Leader Dr. M.C. Saxena and other ICARDA staff is greatly appreciated. Thanks are also due to Prof. O.H. Giha for reading the manuscript, Prof. M. Girgis of the ARC for helping in the statistical analysis, and Miss. A. Meleika for typing the manuscript.

References

Al-Zarari, A.J., Husain, S.S., Trabeth, A.M. and Michail, S.M. 1980. Studies on *Fusarium* wilt of broad bean (*Vicia faba* L.) in Mousl, Iraq. Mesopotamia Journal of Agriculture 15: 189-202.

Babiker, I.A. 1981. The Sudanese national program. Pages 381-387 *in* Faba Bean Improvement: Proceedings of the Faba Bean Conference (Hawtin, G. and Weeb, C., eds.). ICARDA/IFAD Nile Valley Project, 7-11 March 1981, Cairo, Egypt. Martinus Nijhoff Publishers, The Hague, The Netherlands.

Cerning, J., Saposnick, A. and Guilbot, A. 1975. Carbohydrate composition of horse beans (*Vicia faba*) of different origins. Cereal Chemistry 52: 125-138.

Erskine, W., Williams, C.P. and Nakkoul, H. 1985. Genetic and environmental variation in the seed size, protein, yield and cooking quality of lentils. Field Crops Research 12: 153-161.

Freigoun, S.O. 1976. Effect of sowing date on the incidence of wilt and root rot diseases of broad beans. Hudeiba Annual Report 1976-77.

Freigoun, S.O. 1980. Effect of sowing date and watering interval on the incidence of wilt and root rot diseases in faba bean. FABIS Newsletter 2: 41.

Hussein, M.M. 1983. Root rot/wilt complex, powdery mildew and mosaic disease of faba beans and their control. Pages 119-127 *in* Proceedings of the International Workshop on Faba Beans, Kabuli Chickpeas and Lentils in the 1980s (Saxena, M.C. and Varma, S., eds.). ICARDA, 16-20 May 1983, Aleppo, Syria.

Salih, A.F. 1982. Hard seeds in faba bean. Pages 363-371 *in* Faba Bean Improvement: Proceedings of the Faba Bean Conference (Hawtin, G. and Webb, C., eds.). ICARDA/IFAD Nile Valley Project, 7-11 March 1981, Cairo, Egypt. Martinus Nijhoff Publishers, The Hague, The Netherlands.

Williams, P., El-Haramein, J.F.; Nakkoul, H. and Rihawi, S. 1986. Crop quality evaluation methods and guidelines. ICARDA. Technical Manual 14. 142 pp.

تأثير مركب مرض الذبول وتعفن الجذور
على بعض معايير الجودة لبذور الفول (الفول المصرى)

ملخص

بالاضافة الى تأثيره على انتاجية المحصول ، فان مركب مرض الذبول وتعفن الجذور قد أثر بشكل سيء أيضا على معايير الجودة المدروسة في هذا البحث ، فقد وجد أن البذور المجموعة من نباتات مصابة بالمرض كانت أخف وزنا واصغر حجما من البذور المأخوذة من نباتات سليمة ، كما أنها كانت مجعدة shriveled وتحتوى على نسب مئوية أعلى من البذور القاسية hard seed . وقد انخفض المحتوى البروتيني والبروتين القابل للهضم بشكل كبير نتيجة الاصابة بالمرض . وقد تطلبت البذور المأخوذة من نباتات سليمة فترة طهي أطول معنويا وكانت تحتوى على كميات من الالياف أعلى من البذور المأخوذة من نباتات مصابة . ان التأثيرات السلبية على جودة البذور كانت اكثر وضوحا عند اشتداد الاصابة بالمرض .

Contributors' Style Guide

Policy

The aim of FABIS Newsletter is to publish quickly the results of recent research on faba beans. Articles should normally be brief, confined to a single subject, good quality, and of primary interest to research, extension, and production workers, and administrators and policy makers.

Style

Articles should have an abstract (maximum 250 words) and whenever possible the following sections:introduction, materials and methods, and results and discussion. Authors should refer to recent issues of FABIS for guidance on format. Articles will be edited to maintain uniform style but substantial editing will be referred to the author for his/her approval; occasionally, papers may be returned for revision.

Disclaimers

The views expressed and the results presented in the newsletter are those of the author(s) and not the responsibility of ICARDA. Similarly, the use of trade names does not constitute endorsement of or discrimination against any product by ICARDA.

Manuscript

Articles should be typed double-spaced on one side of the page only. The original and two other legible copies should be submitted. The contributor should include his name and initials, title, program or department, institute, postal address, and telex number if available. Figures should be drawn in India ink; send original artwork, not photocopies. Define in footnotes or legends any unusual abbreviations or symbols used in a figure or table. Good quality black and white photographs are acceptable for publication. Photographs and figures should preferably be 8.5 cm or 17.4 cm wide.

Units of measurement are to be in the metric system; e.g. t/ha, kg, g, m, km, ml (=milliliter), m^2.

The numbers one to nine should be written as words except in combination with units of measure; all other numbers should be written as numerals; e.g., nine plants, 10 leaves, 9 g, ninth, 10th, 0700 hr.

Examples of common expressions and abbreviations

3 g; 18 mm; 300 m^2; 4 Mar 1983; 27%; 50 five-day old plants; 1.6 million; 23 ug; 5°C; 1980/81 season; 1980-82 seasons; Fig.; No.; FAO;USA. Fertilizers: 1 kg N or P_2O_5 or K_2O/ha.
Mon, Tues, Wed, Thurs, Fri, Sat, Sun; Jan, Feb, Mar, Apr, May, June, July, Aug, Sept, Oct, Nov, Dec. Versus = vs, least significant difference = LSD, standard error = SE +, coefficient(s) of variation = CV(s). Probability: Use asterisks to denote probability * = P<0.05; ** = P<0.01; *** = P<0.001.

Botanical: Include the authority name at the first mention of scientific names. Cultivar(s) = cv(s), variety = var(s), species = sp./spp., subspecies = subsp., subgenus = subg., forma = f., forma specialis = f. sp.

References

Journal articles: Khalil, S. A. and Harrison, J.G. 1981. Methods of evaluating faba bean materials for chocolate spot. FABIS No. 3: 51-52.

Books: Witcombe, J. R. and Erskine, W. (eds.). 1984. Genetic resources and their exploitation-chickpea, faba beans, and lentils. Advances in Agricultural Biotechnology. Martinus Nijhoff/Dr. W. Junk Publishers, The Hague, The Netherlands, 256 pp..s 1:*Articles from books*: Hawtin, G. C. and Hebblethwaite, P. D. 1983. Background and history of faba bean production. Pages 3-22 *in* The Faba Bean (*Vicia faba* L.) (Hebblethwaite, P.D., ed.). Butterworths, London, England.

Papers in Proceedings: Hawtin, G. C. 1982. The genetic improvement of faba bean. Pages 15-32 *in* Faba Bean Improvement: Proceedings of the Faba Bean Conference (Hawtin, G. and Webb, C., eds.), ICARDA/IFAD Nile Valley Project, 7-11 Mar 1981, Cairo, Egypt.

Submission of articles

Contributions should be sent to FABIS, ICARDA, P.O. Box 5466, Aleppo, Syria.

NEWS
أخبار

Announcements
إعلانات

Faba Bean in the United Kingdom

Two new varieties were recently added to the NIAB Recommended List for 1988. These were the winter bean Punch from the NSDO and the spring bean Gobo from VEB in Germany (GDR).

Punch offers the possibility of improved winter bean yields and has performed particularly well in Eastern England. Gobo shows a significant advance in yield over existing varieties and reflects the continued progress being made with this crop.

There is currently much UK interest in the faba bean crop because of its potential for inclusion as a high protein component of animal feeds. This interest is reflected in the breeding effort, and there are many interesting varieties, especially of spring faba beans, under trial. Notable amongst these are white flowered (low tannin) and determinate types which may offer wider usage and a better plant model for the faba crop.

The UK National List for 1988 with the key to full names and addresses of breeders and agents are given below:

UK National List as at February 1988

Variety	Breeder	UK Agent	NIAB recommended list status
Winter Beans			
Banner	PBI, Cambridge[12]	PBI, Cambridge[13]	Recommended for general use
Bourdon	PBI, Cambridge[12]	PBI, Cambridge[13]	Recommended for general use
Bulldog	PBI, Cambridge[12]	PBI, Cambridge[13]	Recommended for general use
Punch	PBI, Cambridge[12]	PBI, Cambridge[13]	Provisional recommendation
Quasar	PBI, Cambridge[12]	PBI, Cambridge[13]	-
Spring Beans			
Albatross	Lembke, FRG[10]	Twyford, Oxon[18]	-
Alfred	Cebeco, Ne[2]	NRPB, Lincs[11]	Recommended for general use
Blaze	PBI, Cambridge[12]	PBI, Cambridge[13]	-
Cargo	DPF, Den[6]	DPB, Glos[5]	-
Corton	Semundo, Wilts[16]	Semundo, Cambridge[17]	Provisional recommendation
Danas	IGAP/WPBS, Aberystwyth[9]	PBI, Cambridge[13]	-
Exelle	SAP, Bel[15]	ICI Seeds UK[8]	-
Gobo	VEB, GDR[19]	Booker Essex[1]	Provisional recommendation
Maris Bead	PBI, Cambridge[12]	PBI, Cambridge[13]	Recommended for special use
Minden	von Lochow-Petkus, FRG[20]	NRPB, Lincs[11]	Recommended for special use
Nabor	Pf. Oberlimpurg, FRG[14]	HAM, Herts[7]	Recommended for general use
Panther	PBI, Cambridge[12]	PBI, Cambridge[13]	-
Puma	PBI, Cambridge[12]	PBI, Cambridge[13]	-
Stella Spring	Clough, Suffolk[3]	Clough, Suffolk[3]	Becoming outclassed
Tiger	PBI, Cambridge[12]	PBI, Cambridge[13]	Becoming outclassed
Troy	Lembke, FRG[10]	Twyford, Oxon[18]	Recommended for general use
Victor	Cebeco, Ne[2]	Chaldean, Herts[4]	-

Breeders and Agents-Key to full names and addresses

1. Booker Seed Ltd., Crop Research and Development Unit, Great Domsey Farm, Feering, Colchester, Essex, CO5 9ES, UK.
2. Cebeco-Handelsraad, 31 Blaak, P.O. Box 182, *3000AD* Rotterdam, The Netherlands.
3. Roger Clough & Son, Letheringham Lodge, Letheringham, Woodbridge, Suffolk, IP13 ONA, UK.
4. Chaldean Ltd., Chaldean Farm, Much Hadham, Herts, SG10 6HU, UK.
5. Danish Plant Breeding, B V Thomas, Didbrook Fields, Toddington, Nr Cheltenham, Glos, UK.
6. Dansk Planteforaedling A/S, Boelshoj, 4660, Store Hedinge, Denmark.
7. Harlow Agricultural Merchants Ltd., Latchmore Bank, Little Hallingbury, Bishops Stortford, Herts, CM22 7PJ, UK.
8. ICI Seeds UK Ltd., Plant Breeding Station, North End Farm, Docking, Kings Lynn, Norfolk, PE31 8LR, UK.
9. Institute for Grassland and Animal Production, Welsh Plant Breeding Station, Plas Gogerddan, Nr Aberystwyth, Dyfed, SY23 3EB, UK.
10. Hans-Georg Lembke KG, Norddeutsche Pflanzenzucht, D-2331 Hohenlieth, Post Holstsee U Eckernforde, Federal Republic of Germany.
11. Nickerson RPB Ltd., Rothwell, Lincoln, LN7 6DT, UK.
12. Plant Breeding International Cambridge Ltd., Maris Lane, Trumpington, Cambridge, CB2 2LQ, UK.
13. Plant Breeding International Cambridge Ltd., Newton Hall, Newton, Cambridge, CB2 5PS, UK.
14. Pflanzenzucht Oberlimpurg, Postfach 590 7170 Schwabisch Hall, Federal Republic of Germany.
15. Station d'Amelioration des Plantes, rue du Bordia 4 5800, Gembloux, Belgium.
16. Semundo Ltd., Godford, Warminster, Wiltshire, BA12 0JX, UK.
17. Semundo Ltd., Unit 55, Clifton Road, Cambridge, CB1 4FR, UK.
18. Twyford Seeds Ltd., Scotts farm, Kings Sutton, Bandury, Oxfordshire, 0X17 3QW, UK.
19. VEB Saat-und Pflanzgut, Moosdorfstrasse 7-9, 1193 Berlin-Treptow, German Democratic Republic.
20. F von Lochow-Petkus GmbH., Postfach 1311, D-3103 Bergen 1, Federal Republic of Germany.

Contributed by Dr. J.E. Ramsbottom
National Institute of Agricultural Botany (NIAB),
United Kingdom

PBI Transfers Faba Bean Breeding To Unilever PLC

Faba bean breeding, along with the breeding of other crops at the Plant Breeding Institute, Cambridge, UK, was transferred on 1 October 1987 to Unilever PLC. The National Seed Development Organisation (NSDO) which marketed State-bred varieties of crops, including faba bean, is now also part of Unilever.

It is expected that faba bean breeding and international collaboration will continue under Unilever, though with more commercially oriented objectives. The temporary name and address of the company is NSDO, Maris Lane, Trumpington, Cambridge, UK.

Contributed by Dr. D.A. Bond, NSDO
(formerly Plant Breeding Institute: PBI)
United Kingdom

New Journal

The publishers have sent us a specimen copy of the first issue of a new quarterly, *Journal of Production Agriculture*. This is a joint venture of the American Society of Agronomy, the Crop Science Society of America, and the Soil Science Society of America.

All the articles in the first issue are from authors working at US institutions, and it is probably fair to see this as a national, rather than an international journal. Authors in developing countries would have problems in paying the page charges ($ 40/page for the first four pages, $ 150/page thereafter), although the subscription for purchasers outside the US ($ 33/year) is relatively modest when compared with that many of the commercially-published scientific journals.

Major Faba Bean Producing Countries

Area, yield, and production of faba bean (*Vicia faba* L.) in the major faba bean producing countries ranked on 1985 production

Country	Area (1000 ha)					Yield (kg/ha)					Production (1000 MT)				
	1975-77	1979-81	1982-83	1984	1985	1975-77	1979-81	1982-83	1984	1985	1975-77	1979-81	1982-83	1984	1985
China	3913	2267	1910	1800	1700	1125	1162	1283	1347	1353	4400	2633	2450	2425	2300
Ethiopia	270	328	366	343	350	1200	1453	1344	1312	1429	324	476	495	450	500
Egypt	100	103	122	129	140	2301	2135	2280	2302	2193	230	219	278	297	307
Italy	190	161	150	145	141	1211	1277	1146	1390	1395	230	205	48	202	196
France	21	23	45	71	41	2003	3070	3012	3056	3244	42	70	135	217	133
Morocco	200	165	141	160	160	887	589	863	763	763	179	97	121	122	122
Turkey	30	30	40	42	43	1599	1751	1822	1810	1698	47	53	71	76	73
Spain	106	79	44	59	53	978	992	884	1085	1132	104	78	172	64	60
Tunisia	63	69	62	65	65	884	682	726	846	877	56	47	45	55	57
Germany FR	13	5	6	8	13	2862	3224	3201	3579	4265	36	15	19	27	55
Brazil	191	146	110	135	142	462	278	287	327	317	88	41	32	44	45
Mexico	50	35	33	30	30	809	1771	1362	1333	1333	41	62	45	40	40
Sudan	16	15	16	15	16	1226	2521	1938	2533	2500	19	38	31	38	40
Czechoslovakia	29	39	23	15	14	1718	1641	1629	2037	2080	51	64	36	30	28
Algeria	35	46	47	50	53	874	594	441	500	509	31	27	21	25	27
Peru	10	23	24	24	24	892	911	932	936	936	9	21	22	22	22
Portugal	43	36	30	32	32	659	586	608	619	526	28	21	19	20	17
Canada			17	16	19			792	791	789			14	13	15
German DR	6	6	7	7	6	1735	2271	2278	2363	2126	10	13	15	16	12
Dominican Republic	6	8	11	12	13	943	931	950	950	960	6	8	10	12	12

Source: FAO Production Yearbooks.

Area, yield, and production of faba bean in different geographical regions.

Region	Area (1000 ha)					Yield (kg/ha)					Production (1000 MT)				
	1975-77	1979-81	1982-83	1984	1985	1975-77	1979-81	1982-83	1984	1985	1975-77	1979-81	1982-83	1984	1985
Africa	737	733	760	770	793	1181	1245	1314	1292	1340	869	913	997	996	1062
North Central America	74	63	82	80	84	666	1244	950	929	922	50	79	77	74	77
South America	249	200	162	189	197	571	459	534	544	530	142	92	86	103	105
Asia	3982	2319	1966	1859	1758	1127	1172	1297	1359	1362	4490	2717	2549	2526	2393
Europe	459	354	319	344	307	1361	1751	1421	1727	1700	622	477	454	494	522
World total	5501	3680	3305	3258	3155	1122	1164	1263	1321	1321	6174	4283	4172	4302	4170

Source: FAO Production Yearbooks.

Forthcoming Events

أحداث مرتقبة

The Third International Conference on Food Science and Technology Information

The conference, organized by AGROINFORM and the International Food Information Service (IFIS), will be held in Budapest, 3-5 October 1989. Topics covered by the meeting will include:utilization and deficiencies of databases in food science with special reference to marketing aspects, information systems in food science and technology, and computer control in food production. There will be contributed papers, technical exhibition presenting equipment in information science and food production, and display of books and journals planned for general browsing.

For further information write to:

AGROINFORM
Attila ut 93.
1012 Budapest I.
Hungary

Or

International Food Information Service (IFIS) GmbH.
Herriot str. 5.
6000 Frankfurt am Main 7/,
Federal Republic of Germany

Second International Symposium on Adjuvants for Agrichemicals

This conference will be held 1-3 August 1989 at the campus of Virginia Polytechnic Institute and State University. Topics of special interest are: Modes of action of adjuvants; adjuvants in formulation: adjuvant activity with herbicides, insecticides, fungicides, plant growth regulator, soil conditioners, nutrients, biopesticides, etc.; adjuvant activity and plant physiology, biochemistry, morphology, and cytology; adjuvants and the environment, adjuvants and application technology: regulatory considerations; economics of adjuvant use; future research problems and opportunities; and bibliography of world literature on adjuvants (updated). There will be a series of invited speakers, contributed papers, and possibly a poster session.

For further information write to:

Dr. Chester L. Foy
Department of Plant Pathology, Physiology and Weed Science,
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061-0331, USA

DOCUMENT COLLECTION

With the financial support of the International Development Centre (IDRC), ICARDA is building up its document collection on faba bean. The collection will be used to supply needed documents to scientists in developing countries.

We would be grateful if readers who have any relevant documents would send them to:

FABIS
ICARDA
Box 5466
Aleppo, Syria

ARE YOU MOVING ?

If you are moving, please let us know your new address as soon as possible.

FABIS
ICARDA
Box 5466
Aleppo, Syria

Need More Information ?

للمزيد من المعلومات

Need More Information on ICARDA Publications and Services ?

Free Catalog of ICARDA Publications
Request your list of all currently available publications from the Scientific and Technical Information Program (STIP).

ICARDA Information Brochure
ICARDA's historical background and research objectives are outlined in English and Arabic. For your copy, contact STIP.

LENS (Lentil Newsletter)
This newsletter is produced twice a year at ICARDA. Short research articles are published and comprehensive reviews are invited regularly on specific areas of lentil research. The newsletter also includes book reviews, key abstracts on lentils, and recent lentil references. For further information write LENS.

RACHIS (Barley, and Wheat Newsletter)
This ICARDA service is aimed at cereals researchers in the Near East and North Africa region and Mediterranean-type environments. It publishes up-to-the-minute short scientific papers on the latest research results and news items. RACHIS seeks to contribute to improved barley and durum wheat production in the region: to report results, achievements, and new ideas; and to discuss research problems. For further information, write RACHIS.

Field Guide to Major Insect Pests of Faba Bean in the Nile Valley (English and Arabic)
This pocket field guide for research and extension workers explains how to identify and control the main insect pests of faba bean in Egypt and Sudan. The distribution, description, and biological characteristics are given for each insect, along with the type of injury, assessment of damage, and recommended control measures. A key to injuries is included. Insects and the damage they cause on faba beans are illustrated with 41 color photos. For your copy, write FLIP.

Field Manual of Common Faba Bean Diseases in the Nile Valley (English and Arabic)
This pocket field manual is a tool for field workers to diagnose and control diseases of faba beans in Egypt and Sudan. Symptoms, development, and control of various diseases are discussed, and symptoms are illustrated with 38 color photos. Also included are rating scales for disease resistance in faba bean lines and a glossary of basic phyto-pathological terms. For your copy, write FLIP.

Field Guide to Major Insect Pests of Wheat and Barley (Arabic)
This field guide in Arabic covers fungal, bacterial, viral, and physiological diseases, as well as insects and nematodes, that attack wheat and barley crops in the Middle East and North Africa. Forty-four insects and diseases are discussed and illustrated with 72 color photos. For your copy, write Cereals Improvement Program.

ICARDA's Food Legume Improvement Program
In English and Arabic, the 24-page illustrated information brochure briefly describes research projects on lentil, faba bean, and chickpea treated either as single crops or as a group. For your copy, write FLIP.

Screening Chickpeas for Resistance to Ascochyta Blight A Slide-tape Audio-tutorial Module
This slide-tape audio-tutorial module is the first in the food legume training series. It is designed for the use of legume trainees during the training courses at ICARDA as well as for scientists and their support staff in the various national programs. This module is also useful educational material for universities and training departments in national research systems. For your copy of this publication or package, write Training Department.

Checklist of Journal Articles from ICARDA 1978 - 1987
This checklist, compiled to bring information to the attention of the scientific community, consists of references of articles by ICARDA research scientists submitted to refereed scientific journals as of 1978. Each reference includes within year of publication:

author, primary title, volume number, issue number, pagination, language code of the article and/or summary when necessary, and AGRIS reference number. For your copy write: STIP.

Opportunities for Field Research at ICARDA
This brochure is intended primarily to assist Master of Science candidates, who are enrolled at national universities within ICARDA region and selected for the Graduate Research Training Program. It explains to them the opportunity they have to conduct their thesis research work at ICARDA research sites under the supervision of distinguished international scientists. For your copy, write GRI Program, Training Coordination Unit.

Opportunities for Training and Post-Graduate Research at ICARDA
ICARDA has active training courses on the development and improvement of food legumes, cereals, and forages with ICARDA's research scientists, trained instructors, and proven programs. For a complete brochure of the training opportunities at ICARDA, write Training Department.

TO OBTAIN PUBLICATIONS:
Address requests for publications to the specific department or service cited above, at: ICARDA, P.O. Box 5466, Aleppo, Syria.

If you have any

* faba bean news
* announcements of meetings
* book reviews
* new research interests
* suggestions

Please send them to:

FABIS
ICARDA, Box 5466
Aleppo, SYRIA

اعلان الى العلماء والباحثين العرب الكرام

يسر المركز الدولي للبحوث الزراعية في المناطق الجافة (ايكاردا) ، اعلامكم بان مركز بحوث التنمية الدولية (IDRC) في أوتاوا بكندا ، قد وافق على تقديم دعم مالي لمشروع فابس FABIS مدته ثلاث سنوات اعتبارا من بداية عام 1987 ولغاية 1989 ، علما بان ادراج اللغة العربية ضمن النشرة الاخبارية للفول يشكل أحد أهم أهداف هذا المشروع ٠

وبمزيد من السرور تعلن اسرة تحرير " FABIS " للباحثين العرب العاملين في مجال تحسين محصول الفول أنها تصدر نشرتها العلمية باللغتين العربية والانكليزية ٠ لذا فيرجى من الاخوة العلماء الراغبين في نشر بحوثهم باللغة العربية التفضل بارسالها الى العنوان التالي : نشرة " فابس " ، ايكاردا ــ قسم التوثيق ، ص٠ب٠ 5466 حلب ــ سورية ٠

ملاحظة :

تتم كتابة البحث بلغة عربية واضحة ، وفق الترتيب التالي :

1) الملخص ويكتب باللغتين العربية والانكليزية ٠
2) المقدمة ٠
3) المواد والطرق ٠
4) النتائج ٠
5) المناقشة ويمكن دمجها مع النتائج وتصبح (نتائج البحث والمناقشة) ٠
6) المراجع ٠

الآفات والأمراض

المعاملات الزراعية والمكننة

الفيزيولوجيا والأحياء الدقيقة

التربية والوراثة

فابس

مشروع المعلومات المتخصصة عن الفول

فابس ، نشرة علمية 19 ، كانون الاول 1987

المحتويات

ايكاردا والمجموعة الاستشارية للبحوث الزراعبة الدولية

يتمثل الهدف العام للمركز الدولي للبحوث الزراعية في المناطق الجافة (ايكاردا) في زيادة الانتاجية الزراعية والموارد الغذائية المتاحة في المناطق الريفية والحضرية بهدف تحسين الوضع الاجتماعي والاقتصادي لشعوب البلدان النامية وخاصة في شمال أفريقيا وغرب آسيا . وتركز ايكاردا اهتماماتها بصورة رئيسية على المناطق التي تعتمد في زراعتها على الامطار الشتوية التي تتراوح من 200-600 مم سنويا ، وعندما تستدعي الضرورة ستمتد دائرة بحوثها لتغطي مناطق بيئية مروية او ذات أمطار موسمية .

ويضطلع المركز بمسوءولية عالمية في تحسين الشعير والعدس والفول ، وبمسوءولية اقليمية في تحسين القمح والحمص والنظم الزراعية والثروة الحيوانية والمراعي والمحاصيل العلفية . كما ويعتبر تدريب وتأهيل الباحثين الزراعيين في البلدان النامية ، وتبادل نتائج البحوث معهم أحد أهم الانشطة التي تقوم بها ايكاردا .

وقد ساهمت المجموعة الاستشارية للبحوث الزراعية الدولية (CGIAR) بتأسيس ايكاردا في سوريه عام 1977 كمركز للبحوث لا يتوخى الربح . أما المجموعة الاستشارية للبحوث الزراعيه الدولية فهي هيئة غير رسمية من المتبرعين تضم حكومات ومنظمات ومؤسسات خاصة ، وتدعم البحوث الزراعية في جميع انحاء العالم بهدف تحسين الانتاج الغذائي في البلدان النامية ، وذلك من خلال شبكة مؤلفة من ثلاثة عشر مركزا دوليا للبحوث من بينها ايكاردا . وتغطي أعمال الشبكة بحوثا على أنظمة المحاصيل والثروة الحيوانية التي تسهم في تأمين ثلاثة ارباع الغذاء في البلدان النامية .

فابس

تصدر ايكاردا نشرة " فابس FABIS " العلمية ثلاث مرات في السنة بدعم مالي من مركز بحوث التنمية الدولية (IDRC) في أوتاوا بكندا ، وهي نشرة علمية متخصصة بالفول ، وتعتبر وسيلة اتصال لتبادل نتائج البحوث حول هذا النبات . وتضم النشرة بحوثا مختصرة تهدف الى ايصال المعلومات بسرعة ، اضافة الى بعض المقالات العامة التي تدعو اليها أسرة التحرير بشكل منتظم وتتناول مجالات معينة من بحوث الفول ، كما تضم النشرة بعض الاعلانات . وهذه النشرة تقدم المعلومات حول بحوث الفول دون مقابل من خلال قسائم الاستجواب والتصوير النسخي (الفوتوكوبي) وجمع الوثائق العلمية المتعلقة بالفول .

الاشتراكات

توزع نشرة " فابس " العلمية دون مقابل للباحثين المعنيين بنبات الفول . وللاشتراك فيها يرجى الكتابه الى :

FABIS/Documentation Unit/ICARDA, P.O.Box 5466
Aleppo, Syria

هيئة التنسيق

كندا : الدكتور س. برنييه ، قسم علوم النبات ، جامعة مانيتوبا ، وينبج ، مانيتوبا R3T 2N2
مصر : الدكتور عبد الله نصيب ، معهد المحاصيل الحقلية ، مركز البحوث الزراعية ، الجيزه 12619
اليابان : الدكتور ك . كوجر ، كلية الزراعة ، جامعة كاجاوا 2393 Ikenobe. Miki-tyo. Kagawa-Ken
السودان : الدكتور ف . آ . صالح ، هيئة البحوث الزراعية ، محطة بحوث شمباط ، ص.ب. 30 خرطوم شمال .
سورية : الدكتور م . ساكسينا ، برنامج تحسين البقوليات الغذائية ، ايكاردا ، ص.ب. 5466 ، حلب .
البرازيل : الدكتور هـ. ايدار ، المركز الوطني لبحوث الرز والفاصولياء BR-153. km 4-Gionia/Anapolis
Caixa Postal 179. 74.000-Goiania. Goias
فرنسا : الدكتور ج . بيكارد 4 Rue du 8 Mai. 36. 100 Neuvy-Pailloux.
ايطاليا : البروفسور سي دو باتشه ، معهد البيولوجيا الزراعية ، جامعة توشيا ، فيتربو .
اسبانيا : الدكتور ج.ي. كوبيرو ، المدرسة الفنية العليا للهندسة الزراعية ، قسم الوراثة ، ص.ب. 3048 ، قرطبة .
المملكة المتحدة : الدكتور د . آ . بوند ، معهد تربية النبات ، ماريس لين ، ترومبنيجتون ، كامبرديج .

هيئة التحرير

الدكتور موهان ساكسينا/محرر علمي
الدكتور حبيب ابراهيم/مساعد محرر علمي
السيد نهاد مليحه/محرر
السيدة مليكه عبد العالي مارتيني/مساعدة
الدكتور وليد سراج والسيد خالد الجبيلي/الملخصات العربية

صورة الغلاف : سلالة منتجة من الفول ذات نمو [redacted] محدود .

فابِس

نشـرة علميـة متخصصة بالفول

العدد 19 كانون الاول/ديسمبر 1987

المركز الدولي للبحوث الزراعية في المناطق الجافة
ايكاردا
ص. ب. 5466 ، حلب ، سورية